STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FEH Rainfall Model

Return Period (years)	2
FEH Rainfall Version	2013
Site Location GB 404500 337500 SK 04500 37500	
Data Type	Point
Maximum Rainfall (mm/hr)	0
Maximum Time of Concentration (mins)	30
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	0.750
PIMP (%)	100
Add Flow / Climate Change (%)	0
Minimum Backdrop Height (m)	0.000
Maximum Backdrop Height (m)	0.000
Min Design Depth for Optimisation (m)	1.200
Min Vel for Auto Design only (m/s)	1.00
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	0.336	4-8	0.211

Total Area Contributing (ha) = 0.547

Total Pipe Volume (m^3) = 53.971

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

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)

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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
1.000	19.454	0.193	100.8	0.050	6.00	0.0	0.600	o	375	Pipe/Conduit	
1.001	23.215	0.341	68.1	0.135	0.00	0.0	0.600	o	375	Pipe/Conduit	
2.000	8.887	0.015	592.5	0.133	6.00	0.0	0.600	o	825	Pipe/Conduit	
1.002	37.639	0.054	697.0	0.093	0.00	0.0	0.600	o	825	Pipe/Conduit	
1.003	35.390	0.051	693.9	0.056	0.00	0.0	0.600	o	825	Pipe/Conduit	
3.000	10.200	0.200	51.0	0.017	6.00	0.0	0.600	o	225	Pipe/Conduit	
3.001	12.693	0.717	17.7	0.017	0.00	0.0	0.600	o	225	Pipe/Conduit	
4.000	5.000	0.017	294.1	0.000	6.00	0.0	0.600	o	375	Pipe/Conduit	
3.002	13.388	0.101	132.6	0.017	0.00	0.0	0.600	o	375	Pipe/Conduit	
3.003	10.408	0.026	400.3	0.017	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.004	12.345	0.049	251.9	0.012	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	0.00	6.18	110.800	0.050	0.0	0.0	0.0	1.80	199.3	0.0
1.001	0.00	6.36	110.607	0.185	0.0	0.0	0.0	2.20	242.8	0.0
2.000	0.00	6.12	109.831	0.133	0.0	0.0	0.0	1.21	648.1	0.0
1.002	0.00	6.92	109.816	0.411	0.0	0.0	0.0	1.12	597.0	0.0
1.003	0.00	7.44	109.762	0.467	0.0	0.0	0.0	1.12	598.4	0.0
3.000	0.00	6.09	110.900	0.017	0.0	0.0	0.0	1.84	73.0	0.0
3.001	0.00	6.16	110.700	0.034	0.0	0.0	0.0	3.13	124.3	0.0
4.000	0.00	6.08	109.850	0.000	0.0	0.0	0.0	1.05	116.1	0.0
3.002	0.00	6.30	109.833	0.051	0.0	0.0	0.0	1.57	173.6	0.0
3.003	0.00	6.47	109.732	0.068	0.0	0.0	0.0	1.01	160.6	0.0
1.004	0.00	7.65	109.706	0.547	0.0	0.0	0.0	0.99	69.7	0.0

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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)	Backdrop (mm)
10	112.825	2.025	Open Manhole	1350	1.000	110.800	375				
11	112.650	2.043	Open Manhole	1350	1.001	110.607	375	1.000	110.607	375	
12	112.250	2.419	Open Manhole	1800	2.000	109.831	825				
13	112.101	2.285	Open Manhole	1800	1.002	109.816	825	1.001	110.266	375	
								2.000	109.816	825	
14	112.300	2.538	Open Manhole	1800	1.003	109.762	825	1.002	109.762	825	
P1	111.900	1.000	Open Manhole	1200	3.000	110.900	225				
P2	111.900	1.200	Open Manhole	1200	3.001	110.700	225	3.000	110.700	225	
ATT TANK	111.800	1.950	Open Manhole	1350	4.000	109.850	375				
P3	111.900	2.067	Open Manhole	1350	3.002	109.833	375	3.001	109.983	225	
								4.000	109.833	375	
15	111.975	2.243	Open Manhole	1350	3.003	109.732	450	3.002	109.732	375	
FCC A	111.975	2.269	Open Manhole	3000	1.004	109.706	300	1.003	109.711	825	530
								3.003	109.706	450	
headwall	111.000	1.343	Open Manhole	0		OUTFALL		1.004	109.657	300	

No coordinates have been specified, layout information cannot be produced.

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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	10	112.825	110.800	1.650	Open Manhole	1350
1.001	o	375	11	112.650	110.607	1.668	Open Manhole	1350
2.000	o	825	12	112.250	109.831	1.594	Open Manhole	1800
1.002	o	825	13	112.101	109.816	1.460	Open Manhole	1800
1.003	o	825	14	112.300	109.762	1.713	Open Manhole	1800
3.000	o	225	P1	111.900	110.900	0.775	Open Manhole	1200
3.001	o	225	P2	111.900	110.700	0.975	Open Manhole	1200
4.000	o	375	ATT TANK	111.800	109.850	1.575	Open Manhole	1350
3.002	o	375	P3	111.900	109.833	1.692	Open Manhole	1350
3.003	o	450	15	111.975	109.732	1.793	Open Manhole	1350
1.004	o	300	FCC A	111.975	109.706	1.969	Open Manhole	3000

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	19.454	100.8	11	112.650	110.607	1.668	Open Manhole	1350
1.001	23.215	68.1	13	112.101	110.266	1.460	Open Manhole	1800
2.000	8.887	592.5	13	112.101	109.816	1.460	Open Manhole	1800
1.002	37.639	697.0	14	112.300	109.762	1.713	Open Manhole	1800
1.003	35.390	693.9	FCC A	111.975	109.711	1.439	Open Manhole	3000
3.000	10.200	51.0	P2	111.900	110.700	0.975	Open Manhole	1200
3.001	12.693	17.7	P3	111.900	109.983	1.692	Open Manhole	1350
4.000	5.000	294.1	P3	111.900	109.833	1.692	Open Manhole	1350
3.002	13.388	132.6	15	111.975	109.732	1.868	Open Manhole	1350
3.003	10.408	400.3	FCC A	111.975	109.706	1.819	Open Manhole	3000
1.004	12.345	251.9	headwall	111.000	109.657	1.043	Open Manhole	0

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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	10	375	1.650	1.668	Unclassified	1350	0	1.650	Unclassified
1.001	11	375	1.460	1.668	Unclassified	1350	0	1.668	Unclassified
2.000	12	825	1.460	1.594	Unclassified	1800	0	1.594	Unclassified
1.002	13	825	1.460	1.713	Unclassified	1800	0	1.460	Unclassified
1.003	14	825	1.439	1.713	Unclassified	1800	0	1.713	Unclassified
3.000	P1	225	0.775	0.975	Unclassified	1200	0	0.775	Unclassified
3.001	P2	225	0.975	1.692	Unclassified	1200	0	0.975	Unclassified
4.000	ATT TANK	375	1.575	1.692	Unclassified	1350	0	1.575	Unclassified
3.002	P3	375	1.692	1.868	Unclassified	1350	0	1.692	Unclassified
3.003	15	450	1.793	1.819	Unclassified	1350	0	1.793	Unclassified
1.004	FCC A	300	1.043	1.969	Unclassified	3000	0	1.969	Unclassified

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)
1.004	headwall	111.000	109.657	0.000	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)	Time (mins)	Depth (m)
10	0.290	190	0.290	370	0.622	550	0.622	730	0.277	910	0.259	1090	0.259
20	0.290	200	0.290	380	0.622	560	0.622	740	0.277	920	0.259	1100	0.259
30	0.290	210	0.290	390	0.622	570	0.622	750	0.277	930	0.259	1110	0.259
40	0.290	220	0.290	400	0.622	580	0.622	760	0.277	940	0.259	1120	0.259
50	0.290	230	0.290	410	0.622	590	0.622	770	0.277	950	0.259	1130	0.259
60	0.290	240	0.758	420	0.622	600	0.277	780	0.277	960	0.259	1140	0.259
70	0.290	250	0.758	430	0.622	610	0.277	790	0.277	970	0.259	1150	0.259
80	0.290	260	0.758	440	0.622	620	0.277	800	0.277	980	0.259	1160	0.259
90	0.290	270	0.758	450	0.622	630	0.277	810	0.277	990	0.259	1170	0.259
100	0.290	280	0.758	460	0.622	640	0.277	820	0.277	1000	0.259	1180	0.259
110	0.290	290	0.758	470	0.622	650	0.277	830	0.277	1010	0.259	1190	0.259
120	0.290	300	0.622	480	0.622	660	0.277	840	0.277	1020	0.259	1200	0.235
130	0.290	310	0.622	490	0.622	670	0.277	850	0.277	1030	0.259		
140	0.290	320	0.622	500	0.622	680	0.277	860	0.277	1040	0.259		
150	0.290	330	0.622	510	0.622	690	0.277	870	0.277	1050	0.259		
160	0.290	340	0.622	520	0.622	700	0.277	880	0.277	1060	0.259		
170	0.290	350	0.622	530	0.622	710	0.277	890	0.277	1070	0.259		
180	0.290	360	0.622	540	0.622	720	0.277	900	0.259	1080	0.259		

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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 * 10m³/ha Storage	2.000
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	10
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)	19.000	Storm Duration (mins)	30
Ratio R	0.373		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: FCC A, DS/PN: 1.004, Volume (m³): 35.0

Unit Reference	MD-SHE-0288-5000-1500-5000
Design Head (m)	1.500
Design Flow (l/s)	50.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	288
Invert Level (m)	109.706
Minimum Outlet Pipe Diameter (mm)	375
Suggested Manhole Diameter (mm)	2100

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	49.9	Kick-Flo®	1.067	42.4
Flush-Flo™	0.505	49.8	Mean Flow over Head Range	-	42.1

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	8.9	1.200	44.9	3.000	69.8	7.000	105.4
0.200	29.7	1.400	48.3	3.500	75.2	7.500	109.0
0.300	47.6	1.600	51.5	4.000	80.3	8.000	112.5
0.400	49.4	1.800	54.5	4.500	85.0	8.500	115.9
0.500	49.8	2.000	57.4	5.000	89.5	9.000	119.2
0.600	49.6	2.200	60.1	5.500	93.7	9.500	122.4
0.800	48.2	2.400	62.7	6.000	97.8		
1.000	44.8	2.600	65.1	6.500	101.7		

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Storage Structures for Storm

Porous Car Park Manhole: 10, DS/PN: 1.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	6.8
Membrane Percolation (mm/hr)	1000	Length (m)	10.0
Max Percolation (l/s)	18.9	Slope (1:X)	50.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	110.800	Cap Volume Depth (m)	0.350

Porous Car Park Manhole: 11, DS/PN: 1.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	8.0
Membrane Percolation (mm/hr)	1000	Length (m)	10.0
Max Percolation (l/s)	22.2	Slope (1:X)	50.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	110.607	Cap Volume Depth (m)	0.350

Porous Car Park Manhole: 12, DS/PN: 2.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	14.5
Membrane Percolation (mm/hr)	1000	Length (m)	10.0
Max Percolation (l/s)	40.3	Slope (1:X)	50.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	109.831	Cap Volume Depth (m)	0.350

Porous Car Park Manhole: 13, DS/PN: 1.002

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	15.2
Membrane Percolation (mm/hr)	1000	Length (m)	10.0
Max Percolation (l/s)	42.2	Slope (1:X)	50.0
Safety Factor	2.0	Depression Storage (mm)	0
Porosity	0.30	Evaporation (mm/day)	0
Invert Level (m)	109.816	Cap Volume Depth (m)	0.350

Porous Car Park Manhole: 14, DS/PN: 1.003

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	13.8
Max Percolation (l/s)	38.3	Slope (1:X)	50.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	109.762	Cap Volume Depth (m)	0.350

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Porous Car Park Manhole: P1, DS/PN: 3.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	2.4
Membrane Percolation (mm/hr)	1000	Length (m)	10.0
Max Percolation (l/s)	6.7	Slope (1:X)	50.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	110.900	Cap Volume Depth (m)	0.350

Porous Car Park Manhole: P2, DS/PN: 3.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	8.0
Membrane Percolation (mm/hr)	1000	Length (m)	10.0
Max Percolation (l/s)	22.2	Slope (1:X)	50.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	110.700	Cap Volume Depth (m)	0.350

Tank or Pond Manhole: ATT TANK, DS/PN: 4.000

Invert Level (m) 109.850

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	100.0	0.700	0.0	1.400	0.0	2.100	0.0
0.100	100.0	0.800	0.0	1.500	0.0	2.200	0.0
0.200	100.0	0.801	0.0	1.600	0.0	2.300	0.0
0.300	100.0	1.000	0.0	1.700	0.0	2.400	0.0
0.400	100.0	1.100	0.0	1.800	0.0	2.500	0.0
0.401	0.0	1.200	0.0	1.900	0.0		
0.600	0.0	1.300	0.0	2.000	0.0		

Porous Car Park Manhole: P3, DS/PN: 3.002

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	10.4
Max Percolation (l/s)	28.9	Slope (1:X)	50.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	109.833	Cap Volume Depth (m)	0.350

Porous Car Park Manhole: FCC A, DS/PN: 1.004

Infiltration Coefficient Base (m/hr)	0.00000	Invert Level (m)	109.706
Membrane Percolation (mm/hr)	1000	Width (m)	10.0
Max Percolation (l/s)	15.3	Length (m)	5.5
Safety Factor	2.0	Slope (1:X)	50.0
Porosity	0.30	Depression Storage (mm)	5

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Porous Car Park Manhole: FCC A, DS/PN: 1.004

Evaporation (mm/day) 3 Cap Volume Depth (m) 0.350

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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 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 10
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 0.373
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 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, 240, 360, 480, 960, 1440
Return Period(s) (years) 2, 30, 40, 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 (m)
1.000	10	15 Winter	2	+0%					110.852
1.001	11	15 Winter	2	+0%					110.696
2.000	12	30 Winter	2	+0%					110.016
1.002	13	30 Winter	2	+0%					110.013
1.003	14	30 Winter	2	+0%					109.972
3.000	P1	15 Winter	2	+0%					110.930
3.001	P2	15 Winter	2	+0%					110.731
4.000	ATT TANK	30 Winter	2	+0%					109.864
3.002	P3	30 Winter	2	+0%	100/15 Winter				109.941
3.003	15	30 Winter	2	+0%	100/15 Summer				109.941
1.004	FCC A	30 Winter	2	+0%	30/15 Summer				109.940

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	10	-0.323	0.000	0.05		5	7.7	OK	
1.001	11	-0.286	0.000	0.13		7	26.6	OK	
2.000	12	-0.640	0.000	0.04		12	11.6	OK	
1.002	13	-0.628	0.000	0.08		12	38.8	OK	
1.003	14	-0.615	0.000	0.08		13	38.5	OK	
3.000	P1	-0.195	0.000	0.04		6	2.6	OK	
3.001	P2	-0.194	0.000	0.05		7	5.0	OK	
4.000	ATT TANK	-0.361	0.000	0.01			0.6	OK	
3.002	P3	-0.267	0.000	0.04		9	4.9	OK	
3.003	15	-0.241	0.000	0.05			5.4	OK	
1.004	FCC A	-0.066	0.000	0.66		15	37.4	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 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 10
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 0.373
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 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, 240, 360, 480, 960, 1440
Return Period(s) (years) 2, 30, 40, 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 (m)
1.000	10	15 Winter	30	+0%					110.875
1.001	11	15 Winter	30	+0%					110.743
2.000	12	30 Winter	30	+0%					110.115
1.002	13	30 Winter	30	+0%					110.114
1.003	14	30 Winter	30	+0%					110.096
3.000	P1	15 Winter	30	+0%					110.943
3.001	P2	15 Winter	30	+0%					110.747
4.000	ATT TANK	60 Winter	30	+0%					109.956
3.002	P3	30 Winter	30	+0%	100/15 Winter				110.026
3.003	15	30 Winter	30	+0%	100/15 Summer				110.070
1.004	FCC A	30 Winter	30	+0%	30/15 Summer				110.077

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	10	-0.300	0.000	0.09		5	14.5	OK	
1.001	11	-0.239	0.000	0.28		5	58.0	OK	
2.000	12	-0.541	0.000	0.07		12	23.5	OK	
1.002	13	-0.527	0.000	0.16		12	76.6	OK	
1.003	14	-0.491	0.000	0.14		14	67.3	OK	
3.000	P1	-0.182	0.000	0.08		6	5.0	OK	
3.001	P2	-0.178	0.000	0.10		5	10.4	OK	
4.000	ATT TANK	-0.269	0.000	0.08			6.3	OK	
3.002	P3	-0.182	0.000	0.07		15	8.7	OK	
3.003	15	-0.112	0.000	0.10			9.4	OK	
1.004	FCC A	0.071	0.000	0.86		18	48.5	SURCHARGED	

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40 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 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 10
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 0.373
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 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, 240, 360, 480, 960, 1440
Return Period(s) (years) 2, 30, 40, 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 (m)
1.000	10	15 Winter	40	+0%					110.877
1.001	11	15 Winter	40	+0%					110.748
2.000	12	30 Winter	40	+0%					110.134
1.002	13	30 Winter	40	+0%					110.133
1.003	14	30 Winter	40	+0%					110.114
3.000	P1	15 Winter	40	+0%					110.944
3.001	P2	15 Winter	40	+0%					110.749
4.000	ATT TANK	60 Winter	40	+0%					109.973
3.002	P3	30 Winter	40	+0%	100/15 Winter				110.034
3.003	15	30 Winter	40	+0%	100/15 Summer				110.088
1.004	FCC A	30 Winter	40	+0%	30/15 Summer				110.096

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	10	-0.298	0.000	0.09		6	15.5	OK	
1.001	11	-0.234	0.000	0.30		5	61.6	OK	
2.000	12	-0.522	0.000	0.08		12	24.7	OK	
1.002	13	-0.508	0.000	0.17		14	81.4	OK	
1.003	14	-0.473	0.000	0.15		14	70.4	OK	
3.000	P1	-0.181	0.000	0.09		6	5.3	OK	
3.001	P2	-0.176	0.000	0.10		5	11.0	OK	
4.000	ATT TANK	-0.252	0.000	0.10			7.7	OK	
3.002	P3	-0.174	0.000	0.08		17	10.3	OK	
3.003	15	-0.094	0.000	0.11			11.0	OK	
1.004	FCC A	0.090	0.000	0.87		19	49.0	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 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 10
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 0.373
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 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, 240, 360, 480, 960, 1440
Return Period(s) (years) 2, 30, 40, 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 (m)
1.000	10	15 Winter	100	+40%					110.899
1.001	11	15 Winter	100	+40%					110.799
2.000	12	30 Winter	100	+40%					110.424
1.002	13	30 Winter	100	+40%					110.420
1.003	14	30 Winter	100	+40%					110.380
3.000	P1	15 Winter	100	+40%					110.957
3.001	P2	15 Winter	100	+40%					110.764
4.000	ATT TANK	60 Winter	100	+40%					110.216
3.002	P3	30 Winter	100	+40%	100/15 Winter				110.251
3.003	15	30 Winter	100	+40%	100/15 Summer				110.308
1.004	FCC A	30 Winter	100	+40%	30/15 Summer				110.341

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	10	-0.276	0.000	0.16		5	26.4	OK	
1.001	11	-0.183	0.000	0.51		5	105.0	OK	
2.000	12	-0.232	0.000	0.12		25	39.4	OK	
1.002	13	-0.221	0.000	0.27		25	129.7	OK	
1.003	14	-0.207	0.000	0.23		25	108.5	OK	
3.000	P1	-0.168	0.000	0.15		6	9.0	OK	
3.001	P2	-0.161	0.000	0.18		5	18.8	OK	
4.000	ATT TANK	-0.009	0.000	0.19			14.5	OK	
3.002	P3	0.043	0.000	0.15		29	19.2	SURCHARGED	
3.003	15	0.126	0.000	0.20			19.8	SURCHARGED	
1.004	FCC A	0.335	0.000	0.88		32	49.7	SURCHARGED	

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