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)	100	PIMP (%)	100
M5-60 (mm)	20.800	Add Flow / Climate Change (%)	0
Ratio R	0.418	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

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 (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	36.174	2.310	15.7	0.035	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	5.103	0.190	26.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	37.358	1.480	25.2	0.035	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	8.066	0.240	33.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.004	33.097	0.972	34.1	0.058	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	13.709	0.343	40.0	0.016	5.00	0.0	0.600	o	150	Pipe/Conduit	
2.001	10.042	0.251	40.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.002	26.587	0.470	56.6	0.052	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.003	8.532	0.853	10.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.004	4.987	0.033	151.1	0.000	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 (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.24	73.350	0.035	0.0	0.0	0.0	2.56	45.2	4.7
1.001	50.00	5.28	71.040	0.035	0.0	0.0	0.0	1.95	34.5	4.7
1.002	50.00	5.52	70.775	0.070	0.0	0.0	0.0	2.61	104.0	9.5
1.003	50.00	5.58	69.295	0.070	0.0	0.0	0.0	2.26	90.0	9.5
1.004	50.00	5.82	69.055	0.128	0.0	0.0	0.0	2.25	89.4	17.3
2.000	50.00	5.14	73.640	0.016	0.0	0.0	0.0	1.60	28.2	2.2
2.001	50.00	5.25	73.297	0.016	0.0	0.0	0.0	1.60	28.2	2.2
2.002	50.00	5.50	72.971	0.068	0.0	0.0	0.0	1.74	69.3	9.2
2.003	50.00	5.54	72.501	0.068	0.0	0.0	0.0	4.16	165.5	9.2
2.004	50.00	5.61	70.157	0.068	0.0	0.0	0.0	1.06	42.2	9.2

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
2.005	31.170	1.528	20.4	0.017	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.000	7.263	0.048	151.3	0.064	5.00	0.0	0.600	o	150	Pipe/Conduit	
2.006	8.558	0.108	79.2	0.007	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.007	9.647	0.536	18.0	0.008	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.005	8.334	0.833	10.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
4.000	3.384	0.338	10.0	0.048	5.00	0.0	0.600	o	150	Pipe/Conduit	
5.000	13.328	0.355	37.5	0.036	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.006	8.929	0.060	148.8	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.007	8.470	0.056	151.3	0.014	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.008	4.738	0.209	22.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.009	7.874	0.550	14.3	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.010	51.643	2.850	18.1	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.011	50.666	2.450	20.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.012	39.177	0.550	71.2	0.000	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)
2.005	50.00	5.79	70.255	0.085	0.0	0.0	0.0	2.91	115.7	11.5
3.000	50.00	5.15	68.850	0.064	0.0	0.0	0.0	0.81	14.4	8.7
2.006	50.00	5.89	68.727	0.156	0.0	0.0	0.0	1.47	58.5	21.1
2.007	50.00	5.94	68.619	0.164	0.0	0.0	0.0	3.10	123.2	22.2
1.005	50.00	5.98	68.083	0.292	0.0	0.0	0.0	4.16	165.5	39.5
4.000	50.00	5.02	67.663	0.048	0.0	0.0	0.0	3.20	56.6	6.5
5.000	50.00	5.13	67.680	0.036	0.0	0.0	0.0	1.65	29.1	4.9
1.006	50.00	6.16	66.275	0.376	0.0	0.0	0.0	0.82	14.5«	50.9
1.007	50.00	6.33	66.215	0.390	0.0	0.0	0.0	0.81	14.4«	52.8
1.008	50.00	6.37	66.159	0.390	0.0	0.0	0.0	2.12	37.5«	52.8
1.009	50.00	6.42	65.950	0.390	0.0	0.0	0.0	2.68	47.3«	52.8
1.010	50.00	6.78	65.400	0.390	0.0	0.0	0.0	2.38	42.0«	52.8
1.011	50.00	7.16	62.550	0.390	0.0	0.0	0.0	2.22	39.3«	52.8
1.012	50.00	7.71	60.100	0.390	0.0	0.0	0.0	1.19	21.1«	52.8

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)
1.012		60.600	59.550	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	0.000
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 Storage Structures	4
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	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)	20.800	Storm Duration (mins)	30
Ratio R	0.418		

Online Controls for Storm

Hydro-Brake® Optimum Manhole: SW MH17, DS/PN: 1.008, Volume (m³): 1.9

Unit Reference	MD-SHE-0086-3600-1300-3600
Design Head (m)	1.300
Design Flow (l/s)	3.6
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	86
Invert Level (m)	66.159
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.300	3.6
Flush-Flo™	0.375	3.5
Kick-Flo®	0.766	2.8
Mean Flow over Head Range	-	3.1

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	2.6	1.200	3.5	3.000	5.3	7.000	7.9
0.200	3.3	1.400	3.7	3.500	5.7	7.500	8.2
0.300	3.5	1.600	4.0	4.000	6.1	8.000	8.4
0.400	3.5	1.800	4.2	4.500	6.4	8.500	8.7
0.500	3.5	2.000	4.4	5.000	6.7	9.000	8.9
0.600	3.4	2.200	4.6	5.500	7.1	9.500	9.1
0.800	2.9	2.400	4.8	6.000	7.4		
1.000	3.2	2.600	5.0	6.500	7.6		

Storage Structures for Storm

Filter Drain Manhole: SW MH10, DS/PN: 3.000

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.150
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	500.0
Invert Level (m)	69.300	Cap Volume Depth (m)	0.500
Trench Width (m)	0.6	Cap Infiltration Depth (m)	0.000
Trench Length (m)	47.0		

Filter Drain Manhole: SW MH14, DS/PN: 4.000

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.150
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	500.0
Invert Level (m)	68.270	Cap Volume Depth (m)	0.500
Trench Width (m)	0.6	Cap Infiltration Depth (m)	0.000
Trench Length (m)	41.0		

Filter Drain Manhole: SW MH15, DS/PN: 5.000

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.150
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	500.0
Invert Level (m)	68.130	Cap Volume Depth (m)	0.500
Trench Width (m)	0.6	Cap Infiltration Depth (m)	0.000
Trench Length (m)	33.7		

Tank or Pond Manhole: SW TANK, DS/PN: 1.006

Invert Level (m) 66.275

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	200.0	1.200	200.0	1.201	0.0

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	0.000
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	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.417
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.800	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	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 35, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	SW RE01	15 Winter	1	+0%					73.384
1.001	SW MH01	15 Winter	1	+0%					71.084
1.002	SW MH02	15 Winter	1	+0%					70.822
1.003	SW MH03	15 Winter	1	+0%	100/15 Summer				69.351
1.004	SW MH04	15 Winter	1	+0%	100/15 Summer				69.123
2.000	SW RE02	15 Winter	1	+0%					73.671
2.001	SW MH05	15 Winter	1	+0%					73.328
2.002	SW MH06	15 Winter	1	+0%					73.027
2.003	SW MH07	15 Winter	1	+0%					72.539
2.004	SW MH08	15 Winter	1	+0%	30/15 Summer				70.310
2.005	SW MH09	15 Winter	1	+0%					70.303
3.000	SW MH10	15 Winter	1	+0%	30/15 Summer				68.949
2.006	SW MH11	15 Winter	1	+0%	30/15 Summer				68.834
2.007	SW MH12	15 Winter	1	+0%	100/15 Summer				68.690
1.005	SW MH13	15 Winter	1	+0%	30/15 Summer				68.168
4.000	SW MH14	15 Winter	1	+0%					67.708
5.000	SW MH15	15 Winter	1	+0%					67.725

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW RE01	-0.116	0.000	0.12		5.2	OK	
1.001	SW MH01	-0.106	0.000	0.19		5.1	OK	
1.002	SW MH02	-0.178	0.000	0.10		9.4	OK	
1.003	SW MH03	-0.169	0.000	0.14		9.4	OK	
1.004	SW MH04	-0.157	0.000	0.20		16.6	OK	
2.000	SW RE02	-0.119	0.000	0.09		2.4	OK	
2.001	SW MH05	-0.119	0.000	0.09		2.3	OK	
2.002	SW MH06	-0.169	0.000	0.14		8.8	OK	
2.003	SW MH07	-0.187	0.000	0.07		8.8	OK	
2.004	SW MH08	-0.072	0.000	0.30		8.8	OK	
2.005	SW MH09	-0.177	0.000	0.10		11.0	OK	
3.000	SW MH10	-0.051	0.000	0.76		9.4	OK	
2.006	SW MH11	-0.118	0.000	0.45		21.1	OK	
2.007	SW MH12	-0.154	0.000	0.22		22.1	OK	
1.005	SW MH13	-0.140	0.000	0.30		38.9	OK	
4.000	SW MH14	-0.105	0.000	0.19		7.1	OK	
5.000	SW MH15	-0.105	0.000	0.20		5.3	OK	

1 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 Level (m)
1.006	SW TANK	120 Winter	1	+0%	1/60 Summer				66.458
1.007	SW MH16	180 Winter	1	+0%	1/15 Summer				66.464
1.008	SW MH17	180 Winter	1	+0%	1/15 Summer				66.464
1.009	SW MH18	180 Winter	1	+0%					65.979
1.010	SW MH19	180 Winter	1	+0%					65.429
1.011	SW MH20	180 Winter	1	+0%					62.580
1.012	SW MH21	120 Winter	1	+0%					60.141

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.006	SW TANK	0.033	0.000	0.31		4.0	SURCHARGED	
1.007	SW MH16	0.099	0.000	0.38		4.8	SURCHARGED	
1.008	SW MH17	0.155	0.000	0.12		3.5	SURCHARGED	
1.009	SW MH18	-0.121	0.000	0.08		3.5	OK	
1.010	SW MH19	-0.121	0.000	0.08		3.5	OK	
1.011	SW MH20	-0.120	0.000	0.09		3.5	OK	
1.012	SW MH21	-0.109	0.000	0.17		3.5	OK	

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	0.000
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	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.417
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.800	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	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 35, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	SW RE01	15 Winter	30	+35%					73.415
1.001	SW MH01	15 Winter	30	+35%					71.127
1.002	SW MH02	15 Winter	30	+35%					70.868
1.003	SW MH03	15 Winter	30	+35%	100/15 Summer				69.410
1.004	SW MH04	15 Winter	30	+35%	100/15 Summer				69.206
2.000	SW RE02	15 Winter	30	+35%					73.697
2.001	SW MH05	15 Winter	30	+35%					73.354
2.002	SW MH06	15 Winter	30	+35%					73.090
2.003	SW MH07	15 Winter	30	+35%					72.580
2.004	SW MH08	15 Winter	30	+35%	30/15 Summer				70.428
2.005	SW MH09	15 Winter	30	+35%					70.354
3.000	SW MH10	15 Winter	30	+35%	30/15 Summer				69.377
2.006	SW MH11	15 Winter	30	+35%	30/15 Summer				69.119
2.007	SW MH12	15 Winter	30	+35%	100/15 Summer				68.787
1.005	SW MH13	15 Winter	30	+35%	30/15 Summer				68.484
4.000	SW MH14	15 Winter	30	+35%					67.751
5.000	SW MH15	15 Winter	30	+35%					67.770

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW RE01	-0.085	0.000	0.39		17.1	OK	
1.001	SW MH01	-0.063	0.000	0.62		17.0	OK	
1.002	SW MH02	-0.132	0.000	0.36		35.1	OK	
1.003	SW MH03	-0.110	0.000	0.51		34.9	OK	
1.004	SW MH04	-0.074	0.000	0.77		65.0	OK	
2.000	SW RE02	-0.093	0.000	0.30		7.8	OK	
2.001	SW MH05	-0.093	0.000	0.31		7.7	OK	
2.002	SW MH06	-0.106	0.000	0.54		34.8	OK	
2.003	SW MH07	-0.146	0.000	0.27		34.7	OK	
2.004	SW MH08	0.046	0.000	1.16		34.7	SURCHARGED	
2.005	SW MH09	-0.126	0.000	0.40		43.4	OK	
3.000	SW MH10	0.377	0.000	2.47		30.5	SURCHARGED	
2.006	SW MH11	0.167	0.000	1.61		74.3	SURCHARGED	
2.007	SW MH12	-0.057	0.000	0.77		78.5	OK	
1.005	SW MH13	0.176	0.000	1.10		141.2	SURCHARGED	
4.000	SW MH14	-0.062	0.000	0.64		23.5	OK	
5.000	SW MH15	-0.060	0.000	0.66		17.6	OK	

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.	Water Level (m)
1.006	SW TANK	240 Winter	30	+35%	1/60 Summer				67.063
1.007	SW MH16	180 Winter	30	+35%	1/15 Summer				67.061
1.008	SW MH17	180 Winter	30	+35%	1/15 Summer				67.062
1.009	SW MH18	960 Summer	30	+35%					65.979
1.010	SW MH19	2880 Summer	30	+35%					65.429
1.011	SW MH20	2880 Summer	30	+35%					62.580
1.012	SW MH21	2880 Summer	30	+35%					60.142

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.006	SW TANK	0.638	0.000	0.37		4.8	SURCHARGED	
1.007	SW MH16	0.696	0.000	0.34		4.2	SURCHARGED	
1.008	SW MH17	0.753	0.000	0.12		3.5	SURCHARGED	
1.009	SW MH18	-0.121	0.000	0.09		3.5	OK	
1.010	SW MH19	-0.121	0.000	0.09		3.5	OK	
1.011	SW MH20	-0.120	0.000	0.09		3.5	OK	
1.012	SW MH21	-0.108	0.000	0.17		3.5	OK	

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	0.000
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	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.417
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.800	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	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 35, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	SW RE01	15 Winter	100	+45%					73.430
1.001	SW MH01	15 Winter	100	+45%					71.150
1.002	SW MH02	15 Winter	100	+45%					70.888
1.003	SW MH03	15 Winter	100	+45%	100/15 Summer				69.965
1.004	SW MH04	15 Winter	100	+45%	100/15 Summer				69.775
2.000	SW RE02	15 Winter	100	+45%					73.708
2.001	SW MH05	15 Winter	100	+45%					73.366
2.002	SW MH06	15 Winter	100	+45%					73.119
2.003	SW MH07	15 Winter	100	+45%					72.596
2.004	SW MH08	15 Winter	100	+45%	30/15 Summer				70.498
2.005	SW MH09	15 Winter	100	+45%					70.376
3.000	SW MH10	15 Winter	100	+45%	30/15 Summer				69.827
2.006	SW MH11	15 Winter	100	+45%	30/15 Summer				69.578
2.007	SW MH12	15 Winter	100	+45%	100/15 Summer				69.250
1.005	SW MH13	15 Winter	100	+45%	30/15 Summer				68.871
4.000	SW MH14	15 Winter	100	+45%					67.775
5.000	SW MH15	15 Winter	100	+45%					67.794

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW RE01	-0.070	0.000	0.55		23.9	OK	
1.001	SW MH01	-0.040	0.000	0.87		23.7	OK	
1.002	SW MH02	-0.112	0.000	0.50		49.0	OK	
1.003	SW MH03	0.445	0.000	0.68		47.0	FLOOD RISK	
1.004	SW MH04	0.495	0.000	0.97		81.7	FLOOD RISK	
2.000	SW RE02	-0.082	0.000	0.42		10.9	OK	
2.001	SW MH05	-0.081	0.000	0.43		10.8	OK	
2.002	SW MH06	-0.077	0.000	0.76		48.6	OK	
2.003	SW MH07	-0.130	0.000	0.37		48.5	OK	
2.004	SW MH08	0.116	0.000	1.62		48.4	SURCHARGED	
2.005	SW MH09	-0.104	0.000	0.56		60.6	OK	
3.000	SW MH10	0.827	0.000	3.42		42.3	FLOOD RISK	
2.006	SW MH11	0.626	0.000	1.74		80.6	SURCHARGED	
2.007	SW MH12	0.406	0.000	0.84		85.2	SURCHARGED	
1.005	SW MH13	0.563	0.000	1.29		166.4	SURCHARGED	
4.000	SW MH14	-0.038	0.000	0.90		32.8	OK	
5.000	SW MH15	-0.036	0.000	0.92		24.6	OK	

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 Level (m)
1.006	SW TANK	360 Winter	100	+45%	1/60 Summer				67.450
1.007	SW MH16	360 Winter	100	+45%	1/15 Summer				67.447
1.008	SW MH17	360 Winter	100	+45%	1/15 Summer				67.443
1.009	SW MH18	360 Winter	100	+45%					65.980
1.010	SW MH19	360 Winter	100	+45%					65.430
1.011	SW MH20	360 Winter	100	+45%					62.581
1.012	SW MH21	360 Winter	100	+45%					60.142

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.006	SW TANK	1.025	0.000	0.38		4.9	SURCHARGED	
1.007	SW MH16	1.082	0.000	0.36		4.5	SURCHARGED	
1.008	SW MH17	1.134	0.000	0.12		3.6	FLOOD RISK	
1.009	SW MH18	-0.120	0.000	0.09		3.6	OK	
1.010	SW MH19	-0.120	0.000	0.09		3.6	OK	
1.011	SW MH20	-0.119	0.000	0.09		3.6	OK	
1.012	SW MH21	-0.108	0.000	0.17		3.6	OK	