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)	1	PIMP (%)	100
M5-60 (mm)	19.000	Add Flow / Climate Change (%)	10
Ratio R	0.328	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	0.241	4-8	0.104

Total Area Contributing (ha) = 0.345

Total Pipe Volume (m³) = 110.972

Network Design Table for Storm

- Indicates pipe length does not match coordinates
« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	28.295	0.031	900.0	0.117	5.00	0.0	0.600		o	900	Pipe/Conduit	
S2.000	8.783	0.047	186.9	0.000	5.00	0.0	0.600		ooo	-1	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)
S1.000	45.42	5.46	195.558	0.117	0.0	0.0	1.4	1.04	659.2	15.8
S2.000	46.60	5.13	196.204	0.000	0.0	0.0	0.0	1.15	243.2	0.0

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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
S3.000	11.534	0.047	245.0	0.000	5.00	0.0	0.600		ooo	-1	Pipe/Conduit	
S2.001	12.236	0.014	874.0	0.055	0.00	0.0	0.600		o	900	Pipe/Conduit	
S2.002	14.717	0.016	900.0	0.048	0.00	0.0	0.600		o	900	Pipe/Conduit	
S1.001	24.654	0.027	900.0	0.000	0.00	0.0	0.600		o	900	Pipe/Conduit	
S1.002	8.475	0.050	170.0	0.041	0.00	0.0	0.600		o	225	Pipe/Conduit	
S4.000	35.608#	0.036	1000.0	0.069	5.00	0.0		0.015	→[↓]		Cellular Storage	
S4.001	7.000#	0.074	94.6	0.000	0.00	0.0		0.050	o	225	Pipe/Conduit	
S1.003	1.213	0.024	50.5	0.015	0.00	0.0		0.025	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)
S3.000	46.36	5.19	196.204	0.000	0.0	0.0	0.0	1.00	212.1	0.0
S2.001	45.66	5.39	195.557	0.055	0.0	0.0	0.7	1.05	669.0	7.5
S2.002	44.84	5.62	195.543	0.103	0.0	0.0	1.3	1.04	659.2	13.8
S1.001	43.53	6.02	195.527	0.220	0.0	0.0	2.6	1.04	659.2	28.5
S1.002	43.09	6.16	195.450	0.261	0.0	0.0	3.0	1.00	39.8	33.5
S4.000	43.90	5.91	195.510	0.069	0.0	0.0	0.8	0.66	1015.0	9.0
S4.001	42.69	6.29	195.474	0.069	0.0	0.0	0.8	0.30	12.0	9.0
S1.003	42.61	6.32	195.350	0.345	0.0	0.0	4.0	0.83	32.8«	43.8

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Ba
S1	197.844	2.286	Open Manhole	1800	S1.000	195.558	900				
STank 2	197.700	1.496	Open Manhole	3000	S2.000	196.204	-1				
STank 1	198.300	2.096	Open Manhole	3000	S3.000	196.204	-1				
S2	197.682	2.125	Open Manhole	3000	S2.001	195.557	900	S2.000	196.157	-1	
								S3.000	196.157	-1	
S3	197.969	2.426	Open Manhole	1800	S2.002	195.543	900	S2.001	195.543	900	
S4	198.258	2.731	Open Manhole	1800	S1.001	195.527	900	S1.000	195.527	900	
								S2.002	195.527	900	
S5	197.433	1.983	Open Manhole	1800	S1.002	195.450	225	S1.001	195.500	900	
SDemarcation	197.380	1.870	Open Manhole	600	S4.000	195.510					
S6	197.442	1.968	Open Manhole	1200	S4.001	195.474	225	S4.000	195.474		
S7	197.142	1.792	Open Manhole	1800	S1.003	195.350	225	S1.002	195.400	225	
								S4.001	195.400	225	
S	197.150	1.824	Open Manhole	0		OUTFALL		S1.003	195.326	225	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	424399.775	403865.287	424399.775	403865.287	Required	
STank 2	424456.518	403891.550	424456.518	403891.550	Required	
STank 1	424444.643	403903.640	424444.643	403903.640	Required	
S2	424447.791	403892.544	424447.791	403892.544	Required	
S3	424437.574	403885.811	424437.574	403885.811	Required	
S4	424424.641	403878.788	424424.641	403878.788	Required	
S5	424436.422	403857.131	424436.422	403857.131	Required	

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
SDemarcation	424410.647	403833.663	424410.647	403833.663	Required	
S7	424441.924	403850.684	424441.924	403850.684	Required	
S	424442.713	403849.763			No Entry	

PIPELINE SCHEDULES for Storm

Upstream Manhole

- Indicates pipe length does not match coordinates

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	900	S1	197.844	195.558	1.386	Open Manhole	1800
S2.000	ooo	-1	STank 2	197.700	196.204	1.196	Open Manhole	3000
S3.000	ooo	-1	STank 1	198.300	196.204	1.796	Open Manhole	3000
S2.001	o	900	S2	197.682	195.557	1.225	Open Manhole	3000
S2.002	o	900	S3	197.969	195.543	1.526	Open Manhole	1800
S1.001	o		S4	198.258	195.527	1.831	Open Manhole	1800
S1.002	o	225	S5	197.433	195.450	1.758	Open Manhole	1800
S4.000	→[↓]		SDemarcation	197.380	195.510	1.469	Open Manhole	600
S4.001	o	225	S6	197.442	195.474	1.743	Open Manhole	1200
S1.003	o	225	S7	197.142	195.350	1.567	Open Manhole	1800

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)
S1.000	28.295	900.0	S4	198.258	195.527	1.831	Open Manhole	1800
S2.000	8.783	186.9	S2	197.682	196.157	1.225	Open Manhole	3000
S3.000	11.534	245.0	S2	197.682	196.157	1.225	Open Manhole	3000
S2.001	12.236	874.0	S3	197.969	195.543	1.526	Open Manhole	1800
S2.002	14.717	900.0	S4	198.258	195.527	1.831	Open Manhole	1800
S1.001	24.654	900.0	S5	197.433	195.500	1.033	Open Manhole	1800
S1.002	8.475	170.0	S7	197.142	195.400	1.517	Open Manhole	1800
S4.000	35.608#	1000.0	S6	197.442	195.474	1.567	Open Manhole	1200
S4.001	7.000#	94.6	S7	197.142	195.400	1.517	Open Manhole	1800
S1.003	1.213	50.5	S	197.150	195.326	1.599	Open Manhole	0

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.117	0.117	0.117
2.000	-	-	100	0.000	0.000	0.000
3.000	-	-	100	0.000	0.000	0.000
2.001	-	-	100	0.055	0.055	0.055
2.002	-	-	100	0.048	0.048	0.048
1.001	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.041	0.041	0.041
4.000	-	-	100	0.069	0.069	0.069
4.001	-	-	100	0.000	0.000	0.000
1.003	-	-	100	0.015	0.015	0.015
				Total	Total	Total
				0.345	0.345	0.345

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
S1.000	S1	900	1.386	1.831	Unclassified	1800	0	1.386	Unclassified
S2.000	STank 2	-1	1.196	1.225	Unclassified	3000	0	1.196	Unclassified
S3.000	STank 1	-1	1.225	1.796	Unclassified	3000	0	1.796	Unclassified
S2.001	S2	900	1.225	1.526	Unclassified	3000	0	1.225	Unclassified
S2.002	S3	900	1.526	1.831	Unclassified	1800	0	1.526	Unclassified
S1.001	S4	900	1.033	1.831	Unclassified	1800	0	1.831	Unclassified
S1.002	S5	225	1.517	1.758	Unclassified	1800	0	1.758	Unclassified
S4.000	SDemarcation				Cellular Storage	600	0	1.469	Unclassified
S4.001	S6	225	1.517	1.743	Unclassified	1200	0	1.743	Unclassified
S1.003	S7	225	1.567	1.599	Unclassified	1800	0	1.567	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)
S1.003	S	197.150	195.326	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	2	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)		1	Cv (Summer) 0.750
Region	England and Wales		Cv (Winter) 0.840
M5-60 (mm)	19.300	Storm Duration (mins)	30
Ratio R	0.311		

Online Controls for Storm

Hydro-Brake® Optimum Manhole: S5, DS/PN: S1.002, Volume (m³): 19.6

Unit Reference	MD-SHE-0075-3000-1500-3000
Design Head (m)	1.500
Design Flow (l/s)	3.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	75
Invert Level (m)	195.450
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	3.0
Flush-Flo™	0.329	2.6
Kick-Flo®	0.671	2.1
Mean Flow over Head Range	-	2.4

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.1	1.200	2.7	3.000	4.1	7.000	6.1
0.200	2.5	1.400	2.9	3.500	4.4	7.500	6.3
0.300	2.6	1.600	3.1	4.000	4.7	8.000	6.5
0.400	2.6	1.800	3.3	4.500	5.0	8.500	6.7
0.500	2.5	2.000	3.4	5.000	5.2	9.000	6.9
0.600	2.3	2.200	3.6	5.500	5.5	9.500	7.1
0.800	2.2	2.400	3.7	6.000	5.7		
1.000	2.5	2.600	3.9	6.500	5.9		

Hydro-Brake® Optimum Manhole: S7, DS/PN: S1.003, Volume (m³): 5.0

Unit Reference	MD-SHE-0089-3500-0960-3500
Design Head (m)	0.960
Design Flow (l/s)	3.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	89
Invert Level (m)	195.350
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Hydro-Brake® Optimum Manhole: S7, DS/PN: S1.003, Volume (m³): 5.0

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.960	3.5
Flush-Flo™	0.288	3.5
Kick-Flo®	0.609	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	2.8	1.200	3.9	3.000	5.9	7.000	8.9
0.200	3.4	1.400	4.2	3.500	6.4	7.500	9.2
0.300	3.5	1.600	4.4	4.000	6.8	8.000	9.4
0.400	3.4	1.800	4.7	4.500	7.2	8.500	9.7
0.500	3.3	2.000	4.9	5.000	7.6	9.000	10.0
0.600	2.9	2.200	5.1	5.500	7.9	9.500	10.3
0.800	3.2	2.400	5.4	6.000	8.2		
1.000	3.6	2.600	5.6	6.500	8.6		

Storage Structures for Storm

Cellular Storage Manhole: STank 2 , DS/PN: S2.000

Invert Level (m) 196.204 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)
0.000	81.0	0.0	0.801	0.0	0.0
0.800	81.0	0.0			

Cellular Storage Manhole: STank 1, DS/PN: S3.000

Invert Level (m) 196.204 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)
0.000	146.0	0.0	1.201	0.0	0.0
1.200	146.0	0.0			

Porous Car Park Manhole: SDemarcation, DS/PN: S4.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	29.6
Max Percolation (l/s)	41.1	Slope (1:X)	1000.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	195.690	Cap Volume Depth (m)	0.300

Cellular Storage Pipe: S4.000

Manning's N	0.015	Infiltration Coefficient Side (m/hr)	0.00000
Invert Level (m)	195.510	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	145.0	0.0	0.401	0.0	0.0
0.400	145.0	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	2	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 0.323
Region	England and Wales	Cv (Summer)	1.000
M5-60 (mm)	19.100	Cv (Winter)	1.000

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
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, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	240 Summer	1	+0%	100/30 Summer			
S2.000	STank 2	15 Summer	1	+0%	100/120 Summer			
S3.000	STank 1	15 Summer	1	+0%	100/120 Summer			
S2.001	S2	240 Summer	1	+0%	100/30 Summer			
S2.002	S3	240 Summer	1	+0%	100/30 Summer			
S1.001	S4	240 Summer	1	+0%	100/15 Summer			
S1.002	S5	240 Summer	1	+0%	1/15 Summer			
S4.000	SDemarcation	360 Summer	1	+0%				
S4.001	S6	360 Summer	1	+0%	100/30 Summer			
S1.003	S7	360 Summer	1	+0%	30/15 Summer			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
S1.000	S1	195.990	-0.468	0.000	0.02			5.9

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
S2.000	STank 2	196.204	-0.300	0.000	0.00			0.0
S3.000	STank 1	196.204	-0.300	0.000	0.00			0.0
S2.001	S2	195.990	-0.467	0.000	0.01			1.8
S2.002	S3	195.990	-0.453	0.000	0.01			2.9
S1.001	S4	195.990	-0.437	0.000	0.01			3.7
S1.002	S5	195.990	0.315	0.000	0.08			2.6
S4.000	SDemarcation	195.565	-0.346	0.000	0.00		133	2.0
S4.001	S6	195.565	-0.134	0.000	0.06			0.8
S1.003	S7	195.562	-0.013	0.000	0.14			3.4

PN	US/MH Name	Status	Level Exceeded
S1.000	S1	OK	
S2.000	STank 2	OK	
S3.000	STank 1	OK	
S2.001	S2	OK	
S2.002	S3	OK	
S1.001	S4	OK	
S1.002	S5	SURCHARGED	
S4.000	SDemarcation	OK	
S4.001	S6	OK	
S1.003	S7	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	2	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 0.323
Region	England and Wales	Cv (Summer)	1.000
M5-60 (mm)	19.100	Cv (Winter)	1.000

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
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, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	240 Winter	30	+0%	100/30 Summer			
S2.000	STank 2	240 Winter	30	+0%	100/120 Summer			
S3.000	STank 1	240 Winter	30	+0%	100/120 Summer			
S2.001	S2	240 Winter	30	+0%	100/30 Summer			
S2.002	S3	240 Winter	30	+0%	100/30 Summer			
S1.001	S4	240 Winter	30	+0%	100/15 Summer			
S1.002	S5	240 Winter	30	+0%	1/15 Summer			
S4.000	SDemarcation	360 Summer	30	+0%				
S4.001	S6	360 Summer	30	+0%	100/30 Summer			
S1.003	S7	30 Summer	30	+0%	30/15 Summer			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
S1.000	S1	196.338	-0.120	0.000	0.02			8.6

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
S2.000	STank 2	196.338	-0.166	0.000	0.00		159	0.7
S3.000	STank 1	196.338	-0.166	0.000	0.01		160	1.1
S2.001	S2	196.338	-0.119	0.000	0.01			2.7
S2.002	S3	196.338	-0.105	0.000	0.01			4.0
S1.001	S4	196.338	-0.089	0.000	0.01			4.3
S1.002	S5	196.338	0.663	0.000	0.08			2.6
S4.000	SDemarcation	195.685	-0.226	0.000	0.00		238	3.1
S4.001	S6	195.685	-0.014	0.000	0.10			1.2
S1.003	S7	195.723	0.148	0.000	0.14			3.5

PN	US/MH Name	Status	Level Exceeded
S1.000	S1	OK	
S2.000	STank 2	OK	
S3.000	STank 1	OK	
S2.001	S2	OK	
S2.002	S3	OK	
S1.001	S4	OK	
S1.002	S5	SURCHARGED	
S4.000	SDemarcation	OK	
S4.001	S6	OK	
S1.003	S7	SURCHARGED	

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	2	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	0.323
Region	England and Wales	Cv (Summer)	1.000
M5-60 (mm)	19.100	Cv (Winter)	1.000

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
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, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	480 Winter	100	+40%	100/30 Summer			
S2.000	STank 2	480 Winter	100	+40%	100/120 Summer			
S3.000	STank 1	480 Winter	100	+40%	100/120 Summer			
S2.001	S2	480 Winter	100	+40%	100/30 Summer			
S2.002	S3	480 Winter	100	+40%	100/30 Summer			
S1.001	S4	480 Winter	100	+40%	100/15 Summer			
S1.002	S5	480 Winter	100	+40%	1/15 Summer			
S4.000	SDemarcation	480 Winter	100	+40%				
S4.001	S6	480 Winter	100	+40%	100/30 Summer			
S1.003	S7	480 Winter	100	+40%	30/15 Summer			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
S1.000	S1	196.810	0.352	0.000	0.03			11.7

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
S2.000	STank 2	196.748	0.244	0.000	0.13		477	23.6
S3.000	STank 1	196.740	0.236	0.000	0.14		484	23.3
S2.001	S2	196.774	0.317	0.000	0.13			41.4
S2.002	S3	196.803	0.360	0.000	0.11			31.2
S1.001	S4	196.810	0.383	0.000	0.05			16.2
S1.002	S5	196.814	1.139	0.000	0.08			2.6
S4.000	SDemarcation	195.870	-0.041	0.000	0.00		268	2.9
S4.001	S6	195.870	0.171	0.000	0.10			1.2
S1.003	S7	195.868	0.293	0.000	0.14			3.5

PN	US/MH Name	Status	Level Exceeded
S1.000	S1	SURCHARGED	
S2.000	STank 2	SURCHARGED	
S3.000	STank 1	SURCHARGED	
S2.001	S2	SURCHARGED	
S2.002	S3	SURCHARGED	
S1.001	S4	SURCHARGED	
S1.002	S5	SURCHARGED	
S4.000	SDemarcation	OK	
S4.001	S6	SURCHARGED	
S1.003	S7	SURCHARGED	