

The Alan Johnston Partnership		Page 1
1 Dale Street Liverpool L2 2ET	221-144 BURY MARKET SW NETWORK	
Date 07/08/2024 10:53 File SW NETWORK.MDX	Designed by JJR Checked by JRS	
XP Solutions	Network 2019.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales			
Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	19.000	Add Flow / Climate Change (%)	0
Ratio R	0.283	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)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.498	4-8	0.375

Total Area Contributing (ha) = 0.873

Total Pipe Volume (m³) = 22.081

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow	k (l/s)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	31.002	0.200	155.0	0.135	5.00	0.0	0.600	o	375	Pipe/Conduit	
1.001	21.863	0.150	145.8	0.019	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.002	30.780	0.220	139.9	0.026	0.00	0.0	0.600	o	375	Pipe/Conduit	
2.000	3.140	0.065	48.3	0.384	5.00	0.0	0.600	o	375	Pipe/Conduit	
1.003	15.968	0.105	152.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
3.000	6.570	0.065	101.1	0.000	5.00	0.0	0.600	o	225	Pipe/Conduit	
3.001	40.220	0.400	100.6	0.179	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.36	92.065	0.135	0.0	0.0	0.0	1.45	160.5	18.3
1.001	50.00	5.60	91.865	0.154	0.0	0.0	0.0	1.50	165.5	20.9
1.002	50.00	5.93	91.715	0.180	0.0	0.0	0.0	1.53	169.0	24.4
2.000	50.00	5.02	91.560	0.384	0.0	0.0	0.0	2.61	288.5	52.0
1.003	50.00	6.12	91.495	0.564	0.0	0.0	0.0	1.47	162.1	76.4
3.000	50.00	5.08	92.140	0.000	0.0	0.0	0.0	1.30	51.7	0.0
3.001	50.00	5.60	92.075	0.179	0.0	0.0	0.0	1.30	51.8	24.2

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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
3.002	13.259	0.135	98.2	0.002	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.004	22.729	0.160	142.5	0.017	0.00	0.0	0.600	o	375	Pipe/Conduit	
4.000	14.600	0.200	73.0	0.009	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.005	4.613	0.035	131.8	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.006	9.018	0.010	902.0	0.003	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.007	9.018	0.010	902.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
5.000	30.962	0.205	151.0	0.061	5.00	0.0	0.600	o	225	Pipe/Conduit	
5.001	4.382	0.035	125.2	0.021	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.008	10.575	0.075	141.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
6.000	2.824	0.040	70.6	0.017	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.009	4.093	0.030	136.4	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)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
3.002	50.00	5.77	91.675	0.181	0.0	0.0	0.0	1.32	52.5	24.5
1.004	50.00	6.37	91.390	0.762	0.0	0.0	0.0	1.52	167.4	103.2
4.000	50.00	5.21	92.500	0.009	0.0	0.0	0.0	1.18	20.8	1.2
1.005	50.00	6.41	91.230	0.771	0.0	0.0	0.0	1.58	174.1	104.4
1.006	49.84	6.67	91.195	0.774	0.0	0.0	0.0	0.60	65.7«	104.5
1.007	49.07	6.92	91.185	0.774	0.0	0.0	0.0	0.60	65.7«	104.5
5.000	50.00	5.49	92.500	0.061	0.0	0.0	0.0	1.06	42.2	8.3
5.001	50.00	5.55	92.295	0.082	0.0	0.0	0.0	1.17	46.4	11.1
1.008	48.72	7.03	91.175	0.856	0.0	0.0	0.0	1.52	168.3	112.9
6.000	50.00	5.04	92.300	0.017	0.0	0.0	0.0	1.20	21.2	2.3
1.009	48.59	7.08	91.100	0.873	0.0	0.0	0.0	1.55	171.1	114.9

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)
SW01	93.800	1.735	Open Manhole	1500	1.000	92.065	375				
SW02	93.900	2.035	Open Manhole	1500	1.001	91.865	375	1.000	91.865	375	
SW03	93.800	2.085	Open Manhole	1500	1.002	91.715	375	1.001	91.715	375	
SW04	93.750	2.190	Open Manhole	1500	2.000	91.560	375				
SW05	93.800	2.305	Open Manhole	1500	1.003	91.495	375	1.002	91.495	375	
								2.000	91.495	375	
SW06	93.820	1.680	Open Manhole	1500	3.000	92.140	225				
SW07	93.900	1.825	Open Manhole	1350	3.001	92.075	225	3.000	92.075	225	
SW08	93.900	2.225	Open Manhole	1350	3.002	91.675	225	3.001	91.675	225	
SW09	93.800	2.410	Open Manhole	1350	1.004	91.390	375	1.003	91.390	375	
								3.002	91.540	225	
SW10	93.700	1.200	Open Manhole	1350	4.000	92.500	150				
SW11	93.800	2.570	Sealed Manhole	1350	1.005	91.230	375	1.004	91.230	375	845
								4.000	92.300	150	
SW12	93.800	2.605	Open Manhole	1350	1.006	91.195	375	1.005	91.195	375	
Tank 1	93.800	2.615	Open Manhole	1200	1.007	91.185	375	1.006	91.185	375	
SW13	93.900	1.400	Open Manhole	1350	5.000	92.500	225				
SW14	94.050	1.755	Open Manhole	1350	5.001	92.295	225	5.000	92.295	225	
SW15	93.680	2.505	Open Manhole	1350	1.008	91.175	375	1.007	91.175	375	
								5.001	92.260	225	935
SW16	93.800	1.500	Open Manhole	1200	6.000	92.300	150				
SW17 HB	93.800	2.700	Open Manhole	2100	1.009	91.100	375	1.008	91.100	375	935
								6.000	92.260	150	
19	93.700	2.630	Open Manhole	1800		OUTFALL		1.009	91.070	375	

MH Name

Manhole Easting (m)

Manhole Northing (m)

Intersection Easting (m)

Intersection Northing (m)

Manhole Access

Layout (North)

SW01

380627.023

410563.872

380627.023

410563.872

Required

SW02

380604.796

410585.484

380604.796

410585.484

Required

SW03

380587.786

410571.749

380587.786

410571.749

Required

SW04

380561.536

410557.514

380561.536

410557.514

Required

SW05

380559.410

410559.825

380559.410

410559.825

Required

SW06

380535.762

410511.071

380535.762

410511.071

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)
SW07	380542.110	410509.379	380542.110	410509.379	Required	
SW08	380557.929	410546.358	380557.929	410546.358	Required	
SW09	380545.739	410551.573	380545.739	410551.573	Required	
SW10	380533.503	410573.214	380533.503	410573.214	Required	
SW11	380525.164	410561.230	380525.164	410561.230	Required	
SW12	380521.046	410563.310	380521.046	410563.310	Required	
Tank 1	380512.676	410559.952	380512.676	410559.952	Required	
SW13	380515.111	410523.581	380515.111	410523.581	Required	
SW14	380503.505	410552.286	380503.505	410552.286	Required	
SW15	380504.306	410556.594	380504.306	410556.594	Required	
SW16	380498.804	410565.501	380498.804	410565.501	Required	
SW17 HB	380496.557	410563.790	380496.557	410563.790	Required	
19	380492.982	410565.784			No Entry	

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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)
1.000	o	375	SW01	93.800	92.065	1.360	Open Manhole	1500
1.001	o	375	SW02	93.900	91.865	1.660	Open Manhole	1500
1.002	o	375	SW03	93.800	91.715	1.710	Open Manhole	1500
2.000	o	375	SW04	93.750	91.560	1.815	Open Manhole	1500
1.003	o	375	SW05	93.800	91.495	1.930	Open Manhole	1500
3.000	o	225	SW06	93.820	92.140	1.455	Open Manhole	1500
3.001	o	225	SW07	93.900	92.075	1.600	Open Manhole	1350
3.002	o	225	SW08	93.900	91.675	2.000	Open Manhole	1350
1.004	o	375	SW09	93.800	91.390	2.035	Open Manhole	1350
4.000	o	150	SW10	93.700	92.500	1.050	Open Manhole	1350
1.005	o	375	SW11	93.800	91.230	2.195	Sealed Manhole	1350
1.006	o	375	SW12	93.800	91.195	2.230	Open Manhole	1350
1.007	o	375	Tank 1	93.800	91.185	2.240	Open Manhole	1200
5.000	o	225	SW13	93.900	92.500	1.175	Open Manhole	1350
5.001	o	225	SW14	94.050	92.295	1.530	Open Manhole	1350
1.008	o	375	SW15	93.680	91.175	2.130	Open Manhole	1350

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)
1.000	31.002	155.0	SW02	93.900	91.865	1.660	Open Manhole	1500
1.001	21.863	145.8	SW03	93.800	91.715	1.710	Open Manhole	1500
1.002	30.780	139.9	SW05	93.800	91.495	1.930	Open Manhole	1500
2.000	3.140	48.3	SW05	93.800	91.495	1.930	Open Manhole	1500
1.003	15.968	152.0	SW09	93.800	91.390	2.035	Open Manhole	1350
3.000	6.570	101.1	SW07	93.900	92.075	1.600	Open Manhole	1350
3.001	40.220	100.6	SW08	93.900	91.675	2.000	Open Manhole	1350
3.002	13.259	98.2	SW09	93.800	91.540	2.035	Open Manhole	1350
1.004	22.729	142.5	SW11	93.800	91.230	2.195	Sealed Manhole	1350
4.000	14.600	73.0	SW11	93.800	92.300	1.350	Sealed Manhole	1350
1.005	4.613	131.8	SW12	93.800	91.195	2.230	Open Manhole	1350
1.006	9.018	902.0	Tank 1	93.800	91.185	2.240	Open Manhole	1200
1.007	9.018	902.0	SW15	93.680	91.175	2.130	Open Manhole	1350
5.000	30.962	151.0	SW14	94.050	92.295	1.530	Open Manhole	1350
5.001	4.382	125.2	SW15	93.680	92.260	1.195	Open Manhole	1350
1.008	10.575	141.0	SW17 HB	93.800	91.100	2.325	Open Manhole	2100

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	SW16	93.800	92.300	1.350	Open Manhole	1200
1.009	o	375	SW17 HB	93.800	91.100	2.325	Open Manhole	2100

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	2.824	70.6	SW17 HB	93.800	92.260	1.390	Open Manhole	2100
1.009	4.093	136.4	19	93.700	91.070	2.255	Open Manhole	1800

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Network Classifications for Storm

PN	USMH Name	Pipe Dia (mm)	Min Cover Depth (m)	Max Cover Depth (m)	Pipe Type	MH Dia (mm)	MH Width (mm)	MH Ring Depth (m)	MH Type
1.000	SW01	375	1.360	1.660	Unclassified	1500	0	1.360	Unclassified
1.001	SW02	375	1.660	1.710	Unclassified	1500	0	1.660	Unclassified
1.002	SW03	375	1.710	1.930	Unclassified	1500	0	1.710	Unclassified
2.000	SW04	375	1.815	1.930	Unclassified	1500	0	1.815	Unclassified
1.003	SW05	375	1.930	2.035	Unclassified	1500	0	1.930	Unclassified
3.000	SW06	225	1.455	1.600	Unclassified	1500	0	1.455	Unclassified
3.001	SW07	225	1.600	2.000	Unclassified	1350	0	1.600	Unclassified
3.002	SW08	225	2.000	2.035	Unclassified	1350	0	2.000	Unclassified
1.004	SW09	375	2.035	2.195	Unclassified	1350	0	2.035	Unclassified
4.000	SW10	150	1.050	1.350	Unclassified	1350	0	1.050	Unclassified
1.005	SW11	375	2.195	2.230	Unclassified	1350	0	2.195	Unclassified
1.006	SW12	375	2.230	2.240	Unclassified	1350	0	2.230	Unclassified
1.007	Tank 1	375	2.130	2.240	Unclassified	1200	0	2.240	Unclassified
5.000	SW13	225	1.175	1.530	Unclassified	1350	0	1.175	Unclassified
5.001	SW14	225	1.195	1.530	Unclassified	1350	0	1.530	Unclassified
1.008	SW15	375	2.130	2.325	Unclassified	1350	0	2.130	Unclassified
6.000	SW16	150	1.350	1.390	Unclassified	1200	0	1.350	Unclassified
1.009	SW17 HB	375	2.255	2.325	Unclassified	2100	0	2.325	Unclassified

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)
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1.009	19	93.700	91.070	89.440	1800	0
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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 Offline Controls	0
Number of Online Controls	1	Number of Time/Area Diagrams	6
		Number of Storage Structures	1
		Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	30
Ratio R	0.283		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: SW17 HB, DS/PN: 1.009, Volume (m³): 10.3

Unit Reference	MD-SHE-0314-6500-2200-6500
Design Head (m)	2.200
Design Flow (l/s)	65.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	314
Invert Level (m)	91.100
Minimum Outlet Pipe Diameter (mm)	375
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.200	65.0	Kick-Flo®	1.459	53.3
Flush-Flo™	0.666	64.9	Mean Flow over Head Range	-	55.9

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	9.4	0.800	64.6	2.000	62.0	4.000	86.8	7.000	114.0
0.200	32.1	1.000	63.3	2.200	65.0	4.500	91.9	7.500	117.9
0.300	55.9	1.200	60.9	2.400	67.8	5.000	96.8	8.000	121.7
0.400	62.1	1.400	55.9	2.600	70.4	5.500	101.4	8.500	125.3
0.500	64.0	1.600	55.7	3.000	75.5	6.000	105.7	9.000	128.9
0.600	64.8	1.800	59.0	3.500	81.4	6.500	110.0	9.500	132.3

Storage Structures for Storm

Cellular Storage Manhole: Tank 1, DS/PN: 1.007

Invert Level (m) 91.185 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	90.0	0.0	1.600	90.0	0.0	1.601	0.0	0.0

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.283 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 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, 2, 30, 100
 Climate Change (%) 0, 0, 0, 40

										Water	Surcharged
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.		Level (m)	Depth (m)
1.000	SW01	15 Winter	1	+0%	100/15 Summer					92.149	-0.291
1.001	SW02	15 Winter	1	+0%	30/15 Winter					91.953	-0.287
1.002	SW03	15 Winter	1	+0%	30/15 Summer					91.834	-0.256
2.000	SW04	15 Winter	1	+0%	2/15 Summer					91.829	-0.106
1.003	SW05	15 Winter	1	+0%	2/15 Summer					91.824	-0.046
3.000	SW06	15 Winter	1	+0%	30/15 Summer					92.156	-0.209
3.001	SW07	15 Winter	1	+0%	30/15 Summer					92.169	-0.131
3.002	SW08	15 Winter	1	+0%	30/15 Summer					91.792	-0.108
1.004	SW09	15 Winter	1	+0%	1/15 Winter					91.767	0.002
4.000	SW10	120 Winter	1	+0%	100/15 Winter					92.530	-0.120
1.005	SW11	15 Winter	1	+0%	1/15 Summer					91.655	0.050
1.006	SW12	15 Winter	1	+0%	30/15 Summer					91.562	-0.008
1.007	Tank 1	60 Summer	1	+0%	30/15 Summer					91.443	-0.117
5.000	SW13	120 Winter	1	+0%	100/30 Winter					92.523	-0.202
5.001	SW14	120 Winter	1	+0%	100/30 Winter					92.325	-0.195
1.008	SW15	60 Summer	1	+0%	30/15 Summer					91.378	-0.172
6.000	SW16	120 Winter	1	+0%	100/30 Winter					92.331	-0.119
1.009	SW17 HB	60 Summer	1	+0%	30/15 Summer					91.359	-0.116

		Flooded		Pipe			
PN	US/MH Name	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW01	0.000	0.11		15.6	OK	
1.001	SW02	0.000	0.13		17.6	OK	
1.002	SW03	0.000	0.13		20.0	OK	
2.000	SW04	0.000	0.42		44.9	OK	
1.003	SW05	0.000	0.48		60.9	OK	
3.000	SW06	0.000	0.00		0.1	OK	
3.001	SW07	0.000	0.36		17.7	OK	

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

PN	US/MH Name	Flooded		Pipe	Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)		
3.002	SW08	0.000	0.39		17.9	OK
1.004	SW09	0.000	0.49		69.9	SURCHARGED
4.000	SW10	0.000	0.09		1.7	OK
1.005	SW11	0.000	0.55		56.4	SURCHARGED*
1.006	SW12	0.000	1.00		54.9	OK
1.007	Tank 1	0.000	0.81		44.6	OK
5.000	SW13	0.000	0.02		0.9	OK
5.001	SW14	0.000	0.04		1.3	OK
1.008	SW15	0.000	0.41		44.3	OK
6.000	SW16	0.000	0.09		1.2	OK
1.009	SW17 HB	0.000	0.45		44.2	OK

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2 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 Offline Controls 0 Number of Time/Area Diagrams 6
 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.283 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 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, 2, 30, 100
 Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) SurchARGE	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth
									(m)	(m)
1.000	SW01	15 Winter	2	+0%	100/15 Summer				92.160	-0.280
1.001	SW02	15 Winter	2	+0%	30/15 Winter				91.966	-0.274
1.002	SW03	15 Winter	2	+0%	30/15 Summer				91.912	-0.178
2.000	SW04	30 Winter	2	+0%	2/15 Summer				91.992	0.057
1.003	SW05	30 Winter	2	+0%	2/15 Summer				91.899	0.029
3.000	SW06	15 Winter	2	+0%	30/15 Summer				92.172	-0.193
3.001	SW07	15 Winter	2	+0%	30/15 Summer				92.183	-0.117
3.002	SW08	15 Winter	2	+0%	30/15 Summer				91.828	-0.072
1.004	SW09	15 Winter	2	+0%	1/15 Winter				91.790	0.025
4.000	SW10	60 Winter	2	+0%	100/15 Winter				92.535	-0.115
1.005	SW11	15 Winter	2	+0%	1/15 Summer				91.666	0.061
1.006	SW12	30 Winter	2	+0%	30/15 Summer				91.570	0.000
1.007	Tank 1	30 Winter	2	+0%	30/15 Summer				91.470	-0.090
5.000	SW13	60 Winter	2	+0%	100/30 Winter				92.526	-0.199
5.001	SW14	60 Winter	2	+0%	100/30 Winter				92.330	-0.190
1.008	SW15	30 Winter	2	+0%	30/15 Summer				91.407	-0.143
6.000	SW16	60 Winter	2	+0%	100/30 Winter				92.336	-0.114
1.009	SW17 HB	30 Winter	2	+0%	30/15 Summer				91.386	-0.089

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Pipe Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW01	0.000	0.14		20.2	OK	
1.001	SW02	0.000	0.16		22.8	OK	
1.002	SW03	0.000	0.16		23.4	OK	
2.000	SW04	0.000	0.43		45.8	SURCHARGED	
1.003	SW05	0.000	0.46		58.3	SURCHARGED	
3.000	SW06	0.000	0.01		0.2	OK	
3.001	SW07	0.000	0.46		22.8	OK	

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

PN	US/MH Name	Flooded		Pipe	Status	Level Exceeded
		Volume (m³)	Flow / Overflow Cap. (l/s)	Flow (l/s)		
3.002	SW08	0.000	0.49	22.4	OK	
1.004	SW09	0.000	0.53	75.8	SURCHARGED	
4.000	SW10	0.000	0.12	2.4	OK	
1.005	SW11	0.000	0.73	75.9	SURCHARGED*	
1.006	SW12	0.000	1.25	68.4	OK	
1.007	Tank 1	0.000	0.93	51.2	OK	
5.000	SW13	0.000	0.03	1.3	OK	
5.001	SW14	0.000	0.06	1.8	OK	
1.008	SW15	0.000	0.47	50.9	OK	
6.000	SW16	0.000	0.13	1.6	OK	
1.009	SW17 HB	0.000	0.52	50.8	OK	

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.283 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 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, 2, 30, 100
 Climate Change (%) 0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water	Surcharged
									Level (m)	Depth (m)
1.000	SW01	15 Winter	30	+0%	100/15 Summer				92.322	-0.118
1.001	SW02	15 Winter	30	+0%	30/15 Winter				92.291	0.051
1.002	SW03	15 Winter	30	+0%	30/15 Summer				92.234	0.144
2.000	SW04	60 Winter	30	+0%	2/15 Summer				92.267	0.332
1.003	SW05	60 Winter	30	+0%	2/15 Summer				92.183	0.313
3.000	SW06	15 Winter	30	+0%	30/15 Summer				92.447	0.082
3.001	SW07	15 Winter	30	+0%	30/15 Summer				92.451	0.151
3.002	SW08	15 Winter	30	+0%	30/15 Summer				92.164	0.264
1.004	SW09	60 Winter	30	+0%	1/15 Winter				92.075	0.310
4.000	SW10	30 Winter	30	+0%	100/15 Winter				92.551	-0.099
1.005	SW11	60 Winter	30	+0%	1/15 Summer				91.951	0.346
1.006	SW12	60 Winter	30	+0%	30/15 Summer				91.863	0.293
1.007	Tank 1	60 Winter	30	+0%	30/15 Summer				91.842	0.282
5.000	SW13	60 Winter	30	+0%	100/30 Winter				92.537	-0.188
5.001	SW14	60 Winter	30	+0%	100/30 Winter				92.347	-0.173
1.008	SW15	60 Winter	30	+0%	30/15 Summer				91.829	0.279
6.000	SW16	30 Winter	30	+0%	100/30 Winter				92.352	-0.098
1.009	SW17 HB	60 Winter	30	+0%	30/15 Summer				91.774	0.299

PN	US/MH Name	Flooded Volume (m ³)	Pipe Flow / Overflow Cap. (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW01	0.000	0.27	37.9	OK	
1.001	SW02	0.000	0.24	33.9	SURCHARGED	
1.002	SW03	0.000	0.21	31.6	SURCHARGED	
2.000	SW04	0.000	0.58	62.0	SURCHARGED	
1.003	SW05	0.000	0.67	85.3	SURCHARGED	
3.000	SW06	0.000	0.09	3.4	SURCHARGED	
3.001	SW07	0.000	0.94	46.1	SURCHARGED	

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

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Overflow Cap. (l/s)	Flow (l/s)			
3.002	SW08	0.000	0.89	40.6		SURCHARGED	
1.004	SW09	0.000	0.78	112.1		SURCHARGED	
4.000	SW10	0.000	0.24	4.7		OK	
1.005	SW11	0.000	1.10	113.5		SURCHARGED*	
1.006	SW12	0.000	2.07	113.4		SURCHARGED	
1.007	Tank 1	0.000	1.45	79.7		SURCHARGED	
5.000	SW13	0.000	0.06	2.6		OK	
5.001	SW14	0.000	0.12	3.6		OK	
1.008	SW15	0.000	0.64	68.7		SURCHARGED	
6.000	SW16	0.000	0.25	3.1		OK	
1.009	SW17 HB	0.000	0.66	64.8		SURCHARGED	

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.283 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 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, 2, 30, 100
 Climate Change (%) 0, 0, 0, 40

										Water	Surcharged
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth
PN	Name	Storm	Period	Change		Surcharge	Flood	Overflow	Act.	(m)	(m)
1.000	SW01	30 Winter	100	+40%	100/15	Summer				93.727	1.287
1.001	SW02	60 Winter	100	+40%	30/15	Winter				93.616	1.376
1.002	SW03	60 Winter	100	+40%	30/15	Summer				93.610	1.520
2.000	SW04	60 Winter	100	+40%	2/15	Summer				93.653	1.718
1.003	SW05	60 Winter	100	+40%	2/15	Summer				93.603	1.733
3.000	SW06	30 Winter	100	+40%	30/15	Summer				93.794	1.429
3.001	SW07	30 Winter	100	+40%	30/15	Summer				93.792	1.492
3.002	SW08	60 Winter	100	+40%	30/15	Summer				93.513	1.613
1.004	SW09	60 Winter	100	+40%	1/15	Winter				93.493	1.728
4.000	SW10	60 Winter	100	+40%	100/15	Winter				93.394	0.744
1.005	SW11	60 Winter	100	+40%	1/15	Summer				93.368	1.763
1.006	SW12	60 Winter	100	+40%	30/15	Summer				93.278	1.708
1.007	Tank 1	60 Winter	100	+40%	30/15	Summer				93.258	1.698
5.000	SW13	60 Winter	100	+40%	100/30	Winter				93.250	0.525
5.001	SW14	60 Winter	100	+40%	100/30	Winter				93.241	0.721
1.008	SW15	60 Winter	100	+40%	30/15	Summer				93.238	1.688
6.000	SW16	60 Winter	100	+40%	100/30	Winter				93.150	0.700
1.009	SW17	HB 60 Winter	100	+40%	30/15	Summer				93.144	1.669

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Flow (l/s)	Overflow (l/s)		
1.000	SW01	0.000	0.29	41.6		FLOOD RISK	
1.001	SW02	0.000	0.25	35.3		FLOOD RISK	
1.002	SW03	0.000	0.27	39.7		FLOOD RISK	
2.000	SW04	0.000	0.98	104.9		FLOOD RISK	
1.003	SW05	0.000	1.09	138.7		FLOOD RISK	
3.000	SW06	0.000	0.21	7.5		FLOOD RISK	
3.001	SW07	0.000	1.10	54.2		FLOOD RISK	

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PN	US/MH Name	Flooded		Pipe	Status	Level Exceeded
		Volume (m³)	Flow / Overflow Cap. (l/s)	Flow (l/s)		
3.002	SW08	0.000	0.94	42.8	SURCHARGED	
1.004	SW09	0.000	1.29	183.9	SURCHARGED	
4.000	SW10	0.000	0.41	7.9	SURCHARGED	
1.005	SW11	0.000	1.80	186.4	SURCHARGED*	
1.006	SW12	0.000	3.38	185.2	SURCHARGED	
1.007	Tank 1	0.000	1.62	88.7	SURCHARGED	
5.000	SW13	0.000	0.12	4.7	SURCHARGED	
5.001	SW14	0.000	0.25	7.4	SURCHARGED	
1.008	SW15	0.000	0.75	80.7	SURCHARGED	
6.000	SW16	0.000	0.47	5.9	SURCHARGED	
1.009	SW17 HB	0.000	0.66	64.9	SURCHARGED	