

Ramboll UK Ltd										Page 1																																																																																																																																																																																																																																							
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<u>STORM SEWER DESIGN by the Modified Rational Method</u> <u>Design Criteria for Storm</u> Pipe Sizes STANDARD Manhole Sizes STANDARD FSR Rainfall Model - England and Wales <table><tr><td>Return Period (years)</td><td>100</td><td>PIMP (%)</td><td>100</td></tr><tr><td>M5-60 (mm)</td><td>19.000</td><td>Add Flow / Climate Change (%)</td><td>0</td></tr><tr><td>Ratio R</td><td>0.350</td><td>Minimum Backdrop Height (m)</td><td>0.200</td></tr><tr><td>Maximum Rainfall (mm/hr)</td><td>50</td><td>Maximum Backdrop Height (m)</td><td>1.500</td></tr><tr><td>Maximum Time of Concentration (mins)</td><td>30</td><td>Min Design Depth for Optimisation (m)</td><td>0.900</td></tr><tr><td>Foul Sewage (l/s/ha)</td><td>0.000</td><td>Min Vel for Auto Design only (m/s)</td><td>0.75</td></tr><tr><td>Volumetric Runoff Coeff.</td><td>0.750</td><td>Min Slope for Optimisation (1:X)</td><td>500</td></tr></table> Designed with Level Soffits												Return Period (years)	100	PIMP (%)	100	M5-60 (mm)	19.000	Add Flow / Climate Change (%)	0	Ratio R	0.350	Minimum Backdrop Height (m)	0.200	Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500	Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	0.900	Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	0.75	Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500																																																																																																																																																																																																										
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5.000	20.768	0.104	200.0	0.264	4.00	0.0	0.600	o	300	Pipe/Conduit		
3.003	6.803	0.018	377.9	0.060	0.00	0.0	0.600	o	375	Pipe/Conduit		
3.004	38.901	0.097	401.0	0.039	0.00	0.0	0.600	o	375	Pipe/Conduit		
3.005	22.474	0.056	401.3	0.093	0.00	0.0	0.600	o	450	Pipe/Conduit		
3.006	59.845	0.168	356.2	0.231	0.00	0.0	0.600	o	450	Pipe/Conduit		
6.000	19.718	0.049	400.0	0.347	4.00	0.0	0.600	o	300	Pipe/Conduit		
6.001	15.000	0.194	77.5	0.068	0.00	0.0	0.600	o	300	Pipe/Conduit		
3.007	32.943	0.110	300.0	0.130	0.00	0.0	0.600	o	525	Pipe/Conduit		
7.000	21.769	0.073	298.2	0.343	4.00	0.0	0.600	o	300	Pipe/Conduit		
3.008	7.983	0.027	300.0	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit		
1.004	57.458	0.115	499.6	0.100	0.00	0.0	0.600	o	825	Pipe/Conduit		
1.005	7.519	0.080	94.0	0.000	0.00	0.0	0.600	o	825	Pipe/Conduit		
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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)		
5.000	50.00	4.31	1.600	0.264	0.0	0.0	0.0	1.11	78.3	35.7		
3.003	50.00	4.93	1.421	0.665	0.0	0.0	0.0	0.93	102.3	90.0		
3.004	50.00	5.65	1.403	0.704	0.0	0.0	0.0	0.90	99.2	95.3		
3.005	50.00	6.02	1.231	0.797	0.0	0.0	0.0	1.01	160.4	107.9		
3.006	50.00	6.95	1.175	1.028	0.0	0.0	0.0	1.07	170.4	139.2		
6.000	50.00	4.42	1.400	0.347	0.0	0.0	0.0	0.78	55.1	47.0		
6.001	50.00	4.56	1.351	0.415	0.0	0.0	0.0	1.79	126.4	56.2		
3.007	50.00	7.38	0.932	1.573	0.0	0.0	0.0	1.29	278.8	213.0		
7.000	50.00	4.40	1.200	0.343	0.0	0.0	0.0	0.91	64.0	46.4		
3.008	50.00	7.48	0.822	1.916	0.0	0.0	0.0	1.29	278.8	259.5		
1.004	50.00	8.21	0.395	2.462	0.0	0.0	0.0	1.32	706.4	333.4		
1.005	50.00	8.25	0.280	2.462	0.0	0.0	0.0	3.06	1637.4	333.4		
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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
SWMH1 (EX)	3.600	1.305	Open Manhole	1200	1.000	2.295	225				
SWMH7 (EX)	3.450	1.125	Open Manhole	1200	2.000	2.325	150				
SWMH2 (EX)	2.870	2.177	Open Manhole	1800	1.001	0.693	825	1.000	0.693	225	
								2.000	1.896	150	525
SWMH3 (EX)	2.675	2.018	Open Manhole	1800	1.002	0.657	825	1.001	0.657	825	
SWMH4 (EX)	2.730	2.155	Open Manhole	1800	1.003	0.575	825	1.002	0.575	825	
SWMH08	3.100	1.200	Open Manhole	1200	3.000	1.900	300				
SWMH09	3.000	1.271	Open Manhole	1200	3.001	1.729	300	3.000	1.729	300	
SWMH10	2.900	1.251	Open Manhole	1200	3.002	1.649	300	3.001	1.649	300	
SWMH17	3.100	1.200	Open Manhole	1200	4.000	1.900	300				
SWMH18	2.800	1.200	Open Manhole	1200	5.000	1.600	300				
SWMH11	2.900	1.479	Open Manhole	1500	3.003	1.421	375	3.002	1.496	300	
								4.000	1.730	300	230
								5.000	1.496	300	
SWMH12	2.900	1.497	Open Manhole	1500	3.004	1.403	375	3.003	1.403	375	
SWMH13	2.900	1.669	Open Manhole	1500	3.005	1.231	450	3.004	1.306	375	
SWMH14	2.850	1.675	Open Manhole	1500	3.006	1.175	450	3.005	1.175	450	
SWMH20	2.600	1.200	Open Manhole	1200	6.000	1.400	300				
SWMH21	2.600	1.249	Open Manhole	1200	6.001	1.351	300	6.000	1.351	300	
SWMH15	2.600	1.668	Open Manhole	1500	3.007	0.932	525	3.006	1.007	450	
								6.001	1.157	300	
SWMH23	2.400	1.200	Open Manhole	1200	7.000	1.200	300				
SWMH16	2.500	1.678	Open Manhole	1500	3.008	0.822	525	3.007	0.822	525	
								7.000	1.127	300	800
SWMH5 (EX)	2.350	1.955	Open Manhole	1800	1.004	0.395	825	1.003	0.395	825	
								3.008	0.796	525	1000
SWMH6 (EX)	2.500	2.220	Open Manhole	1800	1.005	0.280	825	1.004	0.280	825	
	2.400	2.200	Open Manhole	0		OUTFALL		1.005	0.200	825	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SWMH1 (EX)	-178195.900	534810.749	-178195.900	534810.749	Required	
SWMH7 (EX)	-178117.450	534738.169	-178117.450	534738.169	Required	

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Micro Drainage			Network 2019.1			
<u>Manhole Schedules for Storm</u>						
MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SWMH2 (EX)	-178119.533	534777.541	-178119.533	534777.541	Required	
SWMH3 (EX)	-178101.103	534782.604	-178101.103	534782.604	Required	
SWMH4 (EX)	-178069.500	534813.272	-178069.500	534813.272	Required	
SWMH08	-178177.706	534831.390	-178177.706	534831.390	Required	
SWMH09	-178153.448	534855.487	-178153.448	534855.487	Required	
SWMH10	-178138.369	534860.565	-178138.369	534860.565	Required	
SWMH17	-178157.068	534831.597	-178157.068	534831.597	Required	
SWMH18	-178118.685	534870.769	-178118.685	534870.769	Required	
SWMH11	-178132.962	534855.686	-178132.962	534855.686	Required	
SWMH12	-178127.929	534851.108	-178127.929	534851.108	Required	
SWMH13	-178099.154	534824.930	-178099.154	534824.930	Required	
SWMH14	-178077.916	534817.577	-178077.916	534817.577	Required	
SWMH20	-178060.545	534883.949	-178060.545	534883.949	Required	
SWMH21	-178046.340	534870.274	-178046.340	534870.274	Required	
SWMH15	-178035.555	534859.849	-178035.555	534859.849	Required	
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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SWMH23	-177997.885	534899.486	-177997.885	534899.486	Required	
SWMH16	-178012.211	534883.095	-178012.211	534883.095	Required	
SWMH5 (EX)	-178006.450	534877.568	-178006.450	534877.568	Required	
SWMH6 (EX)	-177967.008	534919.349	-177967.008	534919.349	Required	
	-177968.003	534926.802			No Entry	

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D, L (mm)	W (mm)
---------------------	--------------	--------------	--------------	------------------	-----------	--------

1.005 2.400 0.200 0.200 0 0

Datum (m) 0.000 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
45	0.050	540	0.600	1035	1.150	1530	1.700	2025	1.820	2520	1.820
90	0.100	585	0.650	1080	1.200	1575	1.750	2070	1.820	2565	1.820
135	0.150	630	0.700	1125	1.250	1620	1.800	2115	1.820	2610	1.820
180	0.200	675	0.750	1170	1.300	1665	1.820	2160	1.820	2655	1.820
225	0.250	720	0.800	1215	1.350	1710	1.820	2205	1.820	2700	1.820
270	0.300	765	0.850	1260	1.400	1755	1.820	2250	1.820	2745	1.820
315	0.350	810	0.900	1305	1.450	1800	1.820	2295	1.820	2790	1.820
360	0.400	855	0.950	1350	1.500	1845	1.820	2340	1.820	2835	1.820
405	0.450	900	1.000	1395	1.550	1890	1.820	2385	1.820	2880	1.820
450	0.500	945	1.050	1440	1.600	1935	1.820	2430	1.820		
495	0.550	990	1.100	1485	1.650	1980	1.820	2475	1.820		

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Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	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 Storage Structures	4
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	2	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	30
Ratio R	0.350		

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Online Controls for Storm

Orifice Manhole: SWMH11, DS/PN: 3.003, Volume (m³): 6.7

Diameter (m) 0.075 Discharge Coefficient 0.600 Invert Level (m) 1.421

Hydro-Brake® Optimum Manhole: SWMH6(EX), DS/PN: 1.005, Volume (m³): 35.4

Unit Reference	MD-SHE-0121-8800-2100-8800
Design Head (m)	2.100
Design Flow (l/s)	8.8
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	121
Invert Level (m)	0.280
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.100	8.8
Flush-Flo™	0.528	8.1
Kick-Flo®	1.081	6.4
Mean Flow over Head Range	-	7.3

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)
0.100	4.3	1.200	6.8	3.000	10.4	7.000	15.6
0.200	7.0	1.400	7.3	3.500	11.2	7.500	16.1
0.300	7.7	1.600	7.7	4.000	11.9	8.000	16.6
0.400	8.0	1.800	8.2	4.500	12.6	8.500	17.1
0.500	8.1	2.000	8.6	5.000	13.3	9.000	17.6
0.600	8.1	2.200	9.0	5.500	13.9	9.500	18.0
0.800	7.8	2.400	9.4	6.000	14.5		
1.000	7.0	2.600	9.7	6.500	15.0		

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Storage Structures for Storm Cellular Storage Manhole: SWMH11, DS/PN: 3.003 Invert Level (m) 1.421 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.30 Infiltration Coefficient Side (m/hr) 0.00000 <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>3540.0</td><td>0.0</td><td>1.300</td><td>0.0</td><td>0.0</td></tr><tr><td>0.100</td><td>3540.0</td><td>0.0</td><td>1.400</td><td>0.0</td><td>0.0</td></tr><tr><td>0.200</td><td>3540.0</td><td>0.0</td><td>1.500</td><td>0.0</td><td>0.0</td></tr><tr><td>0.300</td><td>3540.0</td><td>0.0</td><td>1.600</td><td>0.0</td><td>0.0</td></tr><tr><td>0.400</td><td>3540.0</td><td>0.0</td><td>1.700</td><td>0.0</td><td>0.0</td></tr><tr><td>0.500</td><td>3540.0</td><td>0.0</td><td>1.800</td><td>0.0</td><td>0.0</td></tr><tr><td>0.501</td><td>0.0</td><td>0.0</td><td>1.900</td><td>0.0</td><td>0.0</td></tr><tr><td>0.700</td><td>0.0</td><td>0.0</td><td>2.000</td><td>0.0</td><td>0.0</td></tr><tr><td>0.800</td><td>0.0</td><td>0.0</td><td>2.100</td><td>0.0</td><td>0.0</td></tr><tr><td>0.900</td><td>0.0</td><td>0.0</td><td>2.200</td><td>0.0</td><td>0.0</td></tr><tr><td>1.000</td><td>0.0</td><td>0.0</td><td>2.300</td><td>0.0</td><td>0.0</td></tr><tr><td>1.100</td><td>0.0</td><td>0.0</td><td>2.400</td><td>0.0</td><td>0.0</td></tr><tr><td>1.200</td><td>0.0</td><td>0.0</td><td>2.500</td><td>0.0</td><td>0.0</td></tr></tbody></table> Cellular Storage Manhole: SWMH14, DS/PN: 3.006 Invert Level (m) 1.175 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.30 Infiltration Coefficient Side (m/hr) 0.00000 <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>3642.0</td><td>0.0</td><td>1.300</td><td>0.0</td><td>0.0</td></tr><tr><td>0.100</td><td>3642.0</td><td>0.0</td><td>1.400</td><td>0.0</td><td>0.0</td></tr><tr><td>0.200</td><td>3642.0</td><td>0.0</td><td>1.500</td><td>0.0</td><td>0.0</td></tr><tr><td>0.300</td><td>3642.0</td><td>0.0</td><td>1.600</td><td>0.0</td><td>0.0</td></tr><tr><td>0.400</td><td>3642.0</td><td>0.0</td><td>1.700</td><td>0.0</td><td>0.0</td></tr><tr><td>0.500</td><td>3642.0</td><td>0.0</td><td>1.800</td><td>0.0</td><td>0.0</td></tr><tr><td>0.501</td><td>0.0</td><td>0.0</td><td>1.900</td><td>0.0</td><td>0.0</td></tr><tr><td>0.700</td><td>0.0</td><td>0.0</td><td>2.000</td><td>0.0</td><td>0.0</td></tr><tr><td>0.800</td><td>0.0</td><td>0.0</td><td>2.100</td><td>0.0</td><td>0.0</td></tr><tr><td>0.900</td><td>0.0</td><td>0.0</td><td>2.200</td><td>0.0</td><td>0.0</td></tr><tr><td>1.000</td><td>0.0</td><td>0.0</td><td>2.300</td><td>0.0</td><td>0.0</td></tr><tr><td>1.100</td><td>0.0</td><td>0.0</td><td>2.400</td><td>0.0</td><td>0.0</td></tr><tr><td>1.200</td><td>0.0</td><td>0.0</td><td>2.500</td><td>0.0</td><td>0.0</td></tr></tbody></table> Cellular Storage Manhole: SWMH15, DS/PN: 3.007 Invert Level (m) 0.932 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.30 Infiltration Coefficient Side (m/hr) 0.00000			Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	3540.0	0.0	1.300	0.0	0.0	0.100	3540.0	0.0	1.400	0.0	0.0	0.200	3540.0	0.0	1.500	0.0	0.0	0.300	3540.0	0.0	1.600	0.0	0.0	0.400	3540.0	0.0	1.700	0.0	0.0	0.500	3540.0	0.0	1.800	0.0	0.0	0.501	0.0	0.0	1.900	0.0	0.0	0.700	0.0	0.0	2.000	0.0	0.0	0.800	0.0	0.0	2.100	0.0	0.0	0.900	0.0	0.0	2.200	0.0	0.0	1.000	0.0	0.0	2.300	0.0	0.0	1.100	0.0	0.0	2.400	0.0	0.0	1.200	0.0	0.0	2.500	0.0	0.0	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	3642.0	0.0	1.300	0.0	0.0	0.100	3642.0	0.0	1.400	0.0	0.0	0.200	3642.0	0.0	1.500	0.0	0.0	0.300	3642.0	0.0	1.600	0.0	0.0	0.400	3642.0	0.0	1.700	0.0	0.0	0.500	3642.0	0.0	1.800	0.0	0.0	0.501	0.0	0.0	1.900	0.0	0.0	0.700	0.0	0.0	2.000	0.0	0.0	0.800	0.0	0.0	2.100	0.0	0.0	0.900	0.0	0.0	2.200	0.0	0.0	1.000	0.0	0.0	2.300	0.0	0.0	1.100	0.0	0.0	2.400	0.0	0.0	1.200	0.0	0.0	2.500	0.0	0.0
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Cellular Storage Manhole: SWMH15, DS/PN: 3.007

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	3642.0	0.0	1.300	0.0	0.0
0.100	3642.0	0.0	1.400	0.0	0.0
0.200	3642.0	0.0	1.500	0.0	0.0
0.300	3642.0	0.0	1.600	0.0	0.0
0.400	3642.0	0.0	1.700	0.0	0.0
0.500	3642.0	0.0	1.800	0.0	0.0
0.501	0.0	0.0	1.900	0.0	0.0
0.700	0.0	0.0	2.000	0.0	0.0
0.800	0.0	0.0	2.100	0.0	0.0
0.900	0.0	0.0	2.200	0.0	0.0
1.000	0.0	0.0	2.300	0.0	0.0
1.100	0.0	0.0	2.400	0.0	0.0
1.200	0.0	0.0	2.500	0.0	0.0

Cellular Storage Manhole: SWMH23, DS/PN: 7.000

Invert Level (m) 1.200 Safety Factor 2.0

Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.30

Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	1670.0	0.0	1.300	0.0	0.0
0.100	1670.0	0.0	1.400	0.0	0.0
0.200	1670.0	0.0	1.500	0.0	0.0
0.300	1670.0	0.0	1.600	0.0	0.0
0.400	1670.0	0.0	1.700	0.0	0.0
0.500	1670.0	0.0	1.800	0.0	0.0
0.501	0.0	0.0	1.900	0.0	0.0
0.601	0.0	0.0	2.000	0.0	0.0
0.800	0.0	0.0	2.100	0.0	0.0
0.900	0.0	0.0	2.200	0.0	0.0
1.000	0.0	0.0	2.300	0.0	0.0
1.100	0.0	0.0	2.400	0.0	0.0
1.200	0.0	0.0	2.500	0.0	0.0

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Micro Drainage		Network 2019.1				
<u>1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)</u> <u>for Storm</u>						
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 4				
Number of Online Controls 2		Number of Time/Area Diagrams 0				
Number of Offline Controls 2		Number of Real Time Controls 0				
Synthetic Rainfall Details						
Rainfall Model		FSR Ratio R 0.350				
Region England and Wales Cv (Summer) 0.750						
M5-60 (mm)		19.000 Cv (Winter) 0.840				
Margin for Flood Risk Warning (mm)		150.0				
Analysis Timestep 2.5 Second Increment (Extended)						
DTS Status		ON				
DVD Status		ON				
Inertia Status		OFF				
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, 40, 40				
PN	US/MH Name	Storm	Return Climate First (X) First (Y) First (Z) Period Change Surcharge Flood Overflow			
1.000	SWMH1 (EX)	15 Winter	1 +0%			
2.000	SWMH7 (EX)	15 Winter	1 +0%	30/15 Summer		
1.001	SWMH2 (EX)	1440 Winter	1 +0%	30/1440 Summer		
1.002	SWMH3 (EX)	1440 Winter	1 +0%	30/60 Winter		
1.003	SWMH4 (EX)	1440 Winter	1 +0%	30/960 Summer		
3.000	SWMH08	15 Winter	1 +0%	30/15 Summer		
3.001	SWMH09	15 Winter	1 +0%	30/15 Summer		
3.002	SWMH10	15 Winter	1 +0%	30/15 Summer		
4.000	SWMH17	15 Winter	1 +0%			
5.000	SWMH18	15 Winter	1 +0%	30/15 Summer		
3.003	SWMH11	1440 Winter	1 +0%	100/360 Winter		
3.004	SWMH12	15 Winter	1 +0%	100/1440 Winter		
3.005	SWMH13	15 Winter	1 +0%	100/1440 Winter		
3.006	SWMH14	1440 Winter	1 +0%	100/1440 Summer		
6.000	SWMH20	15 Winter	1 +0%	30/15 Summer		30/15 Summer
6.001	SWMH21	15 Winter	1 +0%	30/15 Summer		
3.007	SWMH15	1440 Winter	1 +0%	30/960 Winter		
7.000	SWMH23	240 Winter	1 +0%	30/1440 Summer		
3.008	SWMH16	1440 Winter	1 +0%	30/60 Winter		
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Micro Drainage				Network 2019.1						
<u>1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)</u> <u>for Storm</u>										
PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SWMH1 (EX)		2.342	-0.178	0.000	0.10		6.8	OK	
2.000	SWMH7 (EX)		2.390	-0.085	0.000	0.39		7.0	OK	
1.001	SWMH2 (EX)		1.246	-0.272	0.000	0.01		2.2	OK	
1.002	SWMH3 (EX)		1.246	-0.236	0.000	0.01		3.1	OK	
1.003	SWMH4 (EX)		1.246	-0.154	0.000	0.00		3.0	OK	
3.000	SWMH08		1.988	-0.212	0.000	0.19		13.4	OK	
3.001	SWMH09		1.853	-0.176	0.000	0.35		23.5	OK	
3.002	SWMH10		1.778	-0.172	0.000	0.38		37.4	OK	
4.000	SWMH17		1.931	-0.269	0.000	0.02		1.6	OK	
5.000	SWMH18		1.754	-0.146	0.000	0.52		35.6	OK	
3.003	SWMH11		1.541	-0.255	0.000	0.02		1.6	OK	
3.004	SWMH12		1.456	-0.322	0.000	0.05		4.3	OK	
3.005	SWMH13		1.329	-0.352	0.000	0.11		14.1	OK	
3.006	SWMH14		1.243	-0.382	0.000	0.02		3.1	OK	
6.000	SWMH20	8	1.637	-0.063	0.000	0.95	0.0	45.2	OK	
6.001	SWMH21		1.502	-0.149	0.000	0.50		52.9	OK	
3.007	SWMH15		1.243	-0.214	0.000	0.02		4.5	OK	
7.000	SWMH23		1.260	-0.240	0.000	0.09		5.1	OK	
3.008	SWMH16		1.247	-0.100	0.000	0.03		5.1	OK	
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Micro Drainage				Network 2019.1					
<u>1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)</u> <u>for Storm</u>									
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	
1.004	SWMH5 (EX)	1440 Winter	1	+0%	1/1440 Summer				0
1.005	SWMH6 (EX)	1440 Winter	1	+0%	1/960 Winter				
PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.004	SWMH5 (EX)	1.248	0.028	0.000	0.01	0.0	6.1	SURCHARGED	
1.005	SWMH6 (EX)	1.251	0.146	0.000	0.01		5.2	SURCHARGED	
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Micro Drainage		Network 2019.1					
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		2.000		
Hot Start Level (mm)		0	Inlet Coefficient		0.800		
Manhole Headloss Coeff (Global)		0.500	Flow per Person per Day (l/per/day)		0.000		
Foul Sewage per hectare (l/s)		0.000					
Number of Input Hydrographs		0	Number of Storage Structures		4		
Number of Online Controls		2	Number of Time/Area Diagrams		0		
Number of Offline Controls		2	Number of Real Time Controls		0		
Synthetic Rainfall Details							
Rainfall Model		FSR	Ratio R		0.350		
Region England and Wales		Cv (Summer)	0.750				
M5-60 (mm)		19.000	Cv (Winter)		0.840		
Margin for Flood Risk Warning (mm)		150.0					
Analysis Timestep		2.5 Second Increment (Extended)					
DTS Status		ON					
DVD Status		ON					
Inertia Status		OFF					
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, 40, 40					
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
1.000	SWMH1 (EX)	15 Winter	30	+40%			
2.000	SWMH7 (EX)	15 Winter	30	+40%	30/15 Summer		
1.001	SWMH2 (EX)	1440 Winter	30	+40%	30/1440 Summer		
1.002	SWMH3 (EX)	1440 Winter	30	+40%	30/60 Winter		
1.003	SWMH4 (EX)	1440 Winter	30	+40%	30/960 Summer		
3.000	SWMH08	15 Winter	30	+40%	30/15 Summer		
3.001	SWMH09	15 Winter	30	+40%	30/15 Summer		
3.002	SWMH10	15 Winter	30	+40%	30/15 Summer		
4.000	SWMH17	15 Winter	30	+40%			
5.000	SWMH18	15 Winter	30	+40%	30/15 Summer		
3.003	SWMH11	960 Winter	30	+40%	100/360 Winter		
3.004	SWMH12	1440 Winter	30	+40%	100/1440 Winter		
3.005	SWMH13	1440 Winter	30	+40%	100/1440 Winter		
3.006	SWMH14	1440 Winter	30	+40%	100/1440 Summer		
6.000	SWMH20	15 Winter	30	+40%	30/15 Summer		30/15 Summer
6.001	SWMH21	15 Winter	30	+40%	30/15 Summer		
3.007	SWMH15	1440 Winter	30	+40%	30/960 Winter		
7.000	SWMH23	1440 Winter	30	+40%	30/1440 Summer		
3.008	SWMH16	1440 Winter	30	+40%	30/60 Winter		
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Micro Drainage			Network 2019.1						
30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm									

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Micro Drainage					Network 2019.1				
30 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.	
1.004	SWMH5 (EX)	1440 Winter	30	+40%	1/1440 Summer			0	
1.005	SWMH6 (EX)	1440 Winter	30	+40%	1/960 Winter				
PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.004	SWMH5 (EX)	1.664	0.444	0.000	0.02	0.0	10.8	SURCHARGED	
1.005	SWMH6 (EX)	1.672	0.567	0.000	0.01		8.0	SURCHARGED	
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Micro Drainage		Network 2019.1					
<u>100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>							
<u>Simulation Criteria</u>							
Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000							
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000							
Hot Start Level (mm) 0 Inlet Coefficient 0.800							
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000							
Foul Sewage per hectare (l/s) 0.000							
Number of Input Hydrographs 0 Number of Storage Structures 4							
Number of Online Controls 2 Number of Time/Area Diagrams 0							
Number of Offline Controls 2 Number of Real Time Controls 0							
<u>Synthetic Rainfall Details</u>							
Rainfall Model FSR Ratio R 0.350							
Region England and Wales Cv (Summer) 0.750							
M5-60 (mm) 19.000 Cv (Winter) 0.840							
Margin for Flood Risk Warning (mm) 150.0							
Analysis Timestep 2.5 Second Increment (Extended)							
DTS Status ON							
DVD Status ON							
Inertia Status OFF							
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, 40, 40							
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
1.000	SWMH1 (EX)	15 Winter	100	+40%			
2.000	SWMH7 (EX)	15 Winter	100	+40%	30/15 Summer		
1.001	SWMH2 (EX)	1440 Winter	100	+40%	30/1440 Summer		
1.002	SWMH3 (EX)	1440 Winter	100	+40%	30/60 Winter		
1.003	SWMH4 (EX)	1440 Winter	100	+40%	30/960 Summer		
3.000	SWMH08	15 Winter	100	+40%	30/15 Summer		
3.001	SWMH09	15 Winter	100	+40%	30/15 Summer		
3.002	SWMH10	15 Winter	100	+40%	30/15 Summer		
4.000	SWMH17	15 Winter	100	+40%			
5.000	SWMH18	15 Winter	100	+40%	30/15 Summer		
3.003	SWMH11	960 Winter	100	+40%	100/360 Winter		
3.004	SWMH12	1440 Winter	100	+40%	100/1440 Winter		
3.005	SWMH13	1440 Winter	100	+40%	100/1440 Winter		
3.006	SWMH14	1440 Winter	100	+40%	100/1440 Summer		
6.000	SWMH20	15 Winter	100	+40%	30/15 Summer		30/15 Summer
6.001	SWMH21	15 Summer	100	+40%	30/15 Summer		
3.007	SWMH15	1440 Winter	100	+40%	30/960 Winter		
7.000	SWMH23	1440 Winter	100	+40%	30/1440 Summer		
3.008	SWMH16	1440 Winter	100	+40%	30/60 Winter		
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Micro Drainage			Network 2019.1						
<u>100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>									

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Micro Drainage						Network 2019.1			
<u>100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>									
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	
1.004	SWMH5 (EX)	1440 Winter	100	+40%	1/1440 Summer				0
1.005	SWMH6 (EX)	1440 Winter	100	+40%	1/960 Winter				
PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.004	SWMH5 (EX)	1.849	0.629	0.000	0.03	0.0	18.1	SURCHARGED	
1.005	SWMH6 (EX)	1.861	0.756	0.000	0.01		8.1	SURCHARGED	
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