STORM SEWER DESIGN by the Modified Rational Method

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	25.225	0.253	99.7	0.011	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	11.360	0.114	99.6	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.000	23.909	0.367	65.1	0.011	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	4.830	0.048	100.6	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
3.000	2.198	0.022	99.9	0.009	5.00	0.0	0.600	o	150	Pipe/Conduit	
3.001	12.882	0.129	99.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
4.000	11.637	0.116	100.3	0.006	5.00	0.0	0.600	o	150	Pipe/Conduit	
4.001	12.191	0.122	99.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
5.000	12.777	0.238	53.7	0.006	5.00	0.0	0.600	o	150	Pipe/Conduit	
4.002	13.675	0.137	99.8	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
6.000	9.345	0.093	100.5	0.010	5.00	0.0	0.600	o	150	Pipe/Conduit	
6.001	7.114	0.071	100.2	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
7.000	9.368	0.094	99.7	0.019	5.00	0.0	0.600	o	150	Pipe/Conduit	
7.001	15.262	0.153	99.8	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)
1.000	50.00	5.42	5.750	0.011	0.0	0.0	0.0	1.01	17.8	1.5
1.001	50.00	5.61	5.497	0.011	0.0	0.0	0.0	1.01	17.8	1.5
2.000	50.00	5.32	5.750	0.011	0.0	0.0	0.0	1.25	22.1	1.5
1.002	50.00	5.69	5.383	0.022	0.0	0.0	0.0	1.00	17.7	3.0
3.000	50.00	5.04	5.426	0.009	0.0	0.0	0.0	1.01	17.8	1.2
3.001	50.00	5.25	5.404	0.009	0.0	0.0	0.0	1.01	17.8	1.2
4.000	50.00	5.19	5.150	0.006	0.0	0.0	0.0	1.00	17.7	0.8
4.001	50.00	5.40	5.034	0.006	0.0	0.0	0.0	1.01	17.8	0.8
5.000	50.00	5.15	5.150	0.006	0.0	0.0	0.0	1.38	24.3	0.8
4.002	50.00	5.62	4.912	0.012	0.0	0.0	0.0	1.01	17.8	1.6
6.000	50.00	5.16	5.093	0.010	0.0	0.0	0.0	1.00	17.7	1.4
6.001	50.00	5.27	5.000	0.010	0.0	0.0	0.0	1.00	17.7	1.4
7.000	50.00	5.16	5.394	0.019	0.0	0.0	0.0	1.01	17.8	2.6
7.001	50.00	5.41	5.300	0.019	0.0	0.0	0.0	1.01	17.8	2.6

STORM SEWER DESIGN by the Modified Rational Method

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
1.003	2.577	0.025	103.1	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
8.000	20.640	0.206	100.2	0.011	5.00	0.0	0.600	o	150	Pipe/Conduit	
8.001	2.249	0.022	102.2	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
9.000	8.470	0.085	99.6	0.015	5.00	0.0	0.600	o	150	Pipe/Conduit	
9.001	13.936	0.139	100.3	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
10.000	22.356	0.224	99.8	0.011	5.00	0.0	0.600	o	150	Pipe/Conduit	
8.002	11.750	0.118	99.6	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
11.000	12.020	0.120	100.2	0.024	5.00	0.0	0.600	o	150	Pipe/Conduit	
11.001	2.932	0.029	101.1	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
8.003	2.031	0.020	101.6	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.004	2.676	0.027	99.1	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.005	13.697	0.273	50.2	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.006	3.072	0.031	99.1	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
12.000	6.704	0.067	100.1	0.031	5.00	0.0	0.600	o	150	Pipe/Conduit	
12.001	1.966	0.020	98.3	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)
1.003	50.00	5.73	4.775	0.072	0.0	0.0	0.0	0.99	17.5	9.7
8.000	50.00	5.34	5.950	0.011	0.0	0.0	0.0	1.00	17.7	1.5
8.001	50.00	5.38	5.744	0.011	0.0	0.0	0.0	0.99	17.6	1.5
9.000	50.00	5.14	5.845	0.015	0.0	0.0	0.0	1.01	17.8	2.0
9.001	50.00	5.37	5.760	0.015	0.0	0.0	0.0	1.00	17.7	2.0
10.000	50.00	5.37	5.850	0.011	0.0	0.0	0.0	1.01	17.8	1.5
8.002	50.00	5.57	5.621	0.037	0.0	0.0	0.0	1.01	17.8	5.0
11.000	50.00	5.20	5.520	0.024	0.0	0.0	0.0	1.00	17.7	3.2
11.001	50.00	5.25	5.400	0.024	0.0	0.0	0.0	1.00	17.7	3.2
8.003	50.00	5.61	4.770	0.061	0.0	0.0	0.0	1.00	17.6	8.3
1.004	50.00	5.77	4.100	0.133	0.0	0.0	0.0	1.01	17.8«	18.0
1.005	50.00	5.93	4.073	0.133	0.0	0.0	0.0	1.42	25.2	18.0
1.006	50.00	5.98	3.206	0.133	0.0	0.0	0.0	1.01	17.8«	18.0
12.000	50.00	5.11	3.262	0.031	0.0	0.0	0.0	1.00	17.8	4.2
12.001	50.00	5.14	3.195	0.031	0.0	0.0	0.0	1.01	17.9	4.2

STORM SEWER DESIGN by the Modified Rational Method

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
1.007	4.926	0.049	100.5	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.008	3.510	0.035	100.0	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)
1.007	50.00	6.07	2.929	0.164	0.0	0.0	0.0	1.00	17.7«	22.2
1.008	50.00	6.13	2.880	0.164	0.0	0.0	0.0	1.00	17.8«	22.2

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)
SWMH1	6.400	0.650	Open Manhole	450	1.000	5.750	150				
SWMH2	6.400	0.903	Open Manhole	450	1.001	5.497	150	1.000	5.497	150	
SWMH8	6.400	0.650	Open Manhole	450	2.000	5.750	150				
SWMH3	6.200	0.817	Open Manhole	450	1.002	5.383	150	1.001	5.383	150	
								2.000	5.383	150	
PP1	6.000	0.574	Junction		3.000	5.426	150				
SWMH9	6.000	0.596	Open Manhole	450	3.001	5.404	150	3.000	5.404	150	
SWMH10	5.800	0.650	Open Manhole	450	4.000	5.150	150				
SWMH11	5.800	0.766	Open Manhole	450	4.001	5.034	150	4.000	5.034	150	
SWMH13	5.800	0.650	Open Manhole	450	5.000	5.150	150				
SWMH12	5.800	0.888	Open Manhole	450	4.002	4.912	150	4.001	4.912	150	
								5.000	4.912	150	
PP2	5.800	0.707	Junction		6.000	5.093	150				
SWMH14	5.800	0.800	Open Manhole	450	6.001	5.000	150	6.000	5.000	150	
PP3	6.150	0.756	Junction		7.000	5.394	150				
SWMH15	6.150	0.850	Open Manhole	450	7.001	5.300	150	7.000	5.300	150	
SWMH4	6.200	1.425	Open Manhole	1200	1.003	4.775	150	1.002	5.335	150	560
								3.001	5.275	150	500
								4.002	4.775	150	
								6.001	4.929	150	154
								7.001	5.147	150	372
SWMH16	6.600	0.650	Open Manhole	450	8.000	5.950	150				
SWMH17	6.700	0.956	Open Manhole	450	8.001	5.744	150	8.000	5.744	150	
PP4	6.600	0.755	Junction		9.000	5.845	150				
SWMH20	6.600	0.840	Open Manhole	450	9.001	5.760	150	9.000	5.760	150	
SWMH21	6.500	0.650	Open Manhole	450	10.000	5.850	150				
SWMH18	6.500	0.879	Open Manhole	1200	8.002	5.621	150	8.001	5.722	150	101
								9.001	5.621	150	
								10.000	5.626	150	5
PP5	6.250	0.730	Junction		11.000	5.520	150				
SWMH22	6.250	0.850	Open Manhole	450	11.001	5.400	150	11.000	5.400	150	
SWMH19	6.200	1.430	Open Manhole	1200	8.003	4.770	150	8.002	5.503	150	733
								11.001	5.371	150	601
TANK 1	5.800	1.700	Junction		1.004	4.100	150	1.003	4.750	150	650
								8.003	4.750	150	650
SWMH5	5.500	1.427	Open Manhole	1200	1.005	4.073	150	1.004	4.073	150	
SWMH6	4.700	1.494	Open Manhole	1200	1.006	3.206	150	1.005	3.800	150	594
Channel Drain	3.600	0.338	Junction		12.000	3.262	150				
SWMH23	3.900	0.705	Open Manhole	1200	12.001	3.195	150	12.000	3.195	150	
TANK 2	4.000	1.071	Junction		1.007	2.929	150	1.006	3.175	150	246
								12.001	3.175	150	246
SWMH7	3.700	0.820	Open Manhole	1200	1.008	2.880	150	1.007	2.880	150	
	3.700	0.855	Open Manhole	0		OUTFALL		1.008	2.845	150	

Manhole Schedules for Storm

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

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	150	SWMH1	6.400	5.750	0.500	Open Manhole	450
1.001	o	150	SWMH2	6.400	5.497	0.753	Open Manhole	450
2.000	o	150	SWMH8	6.400	5.750	0.500	Open Manhole	450
1.002	o	150	SWMH3	6.200	5.383	0.667	Open Manhole	450
3.000	o	150	PP1	6.000	5.426	0.424	Junction	
3.001	o	150	SWMH9	6.000	5.404	0.446	Open Manhole	450
4.000	o	150	SWMH10	5.800	5.150	0.500	Open Manhole	450
4.001	o	150	SWMH11	5.800	5.034	0.616	Open Manhole	450
5.000	o	150	SWMH13	5.800	5.150	0.500	Open Manhole	450
4.002	o	150	SWMH12	5.800	4.912	0.738	Open Manhole	450
6.000	o	150	PP2	5.800	5.093	0.557	Junction	
6.001	o	150	SWMH14	5.800	5.000	0.650	Open Manhole	450
7.000	o	150	PP3	6.150	5.394	0.606	Junction	
7.001	o	150	SWMH15	6.150	5.300	0.700	Open Manhole	450
1.003	o	150	SWMH4	6.200	4.775	1.275	Open Manhole	1200

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	25.225	99.7	SWMH2	6.400	5.497	0.753	Open Manhole	450
1.001	11.360	99.6	SWMH3	6.200	5.383	0.667	Open Manhole	450
2.000	23.909	65.1	SWMH3	6.200	5.383	0.667	Open Manhole	450
1.002	4.830	100.6	SWMH4	6.200	5.335	0.715	Open Manhole	1200
3.000	2.198	99.9	SWMH9	6.000	5.404	0.446	Open Manhole	450
3.001	12.882	99.9	SWMH4	6.200	5.275	0.775	Open Manhole	1200
4.000	11.637	100.3	SWMH11	5.800	5.034	0.616	Open Manhole	450
4.001	12.191	99.9	SWMH12	5.800	4.912	0.738	Open Manhole	450
5.000	12.777	53.7	SWMH12	5.800	4.912	0.738	Open Manhole	450
4.002	13.675	99.8	SWMH4	6.200	4.775	1.275	Open Manhole	1200
6.000	9.345	100.5	SWMH14	5.800	5.000	0.650	Open Manhole	450
6.001	7.114	100.2	SWMH4	6.200	4.929	1.121	Open Manhole	1200
7.000	9.368	99.7	SWMH15	6.150	5.300	0.700	Open Manhole	450
7.001	15.262	99.8	SWMH4	6.200	5.147	0.903	Open Manhole	1200
1.003	2.577	103.1	TANK 1	5.800	4.750	0.900	Junction	

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)
8.000	o	150	SWMH16	6.600	5.950	0.500	Open Manhole	450
8.001	o	150	SWMH17	6.700	5.744	0.806	Open Manhole	450
9.000	o	150	PP4	6.600	5.845	0.605	Junction	
9.001	o	150	SWMH20	6.600	5.760	0.690	Open Manhole	450
10.000	o	150	SWMH21	6.500	5.850	0.500	Open Manhole	450
8.002	o	150	SWMH18	6.500	5.621	0.729	Open Manhole	1200
11.000	o	150	PP5	6.250	5.520	0.580	Junction	
11.001	o	150	SWMH22	6.250	5.400	0.700	Open Manhole	450
8.003	o	150	SWMH19	6.200	4.770	1.280	Open Manhole	1200
1.004	o	150	TANK 1	5.800	4.100	1.550	Junction	
1.005	o	150	SWMH5	5.500	4.073	1.277	Open Manhole	1200
1.006	o	150	SWMH6	4.700	3.206	1.344	Open Manhole	1200
12.000	o	150	Channel Drain	3.600	3.262	0.188	Junction	
12.001	o	150	SWMH23	3.900	3.195	0.555	Open Manhole	1200
1.007	o	150	TANK 2	4.000	2.929	0.921	Junction	

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)
8.000	20.640	100.2	SWMH17	6.700	5.744	0.806	Open Manhole	450
8.001	2.249	102.2	SWMH18	6.500	5.722	0.628	Open Manhole	1200
9.000	8.470	99.6	SWMH20	6.600	5.760	0.690	Open Manhole	450
9.001	13.936	100.3	SWMH18	6.500	5.621	0.729	Open Manhole	1200
10.000	22.356	99.8	SWMH18	6.500	5.626	0.724	Open Manhole	1200
8.002	11.750	99.6	SWMH19	6.200	5.503	0.547	Open Manhole	1200
11.000	12.020	100.2	SWMH22	6.250	5.400	0.700	Open Manhole	450
11.001	2.932	101.1	SWMH19	6.200	5.371	0.679	Open Manhole	1200
8.003	2.031	101.6	TANK 1	5.800	4.750	0.900	Junction	
1.004	2.676	99.1	SWMH5	5.500	4.073	1.277	Open Manhole	1200
1.005	13.697	50.2	SWMH6	4.700	3.800	0.750	Open Manhole	1200
1.006	3.072	99.1	TANK 2	4.000	3.175	0.675	Junction	
12.000	6.704	100.1	SWMH23	3.900	3.195	0.555	Open Manhole	1200
12.001	1.966	98.3	TANK 2	4.000	3.175	0.675	Junction	
1.007	4.926	100.5	SWMH7	3.700	2.880	0.670	Open Manhole	1200

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)
1.008	o	150	SWMH7	3.700	2.880	0.670	Open Manhole	1200

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)
1.008	3.510	100.0		3.700	2.845	0.705	Open Manhole	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 7 Number of Storage Structures 7 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH	Summer Storms	Yes
Return Period (years)	2	Winter Storms	Yes
FEH Rainfall Version	2013	Cv (Summer)	0.750
Site Location	GB 503397 103865 TQ 03397 03865	Cv (Winter)	0.840
Data Type	Point	Storm Duration (mins)	30

Online Controls for Storm

Orifice Manhole: SWMH9, DS/PN: 3.001, Volume (m³): 0.1

Diameter (m) 0.037 Discharge Coefficient 0.600 Invert Level (m) 5.404

Orifice Manhole: SWMH14, DS/PN: 6.001, Volume (m³): 0.3

Diameter (m) 0.080 Discharge Coefficient 0.600 Invert Level (m) 5.000

Orifice Manhole: SWMH15, DS/PN: 7.001, Volume (m³): 0.3

Diameter (m) 0.055 Discharge Coefficient 0.600 Invert Level (m) 5.300

Orifice Manhole: SWMH20, DS/PN: 9.001, Volume (m³): 0.3

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 5.760

Orifice Manhole: SWMH22, DS/PN: 11.001, Volume (m³): 0.3

Diameter (m) 0.055 Discharge Coefficient 0.600 Invert Level (m) 5.400

Hydro-Brake® Optimum Manhole: TANK 1, DS/PN: 1.004, Volume (m³): 0.1

Unit Reference	MD-SHE-0047-1200-1400-1200
Design Head (m)	1.400
Design Flow (l/s)	1.2
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	47
Invert Level (m)	4.100
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.400	1.2	Kick-Flo®	0.423	0.7
Flush-Flo™	0.211	0.9	Mean Flow over Head Range	-	0.9

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.8	0.800	0.9	2.000	1.4	4.000	1.9	7.000	2.5
0.200	0.9	1.000	1.0	2.200	1.5	4.500	2.0	7.500	2.6
0.300	0.8	1.200	1.1	2.400	1.5	5.000	2.1	8.000	2.7
0.400	0.7	1.400	1.2	2.600	1.6	5.500	2.2	8.500	2.7
0.500	0.8	1.600	1.3	3.000	1.7	6.000	2.3	9.000	2.8
0.600	0.8	1.800	1.3	3.500	1.8	6.500	2.4	9.500	2.9

Hydro-Brake® Optimum Manhole: TANK 2, DS/PN: 1.007, Volume (m³): 0.1

Unit Reference	MD-SHE-0068-2000-0950-2000
Design Head (m)	0.950
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	68
Invert Level (m)	2.929
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)	0.950	2.0	Kick-Flo®	0.596	1.6
Flush-Flo™	0.292	2.0	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	1.7	0.800	1.8	2.000	2.8	4.000	3.9	7.000	5.0
0.200	2.0	1.000	2.0	2.200	2.9	4.500	4.1	7.500	5.2
0.300	2.0	1.200	2.2	2.400	3.1	5.000	4.3	8.000	5.4
0.400	2.0	1.400	2.4	2.600	3.2	5.500	4.5	8.500	5.5
0.500	1.9	1.600	2.5	3.000	3.4	6.000	4.7	9.000	5.7
0.600	1.6	1.800	2.7	3.500	3.6	6.500	4.9	9.500	5.8

Storage Structures for Storm

Porous Car Park Manhole: SWMH9, DS/PN: 3.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	5.0
Max Percolation (l/s)	6.9	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	5.404	Cap Volume Depth (m)	0.300

Porous Car Park Manhole: SWMH14, DS/PN: 6.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	5.0
Max Percolation (l/s)	13.9	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	5.000	Cap Volume Depth (m)	0.550

Porous Car Park Manhole: SWMH15, DS/PN: 7.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	10.0
Max Percolation (l/s)	13.9	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	5.300	Cap Volume Depth (m)	0.300

Porous Car Park Manhole: SWMH20, DS/PN: 9.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	10.0
Max Percolation (l/s)	13.9	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	5.760	Cap Volume Depth (m)	0.300

Porous Car Park Manhole: SWMH22, DS/PN: 11.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	9.0
Max Percolation (l/s)	25.0	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	5.400	Cap Volume Depth (m)	0.300

Cellular Storage Manhole: TANK 1, DS/PN: 1.004

Invert Level (m)	4.100	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	105.0	0.0	0.800	105.0	0.0	0.801	0.0	0.0

Cellular Storage Manhole: TANK 2, DS/PN: 1.007

Invert Level (m) 2.400 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	72.0	0.0	0.400	72.0	0.0	0.401	0.0	0.0

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 7 Number of Storage Structures 7 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH	Data Type	Point
FEH Rainfall Version	2013	Cv (Summer)	1.000
Site Location	GB 503397 103865 TQ 03397 03865	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, 240, 360, 480, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 45

WARNING: Half Drain Time has not been calculated as the structure is too full.

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)	Flooded Volume (m³)
1.000	SWMH1	15 Summer	100	+45%					5.832	-0.068	0.000
1.001	SWMH2	480 Winter	100	+45%	100/240 Summer				5.796	0.149	0.000
2.000	SWMH8	15 Summer	100	+45%					5.822	-0.078	0.000
1.002	SWMH3	480 Winter	100	+45%	100/15 Summer				5.795	0.262	0.000
3.000	PP1	60 Summer	30	+0%					5.576	0.000	0.000
3.001	SWMH9	60 Summer	100	+45%	30/15 Summer				5.914	0.360	0.000
4.000	SWMH10	480 Winter	100	+45%	100/120 Summer				5.794	0.494	0.000
4.001	SWMH11	480 Winter	100	+45%	100/15 Summer				5.794	0.610	0.000
5.000	SWMH13	480 Winter	100	+45%	100/120 Summer				5.794	0.494	0.000
4.002	SWMH12	480 Winter	100	+45%	100/15 Summer				5.794	0.732	0.000
6.000	PP2	1440 Summer	100	+45%					5.243	0.000	0.000
6.001	SWMH14	480 Winter	100	+45%	100/15 Summer				5.798	0.648	0.000
7.000	PP3	1440 Summer	100	+45%					5.544	0.000	0.000
7.001	SWMH15	60 Summer	100	+45%	30/15 Summer				6.124	0.674	0.000
1.003	SWMH4	480 Winter	100	+45%	30/15 Summer				5.795	0.870	0.000
8.000	SWMH16	15 Summer	100	+45%					6.032	-0.068	0.000
8.001	SWMH17	15 Summer	100	+45%					5.854	-0.040	0.000
9.000	PP4	15 Summer	100	+45%					5.995	0.000	0.000
9.001	SWMH20	60 Summer	100	+45%	30/30 Summer				6.204	0.294	0.000
10.000	SWMH21	15 Summer	100	+45%					5.932	-0.068	0.000
8.002	SWMH18	15 Summer	100	+45%	100/15 Summer				5.831	0.060	0.000
11.000	PP5	15 Winter	100	+45%					5.670	0.000	0.000
11.001	SWMH22	60 Summer	100	+45%	30/30 Summer				6.035	0.485	0.000
8.003	SWMH19	480 Winter	100	+45%	30/15 Summer				5.795	0.875	0.000
1.004	TANK 1	1440 Summer	100	+45%	2/60 Summer				4.901	0.651	0.000

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

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SWMH1	0.56			9.5	OK	
1.001	SWMH2	0.06			1.0	SURCHARGED	
2.000	SWMH8	0.46			9.5	OK	
1.002	SWMH3	0.15			2.0	SURCHARGED	
3.000	PP1	0.25			2.7	SURCHARGED*	
3.001	SWMH9	0.12		34	2.0	FLOOD RISK	
4.000	SWMH10	0.03			0.6	FLOOD RISK	
4.001	SWMH11	0.03			0.6	FLOOD RISK	
5.000	SWMH13	0.03			0.6	FLOOD RISK	
4.002	SWMH12	0.07			1.1	FLOOD RISK	
6.000	PP2	0.03			0.6	SURCHARGED*	
6.001	SWMH14	0.06		403	1.0	FLOOD RISK	
7.000	PP3	0.06			1.1	SURCHARGED*	
7.001	SWMH15	0.34		32	5.6	FLOOD RISK	
1.003	SWMH4	0.59			6.4	SURCHARGED	
8.000	SWMH16	0.57			9.5	OK	
8.001	SWMH17	0.88			9.6	OK	
9.000	PP4	0.71			12.6	SURCHARGED*	
9.001	SWMH20	0.20		33	3.3	SURCHARGED	
10.000	SWMH21	0.57			9.5	OK	
8.002	SWMH18	1.24			20.0	SURCHARGED	
11.000	PP5	1.06			18.9	SURCHARGED*	
11.001	SWMH22	0.45		44	4.9	FLOOD RISK	
8.003	SWMH19	0.48			5.2	SURCHARGED	
1.004	TANK 1	0.11		1474	1.2	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)
1.005	SWMH5	480 Winter	100	+45%					4.096	-0.127
1.006	SWMH6	960 Summer	100	+45%	100/240 Summer				3.900	0.544
12.000	Channel Drain	1440 Summer	100	+45%					3.412	0.000
12.001	SWMH23	960 Summer	100	+45%	30/15 Summer				3.899	0.554
1.007	TANK 2	1440 Summer	100	+45%	100/120 Summer				3.325	0.246
1.008	SWMH7	960 Summer	100	+45%					2.922	-0.108

PN	US/MH Name	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.005	SWMH5	0.000	0.06			1.3	OK	
1.006	SWMH6	0.000	0.12			1.4	SURCHARGED	
12.000	Channel Drain	0.000	0.09			1.5	FLOOD RISK*	
12.001	SWMH23	0.000	0.18			1.9	FLOOD RISK	
1.007	TANK 2	0.000	0.14			2.0	SURCHARGED*	
1.008	SWMH7	0.000	0.17			2.0	OK	