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)	21.000	Add Flow / Climate Change (%)	40
Ratio R	0.434	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	20.000
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 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)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	21.529	0.230	93.6	0.015	5.00	0.0	0.600	o	150	Pipe/Conduit	
S2.000	7.730	1.455	5.3	0.021	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.001	1.000#	0.010	100.0	0.018	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.002	4.072	0.100	40.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S3.000	9.640	1.415	6.8	0.006	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.003	11.470	1.020	11.2	0.007	0.00	0.0	0.600	o	150	Pipe/Conduit	
S4.000	37.918	0.271	140.0	0.020	5.00	0.0	0.600	o	150	Pipe/Conduit	
S4.001	4.994	0.036	140.0	0.021	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)
S1.000	50.00	5.35	48.425	0.015	0.0	0.0	0.8	1.04	18.4	2.8
S2.000	50.00	5.03	49.650	0.021	0.0	0.0	1.1	4.40	77.8	4.0
S1.001	50.00	5.36	48.195	0.054	0.0	0.0	2.9	1.00	17.8	10.2
S1.002	50.00	5.40	48.185	0.054	0.0	0.0	2.9	1.58	28.0	10.2
S3.000	50.00	5.04	50.500	0.006	0.0	0.0	0.3	3.89	68.7	1.1
S1.003	50.00	5.47	48.085	0.066	0.0	0.0	3.6	3.02	53.4	12.6
S4.000	50.00	5.75	47.400	0.020	0.0	0.0	1.1	0.85	15.0	3.9
S4.001	50.00	5.84	47.129	0.042	0.0	0.0	2.3	0.85	15.0	7.9

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
S1.004	15.089	0.108	140.0	0.002	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.005	1.000#	0.020	50.0	0.017	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.006	4.494	0.045	99.9	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
S1.007	1.924	0.020	96.2	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
S1.008	6.516	0.930	7.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S5.000	13.400	1.050	12.8	0.020	5.00	0.0	0.600	o	150	Pipe/Conduit	
S5.001	6.357	0.050	127.1	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S5.002	4.168	0.500	8.3	0.013	0.00	0.0	0.600	o	150	Pipe/Conduit	
S5.003	3.917	0.050	78.3	0.008	0.00	0.0	0.600	o	150	Pipe/Conduit	
S6.000	20.722	0.140	148.0	0.007	5.00	0.0	0.600	o	150	Pipe/Conduit	
S6.001	4.851	0.250	19.4	0.024	0.00	0.0	0.600	o	150	Pipe/Conduit	
S6.002	1.000#	1.400	0.7	0.016	0.00	0.0	0.600	o	150	Pipe/Conduit	
S5.004	5.891	0.050	117.8	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S5.005	3.438	0.400	8.6	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
S5.006	21.369	0.480	44.5	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S5.007	25.343	1.180	21.5	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.009	8.508	1.640	5.2	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S7.000	13.328	0.167	80.0	0.023	5.00	0.0	0.600	o	150	Pipe/Conduit	
S7.001	12.963	0.162	80.0	0.015	0.00	0.0	0.600	o	150	Pipe/Conduit	
S7.002	13.354	0.223	60.0	0.013	0.00	0.0	0.600	o	150	Pipe/Conduit	
S7.003	26.225	0.656	40.0	0.017	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)
S1.004	50.00	6.07	46.990	0.110	0.0	0.0	6.0	1.10	43.9	20.9
S1.005	50.00	6.08	46.905	0.127	0.0	0.0	6.9	1.43	25.2	24.0
S1.006	50.00	6.18	46.885	0.127	0.0	0.0	6.9	0.77	6.0«	24.0
S1.007	50.00	6.22	46.840	0.127	0.0	0.0	6.9	0.78	6.2«	24.0
S1.008	50.00	6.25	46.770	0.127	0.0	0.0	6.9	3.83	67.7	24.0
S5.000	50.00	5.08	49.650	0.020	0.0	0.0	1.1	2.84	50.1	3.8
S5.001	50.00	5.20	48.600	0.020	0.0	0.0	1.1	0.89	15.7	3.8
S5.002	50.00	5.22	48.550	0.032	0.0	0.0	1.8	3.51	62.1	6.2
S5.003	50.00	5.28	48.050	0.041	0.0	0.0	2.2	1.14	20.1	7.7
S6.000	50.00	5.42	50.200	0.007	0.0	0.0	0.4	0.82	14.6	1.2
S6.001	50.00	5.45	49.650	0.031	0.0	0.0	1.7	2.30	40.6	5.8
S6.002	50.00	5.46	49.400	0.047	0.0	0.0	2.6	12.03	212.6	8.9
S5.004	50.00	5.56	48.000	0.088	0.0	0.0	4.8	0.92	16.3«	16.6
S5.005	50.00	5.58	47.950	0.088	0.0	0.0	4.8	2.65	20.8	16.6
S5.006	50.00	5.82	47.500	0.088	0.0	0.0	4.8	1.51	26.7	16.6
S5.007	50.00	6.01	47.020	0.088	0.0	0.0	4.8	2.18	38.6	16.6
S1.009	50.00	6.27	45.690	0.214	0.0	0.0	11.6	6.95	491.0	40.7
S7.000	50.00	5.20	48.750	0.023	0.0	0.0	1.3	1.12	19.9	4.4
S7.001	50.00	5.39	48.583	0.038	0.0	0.0	2.1	1.12	19.9	7.2
S7.002	50.00	5.56	48.421	0.051	0.0	0.0	2.7	1.30	23.0	9.6
S7.003	50.00	5.83	48.199	0.067	0.0	0.0	3.6	1.60	28.2	12.7

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
S7.004	6.011	0.050	120.0	0.020	0.00	0.0	0.600	o	225	Pipe/Conduit	
S7.005	10.056	0.218	46.1	0.023	0.00	0.0	0.600	o	225	Pipe/Conduit	
S7.006	8.844	0.050	176.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S8.000	16.005	0.200	80.0	0.008	5.00	0.0	0.600	o	150	Pipe/Conduit	
S8.001	10.798	0.110	98.2	0.019	0.00	0.0	0.600	o	150	Pipe/Conduit	
S8.002	15.537	0.110	141.2	0.008	0.00	0.0	0.600	o	150	Pipe/Conduit	
S8.003	11.273	0.080	140.9	0.018	0.00	0.0	0.600	o	150	Pipe/Conduit	
S8.004	14.938	0.250	59.8	0.008	0.00	0.0	0.600	o	150	Pipe/Conduit	
S8.005	11.018	0.300	36.7	0.019	0.00	0.0	0.600	o	150	Pipe/Conduit	
S8.006	6.844	0.500	13.7	0.007	0.00	0.0	0.600	o	150	Pipe/Conduit	
S7.007	6.018	0.040	150.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S9.000	2.280	0.265	8.6	0.013	5.00	0.0	0.600	o	150	Pipe/Conduit	
S7.008	7.521	0.050	150.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S7.009	7.352	0.215	34.2	0.008	0.00	0.0	0.600	o	100	Pipe/Conduit	
S7.010	7.301	0.061	120.0	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)
S7.004	50.00	5.92	47.468	0.087	0.0	0.0	4.7	1.19	47.4	16.6
S7.005	50.00	6.01	47.218	0.110	0.0	0.0	6.0	1.93	76.8	20.9
S7.006	50.00	6.20	47.000	0.110	0.0	0.0	6.0	0.75	13.3«	20.9
S8.000	50.00	5.24	48.500	0.008	0.0	0.0	0.4	1.12	19.9	1.5
S8.001	50.00	5.41	48.300	0.027	0.0	0.0	1.5	1.01	17.9	5.1
S8.002	50.00	5.72	48.190	0.035	0.0	0.0	1.9	0.84	14.9	6.6
S8.003	50.00	5.94	48.080	0.053	0.0	0.0	2.9	0.84	14.9	10.1
S8.004	50.00	6.14	48.000	0.062	0.0	0.0	3.3	1.30	23.0	11.7
S8.005	50.00	6.25	47.750	0.081	0.0	0.0	4.4	1.67	29.4	15.3
S8.006	50.00	6.29	47.450	0.088	0.0	0.0	4.7	2.74	48.4	16.6
S7.007	50.00	6.38	46.875	0.198	0.0	0.0	10.7	1.07	42.4	37.5
S9.000	50.00	5.01	47.175	0.013	0.0	0.0	0.7	3.46	61.1	2.4
S7.008	50.00	6.50	46.835	0.211	0.0	0.0	11.4	1.07	42.4	39.9
S7.009	50.00	6.59	46.785	0.218	0.0	0.0	11.8	1.32	10.4«	41.4
S7.010	50.00	6.72	46.520	0.218	0.0	0.0	11.8	0.92	16.2«	41.4

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)
S1.009	S	47.250	44.050	0.000	0	0

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)
S7.010	S	47.720	46.459	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	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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 3 Number of Storage Structures 4 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)	21.000	Storm Duration (mins)	30
Ratio R	0.434		

Online Controls for Storm

Hydro-Brake® Optimum Manhole: SAFC, DS/PN: S1.006, Volume (m³): 1.4

Unit Reference	MD-SHE-0071-2100-0865-2100
Design Head (m)	0.865
Design Flow (l/s)	2.1
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	71
Invert Level (m)	46.885
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.865	2.1	Kick-Flo®	0.547	1.7
Flush-Flo™	0.264	2.1	Mean Flow over Head Range	-	1.8

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	1.8	0.800	2.0	2.000	3.1	4.000	4.2	7.000	5.5
0.200	2.1	1.000	2.2	2.200	3.2	4.500	4.5	7.500	5.7
0.300	2.1	1.200	2.4	2.400	3.3	5.000	4.7	8.000	5.9
0.400	2.0	1.400	2.6	2.600	3.5	5.500	4.9	8.500	6.1
0.500	1.9	1.600	2.8	3.000	3.7	6.000	5.1	9.000	6.2
0.600	1.8	1.800	2.9	3.500	4.0	6.500	5.3	9.500	6.4

Hydro-Brake® Optimum Manhole: SBFC, DS/PN: S5.005, Volume (m³): 2.5

Unit Reference	MD-SHE-0064-2100-1400-2100
Design Head (m)	1.400
Design Flow (l/s)	2.1
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	64
Invert Level (m)	47.950
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.400	2.1	Kick-Flo®	0.569	1.4
Flush-Flo™	0.280	1.7	Mean Flow over Head Range	-	1.7

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	1.5	0.400	1.7	0.800	1.6	1.400	2.1	2.000	2.5
0.200	1.7	0.500	1.6	1.000	1.8	1.600	2.2	2.200	2.6
0.300	1.7	0.600	1.4	1.200	2.0	1.800	2.4	2.400	2.7

Hydro-Brake® Optimum Manhole: SBFC, DS/PN: S5.005, Volume (m³): 2.5

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)
2.600	2.8	4.000	3.4	5.500	4.0	7.000	4.4	8.500	4.8
3.000	3.0	4.500	3.6	6.000	4.1	7.500	4.6	9.000	5.0
3.500	3.2	5.000	3.8	6.500	4.3	8.000	4.7	9.500	5.1

Hydro-Brake® Optimum Manhole: SCFC, DS/PN: S7.009, Volume (m³): 1.7

Unit Reference	MD-SHE-0073-2300-0965-2300
Design Head (m)	0.965
Design Flow (l/s)	2.3
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	73
Invert Level (m)	46.785
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.965	2.3	Kick-Flo®	0.603	1.9
Flush-Flo™	0.294	2.3	Mean Flow over Head Range	-	2.0

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	1.9	0.800	2.1	2.000	3.2	4.000	4.4	7.000	5.8
0.200	2.2	1.000	2.3	2.200	3.4	4.500	4.7	7.500	6.0
0.300	2.3	1.200	2.5	2.400	3.5	5.000	4.9	8.000	6.1
0.400	2.3	1.400	2.7	2.600	3.6	5.500	5.1	8.500	6.3
0.500	2.1	1.600	2.9	3.000	3.9	6.000	5.4	9.000	6.5
0.600	1.9	1.800	3.1	3.500	4.2	6.500	5.6	9.500	6.7

Storage Structures for Storm

Cellular Storage Manhole: SAtank, DS/PN: S1.005

Invert Level (m) 46.905 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	120.0	120.0	0.500	120.0	154.0	0.501	0.0	154.0

Porous Car Park Manhole: SRE, DS/PN: S6.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	2.0
Membrane Percolation (mm/hr)	1000	Length (m)	19.0
Max Percolation (l/s)	10.6	Slope (1:X)	150.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	50.550	Cap Volume Depth (m)	0.150

Cellular Storage Manhole: SBtank, DS/PN: S5.004

Invert Level (m) 48.000 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	40.0	40.0	0.800	40.0	68.0	0.801	0.0	68.0

Cellular Storage Manhole: SCtank, DS/PN: S7.006

Invert Level (m) 47.000 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	260.0	280.0	0.500	260.0	341.0	0.501	0.0	341.0

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	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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 3 Number of Storage Structures 4 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 21.000	Cv (Summer) 0.750
Region	England and Wales	Ratio R 0.431	Cv (Winter) 0.840

Margin for Flood Risk Warning (mm)	0.0
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, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
S1.000	SA1	15 Winter	1	+0%					48.461	-0.114
S2.000	SA2	15 Winter	1	+0%					49.671	-0.129
S1.001	SA3	15 Winter	1	+0%	30/15 Summer				48.289	-0.056
S1.002	SRHT	15 Winter	1	+0%	100/15 Summer				48.250	-0.085
S3.000	SRE	15 Winter	1	+0%					50.510	-0.140
S1.003	SA4	15 Winter	1	+0%					48.130	-0.105
S4.000	SRE	15 Winter	1	+0%					47.447	-0.103
S4.001	SA5	15 Winter	1	+0%	30/15 Summer				47.202	-0.077
S1.004	SA6	15 Winter	1	+0%	100/15 Summer				47.088	-0.127
S1.005	SAtank	120 Winter	1	+0%	30/15 Summer				46.998	-0.057
S1.006	SAFC	120 Winter	1	+0%	1/30 Winter				46.999	0.014
S1.007	SA7	120 Winter	1	+0%					46.888	-0.052
S1.008	SexS27	120 Winter	1	+0%					46.787	-0.133
S5.000	SB1	15 Winter	1	+0%					49.675	-0.125
S5.001	SB2	15 Winter	1	+0%					48.648	-0.102
S5.002	SB3	15 Winter	1	+0%					48.582	-0.118
S5.003	SB4	60 Winter	1	+0%	30/15 Summer				48.148	-0.052
S6.000	SRE	15 Winter	1	+0%					50.226	-0.124
S6.001	SB5	15 Winter	1	+0%					49.685	-0.115
S6.002	SB6	15 Winter	1	+0%					49.428	-0.122
S5.004	SBtank	60 Winter	1	+0%	30/15 Summer				48.147	-0.003
S5.005	SBFC	60 Winter	1	+0%	1/15 Summer				48.144	0.094
S5.006	SexS25	240 Winter	1	+0%					47.524	-0.126
S5.007	SexS26	240 Winter	1	+0%					47.040	-0.130
S1.009	SexS29	240 Winter	1	+0%					45.705	-0.285
S7.000	SC1	15 Winter	1	+0%					48.795	-0.105
S7.001	SC2	15 Winter	1	+0%	100/15 Summer				48.640	-0.094
S7.002	SC3	15 Winter	1	+0%	100/15 Summer				48.481	-0.090
S7.003	SC4	15 Winter	1	+0%	100/15 Summer				48.259	-0.090
S7.004	SC5	15 Winter	1	+0%	30/15 Winter				47.562	-0.131

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

PN	US/MH Name	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	SA1	0.000	0.13		2.2	OK	
S2.000	SA2	0.000	0.05		3.1	OK	
S1.001	SA3	0.000	0.70		7.6	OK	
S1.002	SRHT	0.000	0.39		7.7	OK	
S3.000	SRE	0.000	0.01		0.8	OK	
S1.003	SA4	0.000	0.19		9.3	OK	
S4.000	SRE	0.000	0.21		3.0	OK	
S4.001	SA5	0.000	0.48		5.6	OK	
S1.004	SA6	0.000	0.39		15.2	OK	
S1.005	SAtank	0.000	0.18		2.0	OK	
S1.006	SAFC	0.000	0.35		1.8	SURCHARGED	
S1.007	SA7	0.000	0.46		1.8	OK	
S1.008	SexS27	0.000	0.03		1.8	OK	
S5.000	SB1	0.000	0.06		3.0	OK	
S5.001	SB2	0.000	0.22		2.9	OK	
S5.002	SB3	0.000	0.10		4.6	OK	
S5.003	SB4	0.000	0.22		3.1	OK	
S6.000	SRE	0.000	0.07		0.9	OK	
S6.001	SB5	0.000	0.12		3.9	OK	
S6.002	SB6	0.000	0.08		5.8	OK	
S5.004	SBtank	0.000	0.13		1.8	OK	
S5.005	SBFC	0.000	0.09		1.6	SURCHARGED	
S5.006	SexS25	0.000	0.06		1.6	OK	
S5.007	SexS26	0.000	0.04		1.6	OK	
S1.009	SexS29	0.000	0.01		3.4	OK	
S7.000	SC1	0.000	0.19		3.5	OK	
S7.001	SC2	0.000	0.30		5.4	OK	
S7.002	SC3	0.000	0.33		7.0	OK	
S7.003	SC4	0.000	0.34		9.1	OK	
S7.004	SC5	0.000	0.37		11.6	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)	Surcharged Depth (m)
S7.005	SC6	15 Winter	1	+0%					47.290	-0.153
S7.006	SCtank	120 Winter	1	+0%	30/30 Summer				47.069	-0.081
S8.000	SC7	15 Winter	1	+0%					48.525	-0.125
S8.001	SC8	15 Winter	1	+0%	100/15 Summer				48.348	-0.102
S8.002	SC9	15 Winter	1	+0%	30/15 Summer				48.250	-0.090
S8.003	SC10	15 Winter	1	+0%	30/15 Summer				48.156	-0.074
S8.004	SC11	15 Winter	1	+0%	30/15 Summer				48.063	-0.087
S8.005	SC12	15 Winter	1	+0%	30/15 Summer				47.815	-0.085
S8.006	SC13	15 Winter	1	+0%	30/15 Summer				47.503	-0.097
S7.007	SC14	15 Summer	1	+0%	1/15 Summer				47.231	0.131
S9.000	SC15	15 Winter	1	+0%	30/15 Summer				47.241	-0.084
S7.008	Sj	180 Winter	1	+0%					47.060	0.000
S7.009	SCFC	15 Winter	1	+0%	1/15 Summer				47.233	0.348
S7.010	SexS53	600 Winter	1	+0%					46.560	-0.110

PN	US/MH Name	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S7.005	SC6	0.000	0.23		14.4	OK	
S7.006	SCtank	0.000	0.19		2.2	OK	
S8.000	SC7	0.000	0.06		1.2	OK	
S8.001	SC8	0.000	0.22		3.6	OK	
S8.002	SC9	0.000	0.34		4.6	OK	
S8.003	SC10	0.000	0.51		6.9	OK	
S8.004	SC11	0.000	0.37		7.9	OK	
S8.005	SC12	0.000	0.39		10.2	OK	
S8.006	SC13	0.000	0.27		11.0	OK	
S7.007	SC14	0.000	0.18		5.4	SURCHARGED	
S9.000	SC15	0.000	0.06		2.0	OK	
S7.008	Sj	0.000	0.08		2.5	SURCHARGED*	
S7.009	SCFC	0.000	0.24		2.3	SURCHARGED	
S7.010	SexS53	0.000	0.16		2.3	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	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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 3 Number of Storage Structures 4 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 21.000	Cv (Summer) 0.750
Region	England and Wales	Ratio R 0.431	Cv (Winter) 0.840

Margin for Flood Risk Warning (mm)	0.0
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, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
S1.000	SA1	15 Winter	30	+0%					48.483	-0.092
S2.000	SA2	15 Winter	30	+0%					49.684	-0.116
S1.001	SA3	15 Winter	30	+0%	30/15 Summer				48.434	0.089
S1.002	SRHT	15 Winter	30	+0%	100/15 Summer				48.314	-0.021
S3.000	SRE	15 Winter	30	+0%					50.518	-0.132
S1.003	SA4	15 Winter	30	+0%					48.161	-0.074
S4.000	SRE	15 Winter	30	+0%					47.477	-0.073
S4.001	SA5	15 Winter	30	+0%	30/15 Summer				47.299	0.020
S1.004	SA6	15 Winter	30	+0%	100/15 Summer				47.215	0.000
S1.005	SAtank	120 Winter	30	+0%	30/15 Summer				47.161	0.106
S1.006	SAFC	120 Winter	30	+0%	1/30 Winter				47.164	0.179
S1.007	SA7	120 Winter	30	+0%					46.892	-0.048
S1.008	SexS27	120 Winter	30	+0%					46.788	-0.132
S5.000	SB1	15 Winter	30	+0%					49.690	-0.110
S5.001	SB2	15 Winter	30	+0%					48.680	-0.070
S5.002	SB3	15 Winter	30	+0%					48.604	-0.096
S5.003	SB4	120 Winter	30	+0%	30/15 Summer				48.455	0.255
S6.000	SRE	15 Winter	30	+0%					50.242	-0.108
S6.001	SB5	15 Winter	30	+0%					49.714	-0.086
S6.002	SB6	15 Winter	30	+0%					49.451	-0.099
S5.004	SBtank	120 Winter	30	+0%	30/15 Summer				48.453	0.303
S5.005	SBFC	120 Winter	30	+0%	1/15 Summer				48.450	0.400
S5.006	SexS25	240 Summer	30	+0%					47.525	-0.125
S5.007	SexS26	240 Summer	30	+0%					47.041	-0.129
S1.009	SexS29	240 Winter	30	+0%					45.707	-0.283
S7.000	SC1	15 Winter	30	+0%					48.823	-0.077
S7.001	SC2	15 Winter	30	+0%	100/15 Summer				48.686	-0.048
S7.002	SC3	15 Winter	30	+0%	100/15 Summer				48.534	-0.037
S7.003	SC4	15 Winter	30	+0%	100/15 Summer				48.315	-0.034
S7.004	SC5	15 Winter	30	+0%	30/15 Winter				47.694	0.001

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

PN	US/MH Name	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	SA1	0.000	0.31		5.4	OK	
S2.000	SA2	0.000	0.11		7.7	OK	
S1.001	SA3	0.000	1.83		19.8	SURCHARGED	
S1.002	SRHT	0.000	1.00		19.8	OK	
S3.000	SRE	0.000	0.03		2.1	OK	
S1.003	SA4	0.000	0.50		24.2	OK	
S4.000	SRE	0.000	0.51		7.3	OK	
S4.001	SA5	0.000	1.28		15.2	SURCHARGED	
S1.004	SA6	0.000	1.02		39.4	OK	
S1.005	SAtank	0.000	0.22		2.4	SURCHARGED	
S1.006	SAFC	0.000	0.40		2.1	SURCHARGED	
S1.007	SA7	0.000	0.53		2.1	OK	
S1.008	SexS27	0.000	0.04		2.1	OK	
S5.000	SB1	0.000	0.16		7.3	OK	
S5.001	SB2	0.000	0.54		7.2	OK	
S5.002	SB3	0.000	0.27		12.1	OK	
S5.003	SB4	0.000	0.31		4.3	SURCHARGED	
S6.000	SRE	0.000	0.17		2.4	OK	
S6.001	SB5	0.000	0.38		11.9	OK	
S6.002	SB6	0.000	0.25		18.3	OK	
S5.004	SBtank	0.000	0.14		1.9	SURCHARGED	
S5.005	SBFC	0.000	0.10		1.7	SURCHARGED	
S5.006	SexS25	0.000	0.07		1.7	OK	
S5.007	SexS26	0.000	0.05		1.7	OK	
S1.009	SexS29	0.000	0.01		3.8	OK	
S7.000	SC1	0.000	0.47		8.5	OK	
S7.001	SC2	0.000	0.79		14.3	OK	
S7.002	SC3	0.000	0.90		19.0	OK	
S7.003	SC4	0.000	0.94		25.2	OK	
S7.004	SC5	0.000	1.02		32.1	SURCHARGED	

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)	Surcharged Depth (m)
S7.005	SC6	15 Winter	30	+0%					47.348	-0.095
S7.006	SCtank	180 Winter	30	+0%	30/30 Summer				47.223	0.073
S8.000	SC7	15 Winter	30	+0%					48.540	-0.110
S8.001	SC8	15 Winter	30	+0%	100/15 Summer				48.416	-0.034
S8.002	SC9	15 Winter	30	+0%	30/15 Summer				48.381	0.041
S8.003	SC10	15 Winter	30	+0%	30/15 Summer				48.304	0.074
S8.004	SC11	15 Winter	30	+0%	30/15 Summer				48.170	0.020
S8.005	SC12	15 Winter	30	+0%	30/15 Summer				47.955	0.055
S8.006	SC13	15 Winter	30	+0%	30/15 Summer				47.687	0.087
S7.007	SC14	15 Winter	30	+0%	1/15 Summer				47.476	0.376
S9.000	SC15	15 Winter	30	+0%	30/15 Summer				47.490	0.165
S7.008	Sj	30 Winter	30	+0%					47.060	0.000
S7.009	SCFC	15 Winter	30	+0%	1/15 Summer				47.486	0.601
S7.010	SexS53	2160 Winter	30	+0%					46.560	-0.110

PN	US/MH Name	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S7.005	SC6	0.000	0.63		40.3	OK	
S7.006	SCtank	0.000	0.17		2.0	SURCHARGED	
S8.000	SC7	0.000	0.16		2.9	OK	
S8.001	SC8	0.000	0.60		9.6	OK	
S8.002	SC9	0.000	0.86		11.9	SURCHARGED	
S8.003	SC10	0.000	1.35		18.1	SURCHARGED	
S8.004	SC11	0.000	0.93		19.7	SURCHARGED	
S8.005	SC12	0.000	0.94		25.0	SURCHARGED	
S8.006	SC13	0.000	0.65		26.7	SURCHARGED	
S7.007	SC14	0.000	0.23		6.7	SURCHARGED	
S9.000	SC15	0.000	0.14		4.6	SURCHARGED	
S7.008	Sj	0.000	0.11		3.6	SURCHARGED*	
S7.009	SCFC	0.000	0.23		2.2	SURCHARGED	
S7.010	SexS53	0.000	0.16		2.3	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	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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 3 Number of Storage Structures 4 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 21.000	Cv (Summer) 0.750
Region	England and Wales	Ratio R 0.431	Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 0.0
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, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
S1.000	SA1	15 Winter	100	+0%					48.569	-0.006
S2.000	SA2	15 Winter	100	+0%					49.689	-0.111
S1.001	SA3	15 Winter	100	+0%	30/15 Summer				48.537	0.192
S1.002	SRHT	15 Winter	100	+0%	100/15 Summer				48.379	0.044
S3.000	SRE	15 Winter	100	+0%					50.520	-0.130
S1.003	SA4	15 Winter	100	+0%					48.171	-0.064
S4.000	SRE	15 Winter	100	+0%					47.491	-0.059
S4.001	SA5	15 Winter	100	+0%	30/15 Summer				47.366	0.087
S1.004	SA6	15 Winter	100	+0%	100/15 Summer				47.276	0.061
S1.005	SAtank	120 Winter	100	+0%	30/15 Summer				47.260	0.205
S1.006	SAFC	120 Winter	100	+0%	1/30 Winter				47.257	0.272
S1.007	SA7	120 Winter	100	+0%					46.892	-0.048
S1.008	SexS27	120 Winter	100	+0%					46.788	-0.132
S5.000	SB1	15 Winter	100	+0%					49.696	-0.104
S5.001	SB2	15 Winter	100	+0%					48.695	-0.055
S5.002	SB3	120 Winter	100	+0%					48.659	-0.041
S5.003	SB4	120 Winter	100	+0%	30/15 Summer				48.658	0.458
S6.000	SRE	15 Winter	100	+0%					50.249	-0.101
S6.001	SB5	15 Winter	100	+0%					49.725	-0.075
S6.002	SB6	15 Winter	100	+0%					49.459	-0.091
S5.004	SBtank	120 Winter	100	+0%	30/15 Summer				48.657	0.507
S5.005	SBFC	120 Winter	100	+0%	1/15 Summer				48.653	0.603
S5.006	SexS25	600 Summer	100	+0%					47.525	-0.125
S5.007	SexS26	600 Summer	100	+0%					47.041	-0.129
S1.009	SexS29	600 Winter	100	+0%					45.707	-0.283
S7.000	SC1	15 Winter	100	+0%					48.842	-0.058
S7.001	SC2	15 Winter	100	+0%	100/15 Summer				48.791	0.058
S7.002	SC3	15 Winter	100	+0%	100/15 Summer				48.660	0.089
S7.003	SC4	15 Winter	100	+0%	100/15 Summer				48.426	0.078
S7.004	SC5	15 Summer	100	+0%	30/15 Winter				47.706	0.012

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

PN	US/MH Name	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	SA1	0.000	0.41		7.1	OK	
S2.000	SA2	0.000	0.15		10.0	OK	
S1.001	SA3	0.000	2.25		24.4	SURCHARGED	
S1.002	SRHT	0.000	1.23		24.4	SURCHARGED	
S3.000	SRE	0.000	0.04		2.7	OK	
S1.003	SA4	0.000	0.62		30.0	OK	
S4.000	SRE	0.000	0.66		9.5	OK	
S4.001	SA5	0.000	1.58		18.6	SURCHARGED	
S1.004	SA6	0.000	1.27		49.1	SURCHARGED	
S1.005	SAtank	0.000	0.21		2.3	SURCHARGED	
S1.006	SAFC	0.000	0.40		2.1	SURCHARGED	
S1.007	SA7	0.000	0.53		2.1	OK	
S1.008	SexS27	0.000	0.04		2.1	OK	
S5.000	SB1	0.000	0.21		9.5	OK	
S5.001	SB2	0.000	0.71		9.4	OK	
S5.002	SB3	0.000	0.11		4.8	OK	
S5.003	SB4	0.000	0.40		5.6	SURCHARGED	
S6.000	SRE	0.000	0.23		3.1	OK	
S6.001	SB5	0.000	0.49		15.5	OK	
S6.002	SB6	0.000	0.32		23.8	OK	
S5.004	SBtank	0.000	0.15		2.0	SURCHARGED	
S5.005	SBFC	0.000	0.10		1.7	SURCHARGED	
S5.006	SexS25	0.000	0.07		1.7	OK	
S5.007	SexS26	0.000	0.05		1.7	OK	
S1.009	SexS29	0.000	0.01		3.8	OK	
S7.000	SC1	0.000	0.61		11.1	OK	
S7.001	SC2	0.000	0.90		16.4	SURCHARGED	
S7.002	SC3	0.000	1.02		21.5	SURCHARGED	
S7.003	SC4	0.000	1.05		28.2	SURCHARGED	
S7.004	SC5	0.000	1.19		37.6	SURCHARGED	

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)	Surcharged Depth (m)
S7.005	SC6	15 Winter	100	+0%					47.368	-0.075
S7.006	SCtank	180 Winter	100	+0%	30/30 Summer				47.311	0.161
S8.000	SC7	15 Winter	100	+0%					48.627	-0.023
S8.001	SC8	15 Winter	100	+0%	100/15 Summer				48.614	0.164
S8.002	SC9	15 Winter	100	+0%	30/15 Summer				48.580	0.240
S8.003	SC10	15 Winter	100	+0%	30/15 Summer				48.509	0.279
S8.004	SC11	15 Winter	100	+0%	30/15 Summer				48.368	0.218
S8.005	SC12	15 Winter	100	+0%	30/15 Summer				48.134	0.234
S8.006	SC13	15 Winter	100	+0%	30/15 Summer				47.816	0.216
S7.007	SC14	15 Winter	100	+0%	1/15 Summer				47.565	0.465
S9.000	SC15	15 Winter	100	+0%	30/15 Summer				47.582	0.257
S7.008	Sj	15 Winter	100	+0%					47.060	0.000
S7.009	SCFC	15 Winter	100	+0%	1/15 Summer				47.577	0.692
S7.010	SexS53	2880 Winter	100	+0%					46.560	-0.110

PN	US/MH Name	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S7.005	SC6	0.000	0.77		49.2	OK	
S7.006	SCtank	0.000	0.18		2.1	SURCHARGED	
S8.000	SC7	0.000	0.19		3.6	OK	
S8.001	SC8	0.000	0.62		10.0	SURCHARGED	
S8.002	SC9	0.000	0.91		12.5	SURCHARGED	
S8.003	SC10	0.000	1.39		18.7	SURCHARGED	
S8.004	SC11	0.000	0.97		20.6	SURCHARGED	
S8.005	SC12	0.000	1.02		27.1	SURCHARGED	
S8.006	SC13	0.000	0.71		29.2	SURCHARGED	
S7.007	SC14	0.000	0.23		6.8	SURCHARGED	
S9.000	SC15	0.000	0.16		5.2	SURCHARGED	
S7.008	Sj	0.000	0.16		5.0	SURCHARGED*	
S7.009	SCFC	0.000	0.24		2.2	SURCHARGED	
S7.010	SexS53	0.000	0.16		2.3	OK	

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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 3 Number of Storage Structures 4 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 21.000	Cv (Summer) 0.750
Region England and Wales		Ratio R 0.431	Cv (Winter) 0.840

Margin for Flood Risk Warning (mm)	0.0
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)	100
Climate Change (%)	40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
S1.000	SA1	15 Winter	100	+40%	100/15 Summer				48.851	0.276
S2.000	SA2	15 Winter	100	+40%					49.697	-0.103
S1.001	SA3	15 Winter	100	+40%	100/15 Summer				48.787	0.442
S1.002	SRHT	15 Winter	100	+40%	100/15 Summer				48.504	0.169
S3.000	SRE	15 Winter	100	+40%					50.524	-0.126
S1.003	SA4	15 Winter	100	+40%					48.191	-0.044
S4.000	SRE	180 Winter	100	+40%	100/15 Summer				47.853	0.303
S4.001	SA5	180 Winter	100	+40%	100/15 Summer				47.850	0.571
S1.004	SA6	180 Winter	100	+40%	100/15 Summer				47.850	0.635
S1.005	SAtank	180 Winter	100	+40%	100/15 Summer				47.848	0.793
S1.006	SAFC	180 Winter	100	+40%	100/15 Summer				47.846	0.861
S1.007	SA7	180 Winter	100	+40%					46.893	-0.047
S1.008	SexS27	180 Winter	100	+40%					46.789	-0.131
S5.000	SB1	120 Winter	100	+40%					49.725	-0.075
S5.001	SB2	120 Winter	100	+40%	100/30 Winter				49.723	0.973
S5.002	SB3	120 Winter	100	+40%	100/30 Winter				49.722	1.022
S5.003	SB4	120 Winter	100	+40%	100/15 Summer				49.720	1.520
S6.000	SRE	15 Winter	100	+40%					50.259	-0.091
S6.001	SB5	15 Winter	100	+40%					49.743	-0.057
S6.002	SB6	120 Winter	100	+40%	100/120 Winter				49.719	0.169
S5.004	SBtank	120 Winter	100	+40%	100/15 Summer				49.719	1.569
S5.005	SBFC	120 Winter	100	+40%	100/15 Summer				49.713	1.663
S5.006	SexS25	120 Winter	100	+40%					47.531	-0.119
S5.007	SexS26	120 Winter	100	+40%					47.044	-0.126
S1.009	SexS29	180 Winter	100	+40%					45.710	-0.280
S7.000	SC1	15 Winter	100	+40%	100/15 Summer				49.255	0.355
S7.001	SC2	15 Winter	100	+40%	100/15 Summer				49.176	0.442
S7.002	SC3	15 Winter	100	+40%	100/15 Summer				49.005	0.434
S7.003	SC4	15 Winter	100	+40%	100/15 Summer				48.709	0.361
S7.004	SC5	15 Winter	100	+40%	100/15 Summer				47.738	0.045

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

PN	US/MH Name	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	SA1	0.000	0.57		9.9	SURCHARGED	
S2.000	SA2	0.000	0.21		14.1	OK	
S1.001	SA3	0.000	3.03		32.9	SURCHARGED	
S1.002	SRHT	0.000	1.65		32.6	SURCHARGED	
S3.000	SRE	0.000	0.06		3.8	OK	
S1.003	SA4	0.000	0.84		40.3	OK	
S4.000	SRE	0.000	0.21		3.1	SURCHARGED	
S4.001	SA5	0.000	0.52		6.2	SURCHARGED	
S1.004	SA6	0.000	0.42		16.4	SURCHARGED	
S1.005	SAtank	0.000	0.23		2.5	SURCHARGED	
S1.006	SAFC	0.000	0.42		2.2	SURCHARGED	
S1.007	SA7	0.000	0.56		2.2	OK	
S1.008	SexS27	0.000	0.04		2.2	OK	
S5.000	SB1	0.000	0.09		4.1	OK	
S5.001	SB2	0.000	0.31		4.1	SURCHARGED	
S5.002	SB3	0.000	0.15		6.7	SURCHARGED	
S5.003	SB4	0.000	0.56		7.9	SURCHARGED	
S6.000	SRE	0.000	0.32		4.4	OK	
S6.001	SB5	0.000	0.69		21.7	OK	
S6.002	SB6	0.000	0.13		9.8	SURCHARGED	
S5.004	SBtank	0.000	0.25		3.4	SURCHARGED	
S5.005	SBFC	0.000	0.13		2.3	SURCHARGED	
S5.006	SexS25	0.000	0.09		2.3	OK	
S5.007	SexS26	0.000	0.06		2.3	OK	
S1.009	SexS29	0.000	0.01		4.5	OK	
S7.000	SC1	0.000	0.68		12.3	SURCHARGED	
S7.001	SC2	0.000	1.06		19.2	SURCHARGED	
S7.002	SC3	0.000	1.19		25.0	SURCHARGED	
S7.003	SC4	0.000	1.22		32.7	SURCHARGED	
S7.004	SC5	0.000	1.42		44.8	SURCHARGED	

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)	Surcharged Depth (m)
S7.005	SC6	240 Winter	100	+40%	100/120 Winter				47.478	0.035
S7.006	SCtank	240 Winter	100	+40%	100/15 Summer				47.476	0.326
S8.000	SC7	15 Winter	100	+40%	100/15 Summer				49.126	0.476
S8.001	SC8	15 Winter	100	+40%	100/15 Summer				49.113	0.663
S8.002	SC9	15 Winter	100	+40%	100/15 Summer				49.065	0.725
S8.003	SC10	15 Winter	100	+40%	100/15 Summer				48.971	0.741
S8.004	SC11	15 Winter	100	+40%	100/15 Summer				48.793	0.643
S8.005	SC12	15 Winter	100	+40%	100/15 Summer				48.499	0.599
S8.006	SC13	15 Winter	100	+40%	100/15 Summer				48.089	0.489
S7.007	SC14	15 Winter	100	+40%	100/15 Summer				47.752	0.652
S9.000	SC15	15 Winter	100	+40%	100/15 Summer				47.776	0.451
S7.008	Sj	30 Winter	100	+40%					47.060	0.000
S7.009	SCFC	15 Winter	100	+40%	100/15 Summer				47.770	0.885
S7.010	SexS53	15 Winter	100	+40%					46.561	-0.109

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S7.005	SC6	0.000	0.21		13.3	SURCHARGED	
S7.006	SCtank	0.000	0.16		1.9	SURCHARGED	
S8.000	SC7	0.000	0.24		4.4	SURCHARGED	
S8.001	SC8	0.000	0.65		10.4	SURCHARGED	
S8.002	SC9	0.000	1.02		14.1	SURCHARGED	
S8.003	SC10	0.000	1.48		19.9	SURCHARGED	
S8.004	SC11	0.000	1.11		23.6	SURCHARGED	
S8.005	SC12	0.000	1.17		31.0	SURCHARGED	
S8.006	SC13	0.000	0.82		33.8	SURCHARGED	
S7.007	SC14	0.000	0.24		7.3	SURCHARGED	
S9.000	SC15	0.000	0.21		6.7	SURCHARGED	
S7.008	Sj	0.000	0.14		4.6	SURCHARGED*	
S7.009	SCFC	0.000	0.24		2.3	SURCHARGED	
S7.010	SexS53	0.000	0.17		2.3	OK	

FOUL SEWERAGE DESIGN

Design Criteria for Foul - Main

Pipe Sizes STANDARD Manhole Sizes STANDARD

Industrial Flow (l/s/ha)	0.00	Add Flow / Climate Change (%)	0
Industrial Peak Flow Factor	0.00	Minimum Backdrop Height (m)	0.000
Flow Per Person (l/per/day)	222.00	Maximum Backdrop Height (m)	20.000
Persons per House	3.00	Min Design Depth for Optimisation (m)	1.200
Domestic (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	0.75
Domestic Peak Flow Factor	6.00	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F1.000	5.421	0.045	120.5	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F1.001	9.436	0.175	53.9	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F2.000	5.029	0.070	71.8	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F1.002	10.072	0.180	56.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F3.000	2.524	0.050	50.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F4.000	9.108	0.145	62.6	0.000	0	0.0	1.500	o	100	Pipe/Conduit	
F3.001	12.230	0.250	48.9	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F3.002	4.445	0.905	4.9	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F1.003	19.752	0.580	34.1	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.004	20.031	1.750	11.4	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F5.000	27.019	0.400	67.5	0.000	0	0.0	1.500	o	100	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.000	48.900	0.000	0.0	0	0.0	0	0.00	0.80	14.1	0.0
F1.001	48.855	0.000	0.0	0	0.0	0	0.00	1.19	21.1	0.0
F2.000	48.750	0.000	0.0	0	0.0	0	0.00	1.03	18.3	0.0
F1.002	48.680	0.000	0.0	0	0.0	0	0.00	1.17	20.7	0.0
F3.000	48.280	0.000	0.0	0	0.0	0	0.00	1.24	21.9	0.0
F4.000	48.425	0.000	0.0	0	0.0	0	0.00	0.84	6.6	0.0
F3.001	48.230	0.000	0.0	0	0.0	0	0.00	1.25	22.2	0.0
F3.002	47.980	0.000	0.0	0	0.0	0	0.00	3.97	70.2	0.0
F1.003	47.000	0.000	0.0	0	0.0	0	0.00	1.97	78.4	0.0
F1.004	46.420	0.000	0.0	0	0.0	0	0.00	3.40	135.3	0.0
F5.000	46.950	0.000	0.0	0	0.0	0	0.00	0.81	6.4	0.0

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F5.001	3.826	0.450	8.5	0.000	0	0.0	1.500	o	100	Pipe/Conduit	
F1.005	16.461	0.545	30.2	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F6.000	6.299	0.080	78.7	0.000	0	0.0	1.500	o	100	Pipe/Conduit	
F6.001	9.812	0.130	75.5	0.000	0	0.0	1.500	o	100	Pipe/Conduit	
F6.002	9.805	0.068	145.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F7.000	0.705	0.009	80.0	0.000	0	0.0	1.500	o	100	Pipe/Conduit	
F6.003	3.389	0.023	145.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F8.000	0.702	0.009	80.0	0.000	0	0.0	1.500	o	100	Pipe/Conduit	
F6.004	2.986	0.021	145.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F9.000	2.190	0.027	80.0	0.000	0	0.0	1.500	o	100	Pipe/Conduit	
F6.005	5.296	0.037	145.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F10.000	2.224	0.028	80.0	0.000	0	0.0	1.500	o	100	Pipe/Conduit	
F6.006	6.318	0.044	145.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F11.000	0.706	0.009	80.0	0.000	0	0.0	1.500	o	100	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F5.001	46.550	0.000	0.0	0	0.0	0	0.00	2.29	18.0	0.0
F1.005	44.670	0.000	0.0	0	0.0	0	0.00	2.09	83.2	0.0
F6.000	47.730	0.000	0.0	0	0.0	0	0.00	0.75	5.9	0.0
F6.001	47.650	0.000	0.0	0	0.0	0	0.00	0.77	6.0	0.0
F6.002	47.470	0.000	0.0	0	0.0	0	0.00	0.73	12.8	0.0
F7.000	47.600	0.000	0.0	0	0.0	0	0.00	0.74	5.8	0.0
F6.003	47.402	0.000	0.0	0	0.0	0	0.00	0.73	12.8	0.0
F8.000	47.550	0.000	0.0	0	0.0	0	0.00	0.74	5.8	0.0
F6.004	47.379	0.000	0.0	0	0.0	0	0.00	0.73	12.8	0.0
F9.000	47.600	0.000	0.0	0	0.0	0	0.00	0.74	5.8	0.0
F6.005	47.358	0.000	0.0	0	0.0	0	0.00	0.73	12.8	0.0
F10.000	48.380	0.000	0.0	0	0.0	0	0.00	0.74	5.8	0.0
F6.006	47.322	0.000	0.0	0	0.0	0	0.00	0.73	12.8	0.0
F11.000	48.300	0.000	0.0	0	0.0	0	0.00	0.74	5.8	0.0

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F6.007	3.848	0.027	145.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F12.000	2.225	0.028	80.0	0.000	0	0.0	1.500	o	100	Pipe/Conduit	
F6.008	9.183	0.063	145.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F13.000	2.039	0.025	80.0	0.000	0	0.0	1.500	o	100	Pipe/Conduit	
F6.009	9.263	0.064	145.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F14.000	3.017	1.425	2.1	0.000	0	0.0	1.500	o	100	Pipe/Conduit	
F15.000	2.004	1.425	1.4	0.000	0	0.0	1.500	o	100	Pipe/Conduit	
F6.010	8.336	0.057	145.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F16.000	1.778	0.022	80.0	0.000	0	0.0	1.500	o	100	Pipe/Conduit	
F6.011	8.450	0.058	145.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F17.000	1.974	0.025	80.0	0.000	0	0.0	1.500	o	100	Pipe/Conduit	
F6.012	2.535	0.017	145.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F18.000	2.001	0.025	80.0	0.000	0	0.0	1.500	o	100	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F6.007	47.278	0.000	0.0	0	0.0	0	0.00	0.73	12.8	0.0
F12.000	48.380	0.000	0.0	0	0.0	0	0.00	0.74	5.8	0.0
F6.008	47.252	0.000	0.0	0	0.0	0	0.00	0.73	12.8	0.0
F13.000	48.300	0.000	0.0	0	0.0	0	0.00	0.74	5.8	0.0
F6.009	47.188	0.000	0.0	0	0.0	0	0.00	0.73	12.8	0.0
F14.000	48.600	0.000	0.0	0	0.0	0	0.00	4.60	36.1	0.0
F15.000	48.600	0.000	0.0	0	0.0	0	0.00	5.65	44.3	0.0
F6.010	47.125	0.000	0.0	0	0.0	0	0.00	0.73	12.8	0.0
F16.000	48.600	0.000	0.0	0	0.0	0	0.00	0.74	5.8	0.0
F6.011	47.068	0.000	0.0	0	0.0	0	0.00	0.73	12.8	0.0
F17.000	48.600	0.000	0.0	0	0.0	0	0.00	0.74	5.8	0.0
F6.012	47.009	0.000	0.0	0	0.0	0	0.00	0.73	12.8	0.0
F18.000	48.600	0.000	0.0	0	0.0	0	0.00	0.74	5.8	0.0

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F6.013	4.513	0.031	145.6	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F19.000	2.000	0.025	80.0	0.000	0	0.0	1.500	o	100	Pipe/Conduit	
F6.014	2.300	0.016	145.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F20.000	2.007	0.025	80.0	0.000	0	0.0	1.500	o	100	Pipe/Conduit	
F6.015	14.756	0.102	145.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F21.000	1.498	0.019	80.0	0.000	0	0.0	1.500	o	100	Pipe/Conduit	
F6.016	6.069	0.042	145.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F22.000	2.258	0.028	80.0	0.000	0	0.0	1.500	o	100	Pipe/Conduit	
F6.017	2.313	0.021	110.1	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F6.018	4.560	0.930	4.9	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F6.019	1.727	0.120	14.4	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F6.020	6.516	0.043	150.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F1.006	11.276	0.145	77.8	0.000	0	0.0	1.500	o	225	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F6.013	46.992	0.000	0.0	0	0.0	0	0.00	0.73	12.8	0.0
F19.000	48.600	0.000	0.0	0	0.0	0	0.00	0.74	5.8	0.0
F6.014	46.961	0.000	0.0	0	0.0	0	0.00	0.73	12.8	0.0
F20.000	48.600	0.000	0.0	0	0.0	0	0.00	0.74	5.8	0.0
F6.015	46.945	0.000	0.0	0	0.0	0	0.00	0.73	12.8	0.0
F21.000	48.600	0.000	0.0	0	0.0	0	0.00	0.74	5.8	0.0
F6.016	46.843	0.000	0.0	0	0.0	0	0.00	0.73	12.8	0.0
F22.000	48.600	0.000	0.0	0	0.0	0	0.00	0.74	5.8	0.0
F6.017	46.801	0.000	0.0	0	0.0	0	0.00	0.83	14.7	0.0
F6.018	46.780	0.000	0.0	0	0.0	0	0.00	3.97	70.2	0.0
F6.019	44.350	0.000	0.0	0	0.0	0	0.00	2.32	41.0	0.0
F6.020	44.230	0.000	0.0	0	0.0	0	0.00	0.71	12.6	0.0
F1.006	44.112	0.000	0.0	0	0.0	0	0.00	1.30	51.8	0.0

Miss Kirsty Burwood

Price & Myers LLP
37 Alfred Place
London
WC1E 7DP

Wastewater pre-planning
Our ref DS6076809

16 September 2021

Pre-planning enquiry: Confirmation of sufficient capacity

Dear Miss Burwood

Thank you for providing information on phase 2 your development located on Liddell Road/Maygrove Road, West Hempstead for the construction of 106 flats, and 3800 sq.m. commercial premises. Foul and surface water for phase 2 will discharge via gravity to a new connection into the combined sewer at chamber 1702 in Maygrove Road. Surface water will be limited by SuDS to 6.5l/s for 6500 sq.m.

We have completed the assessment of the foul water flows and surface water run-off based on the information submitted in your application with the purpose of assessing sewerage capacity within the existing Thames Water sewer network.

Foul Water

If your proposals progress in line with the details you've provided, we're pleased to confirm that there will be sufficient sewerage capacity in the adjacent foul water sewer network to serve your development.

This confirmation is valid for 12 months or for the life of any planning approval that this information is used to support, to a maximum of three years.

You'll need to keep us informed of any changes to your design – for example, an increase in the number or density of homes. Such changes could mean there is no longer sufficient capacity.

Surface Water

In accordance with the Building Act 2000 Clause H3.3, positive connection of surface water to a public sewer will only be consented when it can be demonstrated that the hierarchy of disposal methods have been examined and proven to be impracticable. Before we can consider your surface water needs, you'll need written approval from the lead local flood authority that you have followed the sequential approach to the disposal of surface water and considered all practical means.

The disposal hierarchy being:

1. store rainwater for later use.
2. use infiltration techniques where possible.

3. attenuate rainwater in ponds or open water features for gradual release.
4. attenuate rainwater by storing in tanks or sealed water features for gradual release.
5. discharge rainwater direct to a watercourse.
6. discharge rainwater to a surface water sewer/drain.
7. discharge rainwater to the combined sewer.
8. discharge rainwater to the foul sewer

Where connection to the public sewerage network is still required to manage surface water flows we will accept these flows at a discharge rate in line with CIRIA's best practice guide on SuDS or that stated within the sites planning approval.

If the above surface water hierarchy has been followed and if the flows are restricted to a total of 6.5 l/s then Thames Water would not have any objections to the proposal.

Please see the attached 'Planning your wastewater' leaflet for additional information.

What happens next?

Please make sure you submit your connection application, giving us at least 21 days' notice of the date you wish to make your new connection/s.

If you've any further questions, please contact me on 020 3577 9811.

Yours sincerely

Many Thanks

Kind Regards

Andrew John

Andrew John
Adoption Engineer
Developer Services – Adoptions Engineer, Sewer Adoptions Team
Get advice on making your sewer connection correctly at connectright.org.uk
Clearwater Court, Vastern Road, Reading, RG1 8DB
Find us online at developers.thameswater.co.uk