

Walsh Associates		Page 1
32 Lafone Street London SE1 2LX		
Date 10/08/2021 14:14	Designed by jacqui.kantor	
File 5359-210618-exceedance ...	Checked by	
Innovyze	Network 2019.1	

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 (%)	0
Ratio R	0.435	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	0.000
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 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	56.711	0.350	162.0	0.113	5.00	0.0	0.600	o	300	Pipe/Conduit	
S1.001	5.334	0.053	100.6	0.027	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.002	27.710	0.111	250.0	0.185	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.003	33.513	0.134	250.0	0.370	0.00	0.0	0.600	o	375	Pipe/Conduit	
S2.000	23.788	0.050	475.8	0.048	5.00	0.0	0.600	o	150	Pipe/Conduit	
S2.001	27.182	0.074	367.3	0.106	0.00	0.0	0.600	o	150	Pipe/Conduit	
S2.002	25.931	0.200	129.7	0.053	0.00	0.0	0.600	o	150	Pipe/Conduit	
S2.003	23.074	0.100	230.7	0.059	0.00	0.0	0.600	o	150	Pipe/Conduit	
S2.004	11.459	0.374	30.6	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)
S1.000	50.00	5.77	33.700	0.113	0.0	0.0	0.0	1.23	87.1	15.3
S1.001	50.00	5.82	33.350	0.140	0.0	0.0	0.0	1.81	199.5	18.9
S1.002	50.00	6.22	30.096	0.324	0.0	0.0	0.0	1.14	126.1	43.9
S1.003	50.00	6.71	29.986	0.694	0.0	0.0	0.0	1.14	126.1	94.0
S2.000	50.00	5.87	34.150	0.048	0.0	0.0	0.0	0.45	8.0	6.4
S2.001	50.00	6.75	34.100	0.154	0.0	0.0	0.0	0.52	9.2«	20.8
S2.002	50.00	7.24	33.750	0.206	0.0	0.0	0.0	0.88	15.6«	28.0
S2.003	50.00	7.82	33.450	0.266	0.0	0.0	0.0	0.66	11.6«	36.0
S2.004	50.00	7.93	33.300	0.266	0.0	0.0	0.0	1.83	32.3«	36.0

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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
S1.004	16.870	0.067	250.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.005	21.129	0.085	250.0	0.086	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.006	43.133	0.173	249.3	0.020	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.007	17.541	0.117	150.0	0.139	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.008	5.556	0.014	400.8	0.006	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.009	8.936	0.036	248.2	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.010	19.254	0.036	534.8	0.100	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.011	11.708	0.148	79.1	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.012	9.646	0.039	250.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.013	9.646	0.030	321.5	0.080	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.014	9.367	0.053	176.7	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S3.000	11.540	0.080	144.3	0.014	5.00	0.0	0.600	o	375	Pipe/Conduit	
S3.001	3.006	0.080	37.6	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S3.002	18.490	0.420	44.0	0.173	0.00	0.0	0.600	o	375	Pipe/Conduit	
S4.000	17.477	0.076	230.0	0.222	5.00	0.0	0.600	o	225	Pipe/Conduit	
S4.001	24.516	0.123	199.3	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S4.002	7.591	0.045	168.7	0.082	0.00	0.0	0.600	o	150	Pipe/Conduit	
S3.003	18.490	0.420	44.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S3.004	36.710	0.300	122.4	0.000	0.00	0.0	0.600	o	375	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	8.21	29.851	0.960	0.0	0.0	0.0	0.99	70.0«	129.9
S1.005	50.00	8.57	29.784	1.046	0.0	0.0	0.0	0.99	70.0«	141.6
S1.006	50.00	9.44	29.234	1.066	0.0	0.0	0.0	0.82	32.7«	144.3
S1.007	50.00	9.71	28.825	1.204	0.0	0.0	0.0	1.07	42.4«	163.1
S1.008	50.00	9.83	26.000	1.211	0.0	0.0	0.0	0.78	55.1«	163.9
S1.009	50.00	9.98	25.978	1.211	0.0	0.0	0.0	0.99	70.2«	163.9
S1.010	50.00	10.40	25.942	1.310	0.0	0.0	0.0	0.78	85.8«	177.5
S1.011	50.00	10.53	25.870	1.310	0.0	0.0	0.0	1.47	58.5«	177.5
S1.012	50.00	10.72	25.838	1.310	0.0	0.0	0.0	0.82	32.7«	177.5
S1.013	50.00	10.95	25.799	1.390	0.0	0.0	0.0	0.72	28.8«	188.3
S1.014	50.00	11.11	25.765	1.390	0.0	0.0	0.0	0.98	39.0«	188.3
S3.000	50.00	5.13	31.000	0.014	0.0	0.0	0.0	1.51	166.4	1.9
S3.001	50.00	5.14	30.920	0.014	0.0	0.0	0.0	2.96	327.4	1.9
S3.002	50.00	5.26	30.840	0.187	0.0	0.0	0.0	2.74	302.3	25.3
S4.000	50.00	5.34	33.850	0.222	0.0	0.0	0.0	0.86	34.1	30.1
S4.001	50.00	5.92	33.850	0.222	0.0	0.0	0.0	0.71	12.5«	30.1
S4.002	50.00	6.08	33.575	0.304	0.0	0.0	0.0	0.77	13.6«	41.1
S3.003	50.00	6.19	30.420	0.490	0.0	0.0	0.0	2.74	302.3	66.4
S3.004	50.00	6.57	30.000	0.490	0.0	0.0	0.0	1.64	180.8	66.4

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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
S3.005	11.680	0.078	150.0	0.234	0.00	0.0	0.600	o	375	Pipe/Conduit	
S3.006	8.740	0.058	150.7	0.102	0.00	0.0	0.600	o	375	Pipe/Conduit	
S3.007	16.298	0.065	250.7	0.054	0.00	0.0	0.600	o	375	Pipe/Conduit	
S5.000	37.655	0.038	990.9	0.028	5.00	0.0	0.600	o	300	Pipe/Conduit	
S5.001	19.675	0.131	150.0	0.036	0.00	0.0	0.600	o	300	Pipe/Conduit	
S5.002	11.104	4.000	2.8	0.087	0.00	0.0	0.600	o	150	Pipe/Conduit	
S6.000	12.423	0.116	107.1	0.000	5.00	0.0	0.600	o	100	Pipe/Conduit	
S3.008	2.082	0.014	150.0	0.063	0.00	0.0	0.600	o	375	Pipe/Conduit	
S7.000	39.547	0.566	69.9	0.018	5.00	0.0	0.600	o	150	Pipe/Conduit	
S7.001	18.702	0.187	100.0	0.017	0.00	0.0	0.600	o	225	Pipe/Conduit	
S7.002	5.255	0.027	194.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S8.000	10.371	0.067	154.8	0.000	5.00	0.0	0.600	o	100	Pipe/Conduit	
S8.001	16.523	0.364	45.3	0.057	0.00	0.0	0.600	o	225	Pipe/Conduit	
S7.003	1.968	0.041	48.0	0.050	0.00	0.0	0.600	o	150	Pipe/Conduit	
S7.004	5.239	0.041	127.8	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S3.005	50.00	6.70	28.720	0.725	0.0	0.0	0.0	1.48	163.1	98.1
S3.006	50.00	6.80	28.642	0.827	0.0	0.0	0.0	1.47	162.8	111.9
S3.007	50.00	7.04	28.584	0.881	0.0	0.0	0.0	1.14	125.9	119.3
S5.000	50.00	6.28	33.850	0.028	0.0	0.0	0.0	0.49	34.7	3.9
S5.001	50.00	6.53	33.812	0.065	0.0	0.0	0.0	1.28	90.6	8.8
S5.002	50.00	6.56	33.800	0.152	0.0	0.0	0.0	6.09	107.7	20.6
S6.000	50.00	5.28	30.000	0.000	0.0	0.0	0.0	0.74	5.8	0.0
S3.008	50.00	7.06	28.519	1.095	0.0	0.0	0.0	1.48	163.1	148.3
S7.000	50.00	5.55	27.750	0.018	0.0	0.0	0.0	1.20	21.3	2.4
S7.001	50.00	5.79	26.740	0.034	0.0	0.0	0.0	1.31	52.0	4.6
S7.002	50.00	5.88	26.550	0.034	0.0	0.0	0.0	0.93	37.1	4.6
S8.000	50.00	5.28	26.800	0.000	0.0	0.0	0.0	0.62	4.8	0.0
S8.001	50.00	5.42	27.300	0.057	0.0	0.0	0.0	1.95	77.4	7.7
S7.003	50.00	5.90	26.537	0.141	0.0	0.0	0.0	1.46	25.7	19.1
S7.004	50.00	5.98	26.421	0.141	0.0	0.0	0.0	1.16	45.9	19.1

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S5, DS/PN: S1.006, Volume (m³): 6.8

Unit Reference	MD-SHE-0151-1840-4000-1840
Design Head (m)	4.000
Design Flow (l/s)	18.4
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	151
Invert Level (m)	29.234
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	4.000	18.4
Flush-Flo™	0.662	14.0
Kick-Flo®	1.354	11.0
Mean Flow over Head Range	-	14.0

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)
0.100	5.4	1.200	12.5	3.000	16.0	7.000	24.1
0.200	11.2	1.400	11.2	3.500	17.3	7.500	24.9
0.300	12.6	1.600	11.9	4.000	18.4	8.000	25.7
0.400	13.4	1.800	12.6	4.500	19.5	8.500	26.4
0.500	13.8	2.000	13.2	5.000	20.5	9.000	27.2
0.600	13.9	2.200	13.8	5.500	21.4	9.500	27.9
0.800	13.9	2.400	14.4	6.000	22.3		
1.000	13.4	2.600	15.0	6.500	23.2		

Hydro-Brake® Optimum Manhole: S9, DS/PN: S1.011, Volume (m³): 8.0

Unit Reference	MD-SHE-0173-2400-4000-2400
Design Head (m)	4.000
Design Flow (l/s)	24.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	173
Invert Level (m)	25.870
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1800

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Hydro-Brake® Optimum Manhole: S9, DS/PN: S1.011, Volume (m³): 8.0

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	4.000	24.0
Flush-Flo™	0.749	19.5
Kick-Flo®	1.551	15.3
Mean Flow over Head Range	-	18.8

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)
0.100	6.1	1.200	18.5	3.000	20.9	7.000	31.4
0.200	15.0	1.400	17.1	3.500	22.5	7.500	32.4
0.300	17.0	1.600	15.5	4.000	24.0	8.000	33.5
0.400	18.2	1.800	16.4	4.500	25.4	8.500	34.5
0.500	19.0	2.000	17.2	5.000	26.7	9.000	35.4
0.600	19.3	2.200	18.0	5.500	27.9	9.500	36.4
0.800	19.5	2.400	18.8	6.000	29.1		
1.000	19.2	2.600	19.5	6.500	30.3		

Complex Manhole: S11, DS/PN: S1.014, Volume (m³): 3.2

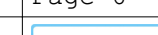
Hydro-Brake® Optimum

Unit Reference	MD-SHE-0152-1300-1800-1300
Design Head (m)	1.800
Design Flow (l/s)	13.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	152
Invert Level (m)	25.765
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.800	13.0
Flush-Flo™	0.532	13.0
Kick-Flo®	1.113	10.3
Mean Flow over Head Range	-	11.4

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

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Hydro-Brake® Optimum

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Hydro-Brake® Optimum Manhole: S18, DS/PN: S5.002, Volume (m³): 2.1

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
1.200	3.6	2.400	5.0	5.000	7.0	8.000	8.8
1.400	3.9	2.600	5.2	5.500	7.4	8.500	9.0
1.600	4.1	3.000	5.5	6.000	7.7	9.000	9.3
1.800	4.4	3.500	6.0	6.500	8.0	9.500	9.6
2.000	4.6	4.000	6.3	7.000	8.3		
2.200	4.8	4.500	6.7	7.500	8.5		

Complex Manhole: S17, DS/PN: S3.008, Volume (m³): 10.3

Hydro-Brake® Optimum

Unit Reference	MD-SHE-0097-7000-3200-7000
Design Head (m)	3.200
Design Flow (l/s)	7.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	97
Invert Level (m)	28.519
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	3.200	7.0
Flush-Flo™	0.417	4.8
Kick-Flo®	0.866	3.8
Mean Flow over Head Range	-	5.2

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	3.2	1.200	4.4	3.000	6.8	7.000	10.1
0.200	4.4	1.400	4.8	3.500	7.3	7.500	10.5
0.300	4.7	1.600	5.1	4.000	7.8	8.000	10.8
0.400	4.8	1.800	5.3	4.500	8.2	8.500	11.1
0.500	4.8	2.000	5.6	5.000	8.6	9.000	11.4
0.600	4.7	2.200	5.9	5.500	9.0	9.500	11.7
0.800	4.2	2.400	6.1	6.000	9.4		
1.000	4.1	2.600	6.3	6.500	9.8		

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Orifice

Diameter (m) 0.040 Discharge Coefficient 0.600 Invert Level (m) 31.719

Hydro-Brake® Optimum Manhole: S21, DS/PN: S7.003, Volume (m³): 2.6

Unit Reference	MD-SHE-0063-1800-1000-1800
Design Head (m)	1.000
Design Flow (l/s)	1.8
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	63
Invert Level (m)	26.537
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	1.8
Flush-Flo™	0.280	1.7
Kick-Flo®	0.565	1.4
Mean Flow over Head Range	-	1.5

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	1.5	1.200	2.0	3.000	3.0	7.000	4.4
0.200	1.7	1.400	2.1	3.500	3.2	7.500	4.6
0.300	1.7	1.600	2.2	4.000	3.4	8.000	4.7
0.400	1.7	1.800	2.3	4.500	3.6	8.500	4.8
0.500	1.6	2.000	2.5	5.000	3.8	9.000	5.0
0.600	1.4	2.200	2.6	5.500	3.9	9.500	5.1
0.800	1.6	2.400	2.7	6.000	4.1		
1.000	1.8	2.600	2.8	6.500	4.3		

Non Return Valve Manhole: S39, DS/PN: S7.004, Volume (m³): 0.5

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Offline Controls for Storm

Pipe Manhole: S5, DS/PN: S2.000, Loop to PN: S2.002

Diameter (m)	0.150	Roughness k (mm)	0.600
Section Type	Pipe/Conduit	Entry Loss Coefficient	0.500
Slope (1:X)	500.0	Coefficient of Contraction	0.600
Length (m)	5.000	Upstream Invert Level (m)	34.150

Pipe Manhole: S6, DS/PN: S2.001, Loop to PN: S2.002

Diameter (m)	0.150	Roughness k (mm)	0.600
Section Type	Pipe/Conduit	Entry Loss Coefficient	0.500
Slope (1:X)	100.0	Coefficient of Contraction	0.600
Length (m)	5.000	Upstream Invert Level (m)	34.100

Pipe Manhole: S6, DS/PN: S2.002, Loop to PN: S2.004

Diameter (m)	0.150	Roughness k (mm)	0.600
Section Type	Pipe/Conduit	Entry Loss Coefficient	0.500
Slope (1:X)	100.0	Coefficient of Contraction	0.600
Length (m)	10.000	Upstream Invert Level (m)	33.750

Pipe Manhole: S21, DS/PN: S4.000, Loop to PN: S5.001

Diameter (m)	-4	Roughness k (mm)	0.600
Section Type	Pipe/Conduit	Entry Loss Coefficient	0.500
Slope (1:X)	1000.0	Coefficient of Contraction	0.600
Length (m)	5.000	Upstream Invert Level (m)	33.850

Pipe Manhole: S17, DS/PN: S5.001, Loop to PN: S4.000

Diameter (m)	0.450	Roughness k (mm)	0.600
Section Type	Pipe/Conduit	Entry Loss Coefficient	0.500
Slope (1:X)	1000.0	Coefficient of Contraction	0.600
Length (m)	5.000	Upstream Invert Level (m)	33.850

Flap Valve Manhole: S37, DS/PN: S8.000, Loop to PN: S6.000

Discharge Coefficient 0.600 Diameter (m) 0.100 Invert Level (m) 26.800

Pump Manhole: S37, DS/PN: S8.000, Loop to PN: S6.000

Invert Level (m) 26.800

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.0000	0.500	0.0000	0.900	1.8000	1.300	1.8000
0.200	0.0000	0.600	0.0000	1.000	1.8000	1.400	1.8000
0.300	0.0000	0.700	0.0000	1.100	1.8000	1.500	1.8000
0.400	0.0000	0.800	1.8000	1.200	1.8000	1.600	1.8000

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Innovyze		Network 2019.1																																									
<u>Pump Manhole: S37, DS/PN: S8.000, Loop to PN: S6.000</u> <table><tr><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th></tr><tr><td>1.700</td><td>1.8000</td><td>2.100</td><td>1.8000</td><td>2.500</td><td>1.8000</td><td>2.900</td><td>1.8000</td></tr><tr><td>1.800</td><td>1.8000</td><td>2.200</td><td>1.8000</td><td>2.600</td><td>1.8000</td><td>3.000</td><td>1.8000</td></tr><tr><td>1.900</td><td>1.8000</td><td>2.300</td><td>1.8000</td><td>2.700</td><td>1.8000</td><td></td><td></td></tr><tr><td>2.000</td><td>1.8000</td><td>2.400</td><td>1.8000</td><td>2.800</td><td>1.8000</td><td></td><td></td></tr></table>				Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	1.700	1.8000	2.100	1.8000	2.500	1.8000	2.900	1.8000	1.800	1.8000	2.200	1.8000	2.600	1.8000	3.000	1.8000	1.900	1.8000	2.300	1.8000	2.700	1.8000			2.000	1.8000	2.400	1.8000	2.800	1.8000		
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)																																				
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1.800	1.8000	2.200	1.8000	2.600	1.8000	3.000	1.8000																																				
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2.000	1.8000	2.400	1.8000	2.800	1.8000																																						
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Storage Structures for Storm																				
Cellular Storage Manhole: S2, DS/PN: S1.002																				
Invert Level (m) 29.700 Safety Factor 2.0																				
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95																				
Infiltration Coefficient Side (m/hr) 0.00000																				
<table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr><tr><td>0.000</td><td>80.0</td><td>0.0</td><td>3.201</td><td>0.0</td><td>0.0</td></tr><tr><td>3.200</td><td>80.0</td><td>0.0</td><td></td><td></td><td></td></tr></table>			Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	80.0	0.0	3.201	0.0	0.0	3.200	80.0	0.0			
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)															
0.000	80.0	0.0	3.201	0.0	0.0															
3.200	80.0	0.0																		
Cellular Storage Manhole: S3, DS/PN: S1.003																				
Invert Level (m) 29.700 Safety Factor 2.0																				
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95																				
Infiltration Coefficient Side (m/hr) 0.00000																				
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Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)															
0.000	80.0	0.0	3.201	0.0	0.0															
3.200	80.0	0.0																		
Complex Manhole: S5, DS/PN: S2.000																				
Porous Car Park																				
Infiltration Coefficient Base (m/hr) 0.00000 Width (m) 19.7																				
Membrane Percolation (mm/hr) 1000 Length (m) 8.0																				
Max Percolation (l/s) 43.8 Slope (1:X) 1000.0																				
Safety Factor 2.0 Depression Storage (mm) 5																				
Porosity 0.95 Evaporation (mm/day) 3																				
Invert Level (m) 34.050 Cap Volume Depth (m) 0.150																				
Infiltration Trench																				
Infiltration Coefficient Base (m/hr) 0.00000 Trench Width (m) 4.0																				
Infiltration Coefficient Side (m/hr) 0.00000 Trench Length (m) 21.0																				
Safety Factor 2.0 Slope (1:X) 0.0																				
Porosity 0.30 Cap Volume Depth (m) 0.500																				
Invert Level (m) 33.925 Cap Infiltration Depth (m) 0.000																				
Porous Car Park Manhole: S6, DS/PN: S2.001																				
Infiltration Coefficient Base (m/hr) 0.00000 Invert Level (m) 34.050																				
Membrane Percolation (mm/hr) 1000 Width (m) 26.1																				
Max Percolation (l/s) 58.0 Length (m) 8.0																				
Safety Factor 2.0 Slope (1:X) 1000.0																				
Porosity 0.95 Depression Storage (mm) 5																				
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Porous Car Park Manhole: S6, DS/PN: S2.001

Evaporation (mm/day) 3 Cap Volume Depth (m) 0.150

Infiltration Trench Manhole: S6, DS/PN: S2.002

Infiltration Coefficient Base (m/hr)	0.00000	Trench Width (m)	2.7
Infiltration Coefficient Side (m/hr)	0.00000	Trench Length (m)	10.0
Safety Factor	2.0	Slope (1:X)	0.0
Porosity	0.30	Cap Volume Depth (m)	0.500
Invert Level (m)	33.925	Cap Infiltration Depth (m)	0.000

Porous Car Park Manhole: S7, DS/PN: S2.003

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	80.0
Membrane Percolation (mm/hr)	1000	Length (m)	2.5
Max Percolation (l/s)	55.6	Slope (1:X)	1000.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.95	Evaporation (mm/day)	3
Invert Level (m)	33.300	Cap Volume Depth (m)	0.150

Cellular Storage Manhole: S4, DS/PN: S1.005

Invert Level (m)	29.700	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	80.0	0.0	3.201	0.0	0.0
3.200	80.0	0.0			

Cellular Storage Manhole: S11, DS/PN: S1.010

Invert Level (m)	26.000	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	100.0	0.0	2.401	0.0	0.0
2.400	100.0	0.0			

Complex Manhole: S13, DS/PN: S1.013

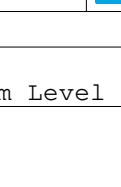
Cellular Storage

Invert Level (m)	25.838	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

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Cellular Storage <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>160.0</td><td>0.0</td><td>0.801</td><td>0.0</td><td>0.0</td></tr><tr><td>0.800</td><td>160.0</td><td>0.0</td><td></td><td></td><td></td></tr></tbody></table> Infiltration Trench <table><tbody><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Trench Width (m)</td><td>1.6</td></tr><tr><td>Infiltration Coefficient Side (m/hr)</td><td>0.00000</td><td>Trench Length (m)</td><td>16.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Slope (1:X)</td><td>0.0</td></tr><tr><td>Porosity</td><td>0.30</td><td>Cap Volume Depth (m)</td><td>0.500</td></tr><tr><td>Invert Level (m)</td><td>28.425</td><td>Cap Infiltration Depth (m)</td><td>0.000</td></tr></tbody></table> Cellular Storage Manhole: S21, DS/PN: S4.000 <table><tbody><tr><td>Invert Level (m)</td><td>33.850</td><td>Safety Factor</td><td>2.0</td></tr><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Porosity</td><td>0.95</td></tr><tr><td>Infiltration Coefficient Side (m/hr)</td><td>0.00000</td><td></td><td></td></tr></tbody></table> <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>100.0</td><td>0.0</td><td>0.451</td><td>0.0</td><td>0.0</td></tr><tr><td>0.450</td><td>100.0</td><td>0.0</td><td></td><td></td><td></td></tr></tbody></table> Porous Car Park Manhole: S23, DS/PN: S4.002 <table><tbody><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Width (m)</td><td>11.0</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Length (m)</td><td>11.0</td></tr><tr><td>Max Percolation (l/s)</td><td>33.6</td><td>Slope (1:X)</td><td>0.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Invert Level (m)</td><td>33.850</td><td>Cap Volume Depth (m)</td><td>0.500</td></tr></tbody></table> Cellular Storage Manhole: S16, DS/PN: S3.004 <table><tbody><tr><td>Invert Level (m)</td><td>30.000</td><td>Safety Factor</td><td>2.0</td></tr><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Porosity</td><td>0.95</td></tr><tr><td>Infiltration Coefficient Side (m/hr)</td><td>0.00000</td><td></td><td></td></tr></tbody></table> <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>260.0</td><td>0.0</td><td>3.001</td><td>0.0</td><td>0.0</td></tr><tr><td>3.000</td><td>260.0</td><td>0.0</td><td></td><td></td><td></td></tr></tbody></table> Porous Car Park Manhole: S16, DS/PN: S3.007 <table><tbody><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.00000</td><td>Invert Level (m)</td><td>33.700</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Width (m)</td><td>9.7</td></tr><tr><td>Max Percolation (l/s)</td><td>53.9</td><td>Length (m)</td><td>20.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Slope (1:X)</td><td>0.0</td></tr><tr><td>Porosity</td><td>0.30</td><td>Depression Storage (mm)</td><td>5</td></tr></tbody></table>			Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	160.0	0.0	0.801	0.0	0.0	0.800	160.0	0.0				Infiltration Coefficient Base (m/hr)	0.00000	Trench Width (m)	1.6	Infiltration Coefficient Side (m/hr)	0.00000	Trench Length (m)	16.0	Safety Factor	2.0	Slope (1:X)	0.0	Porosity	0.30	Cap Volume Depth (m)	0.500	Invert Level (m)	28.425	Cap Infiltration Depth (m)	0.000	Invert Level (m)	33.850	Safety Factor	2.0	Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95	Infiltration Coefficient Side (m/hr)	0.00000			Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	100.0	0.0	0.451	0.0	0.0	0.450	100.0	0.0				Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	11.0	Membrane Percolation (mm/hr)	1000	Length (m)	11.0	Max Percolation (l/s)	33.6	Slope (1:X)	0.0	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	33.850	Cap Volume Depth (m)	0.500	Invert Level (m)	30.000	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)	0.000	260.0	0.0	3.001	0.0	0.0	3.000	260.0	0.0				Infiltration Coefficient Base (m/hr)	0.00000	Invert Level (m)	33.700	Membrane Percolation (mm/hr)	1000	Width (m)	9.7	Max Percolation (l/s)	53.9	Length (m)	20.0	Safety Factor	2.0	Slope (1:X)	0.0	Porosity	0.30	Depression Storage (mm)	5
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)																																																																																																																																											
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<u>Porous Car Park Manhole: S16, DS/PN: S3.007</u> Evaporation (mm/day) 3 Cap Volume Depth (m) 0.300 <u>Cellular Storage Manhole: S29, DS/PN: S5.000</u> Invert Level (m) 33.850 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000 <table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr><tr><td>0.000</td><td>139.0</td><td>0.0</td><td>0.451</td><td>0.0</td><td>0.0</td></tr><tr><td>0.450</td><td>139.0</td><td>0.0</td><td></td><td></td><td></td></tr></table> <u>Cellular Storage Manhole: S17, DS/PN: S5.001</u> Invert Level (m) 33.850 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000 <table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr><tr><td>0.000</td><td>421.0</td><td>0.0</td><td>0.451</td><td>0.0</td><td>0.0</td></tr><tr><td>0.450</td><td>421.0</td><td>0.0</td><td></td><td></td><td></td></tr></table> <u>Cellular Storage Manhole: S21, DS/PN: S8.001</u> Invert Level (m) 26.600 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000 <table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr><tr><td>0.000</td><td>140.0</td><td>300.0</td><td>0.801</td><td>0.0</td><td>364.0</td></tr><tr><td>0.800</td><td>140.0</td><td>364.0</td><td></td><td></td><td></td></tr></table>			Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	139.0	0.0	0.451	0.0	0.0	0.450	139.0	0.0				Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	421.0	0.0	0.451	0.0	0.0	0.450	421.0	0.0				Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	140.0	300.0	0.801	0.0	364.0	0.800	140.0	364.0			
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)																																																			
0.000	139.0	0.0	0.451	0.0	0.0																																																			
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Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)																																																			
0.000	421.0	0.0	0.451	0.0	0.0																																																			
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0.000	140.0	300.0	0.801	0.0	364.0																																																			
0.800	140.0	364.0																																																						
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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 Coefficient	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	16
Number of Online Controls	9	Number of Time/Area Diagrams	0
Number of Offline Controls	7	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	2013
Site Location	GB 528850 184100 TQ 28850 84100
Data Type	Catchment
Cv (Summer)	0.750
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	OFF

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 (%)	40, 40, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S2	15 Winter	2	+40%	100/15 Summer			
S1.001	S1	15 Winter	2	+40%				
S1.002	S2	360 Winter	2	+40%	30/15 Summer			
S1.003	S3	360 Winter	2	+40%	2/240 Winter			
S2.000	S5	1440 Winter	2	+40%			2/1440 Winter	30
S2.001	S6	240 Winter	2	+40%	100/15 Winter		2/15 Winter	53
S2.002	S6	15 Winter	2	+40%	30/15 Summer		2/15 Summer	54
S2.003	S7	360 Winter	2	+40%	30/30 Winter			
S2.004	S8	360 Winter	2	+40%	30/60 Winter			
S1.004	S3	360 Winter	2	+40%	2/120 Summer			
S1.005	S4	360 Winter	2	+40%	2/60 Winter			
S1.006	S5	360 Winter	2	+40%	2/15 Summer			
S1.007	S6	15 Winter	2	+40%	30/15 Summer			
S1.008	S7	960 Winter	2	+40%	2/120 Summer			
S1.009	S8	960 Winter	2	+40%	2/120 Summer			
S1.010	S11	960 Winter	2	+40%	2/120 Winter			

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
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PN	US/MH Name	Water	Surcharged	Flooded			Pipe	Status	Level Exceeded
		Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
S1.000	S2	33.817	-0.183	0.000	0.31		25.7	OK	
S1.001	S1	33.487	-0.238	0.000	0.29		30.8	OK	
S1.002	S2	30.401	-0.070	0.000	0.11		12.3	OK	
S1.003	S3	30.399	0.038	0.000	0.23		25.5	SURCHARGED	
S2.000	S5	34.154	-0.146	0.000	0.01	0.0	0.0	OK	
S2.001	S6	34.142	-0.108	0.000	0.18	2.5	1.5	OK	
S2.002	S6	33.811	-0.089	0.000	0.34	5.5	5.1	OK	
S2.003	S7	33.507	-0.093	0.000	0.31		3.4	OK	
S2.004	S8	33.345	-0.105	0.000	0.19		5.6	OK	
S1.004	S3	30.392	0.241	0.000	0.43		25.5	SURCHARGED	
S1.005	S4	30.381	0.297	0.000	0.28		16.9	SURCHARGED	
S1.006	S5	30.379	0.920	0.000	0.45		13.9	SURCHARGED	
S1.007	S6	28.983	-0.067	0.000	0.83		31.2	OK	
S1.008	S7	26.575	0.275	0.000	0.37		16.7	SURCHARGED	
S1.009	S8	26.569	0.291	0.000	0.31		16.7	SURCHARGED	
S1.010	S11	26.560	0.243	0.000	0.27		16.3	SURCHARGED	

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2 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
S1.011	S9	960 Winter	2	+40%	2/15 Summer		
S1.012	S10	960 Winter	2	+40%	2/120 Summer		
S1.013	S13	960 Winter	2	+40%	2/60 Winter		
S1.014	S11	960 Winter	2	+40%	2/60 Summer		
S3.000	S12	15 Winter	2	+40%	30/120 Winter	100/960 Winter	
S3.001	S22	15 Winter	2	+40%	30/120 Summer		
S3.002	S13	15 Winter	2	+40%	30/60 Winter		
S4.000	S21	15 Winter	2	+40%	30/15 Summer		2/15 Summer
S4.001	S22	15 Winter	2	+40%	30/15 Summer		
S4.002	S23	15 Winter	2	+40%	2/15 Summer		
S3.003	S26	480 Winter	2	+40%	2/240 Winter		
S3.004	S16	480 Winter	2	+40%	2/60 Winter		
S3.005	S14	480 Winter	2	+40%	2/15 Summer		
S3.006	S15	480 Winter	2	+40%	2/15 Summer		
S3.007	S16	480 Winter	2	+40%	2/15 Summer		
S5.000	S29	240 Winter	2	+40%	100/120 Winter		
S5.001	S17	240 Winter	2	+40%	100/30 Winter		2/15 Summer
S5.002	S18	15 Winter	2	+40%	2/15 Summer		
S6.000	S33	480 Winter	2	+40%	2/15 Summer		
S3.008	S17	480 Winter	2	+40%	2/15 Summer		
S7.000	S19	15 Winter	2	+40%	30/15 Winter		
S7.001	S20	30 Winter	2	+40%	2/15 Summer		
S7.002	S36	30 Winter	2	+40%	2/15 Summer		
S8.000	S37	1440 Winter	2	+40%	30/30 Winter		
S8.001	S21	1440 Winter	2	+40%			
S7.003	S21	30 Winter	2	+40%	2/15 Summer		
S7.004	S39	30 Winter	2	+40%			

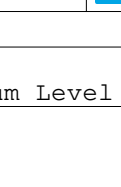
PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Pipe Flow / Overflow Cap. (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.011	S9		26.574	0.479	0.000	0.31	15.3	SURCHARGED	
S1.012	S10		26.335	0.272	0.000	0.56	15.3	SURCHARGED	
S1.013	S13		26.317	0.293	0.000	0.56	13.0	SURCHARGED	
S1.014	S11		26.300	0.310	0.000	0.40	13.0	SURCHARGED	
S3.000	S12		31.042	-0.333	0.000	0.03	3.2	OK	1
S3.001	S22		30.962	-0.333	0.000	0.03	3.2	OK	
S3.002	S13		30.937	-0.278	0.000	0.15	37.5	OK	
S4.000	S21	54	33.965	-0.110	0.000	0.30	20.5	9.1	OK
S4.001	S22		33.947	-0.053	0.000	0.74	8.9	OK	
S4.002	S23		33.822	0.097	0.000	1.82	21.3	SURCHARGED	
S3.003	S26		30.871	0.076	0.000	0.05	12.5	SURCHARGED	
S3.004	S16		30.870	0.495	0.000	0.09	15.5	SURCHARGED	
S3.005	S14		30.896	1.801	0.000	0.12	13.2	SURCHARGED	
S3.006	S15		30.905	1.888	0.000	0.10	11.0	SURCHARGED	
S3.007	S16		30.908	1.949	0.000	0.08	8.0	SURCHARGED	

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

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Cap. (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S5.000	S29		33.942	-0.208	0.000	0.04	1.0	OK	
S5.001	S17	53	33.942	-0.170	0.000	0.03	0.6	2.7	OK
S5.002	S18		34.071	0.121	0.000	0.03	3.0	SURCHARGED	
S6.000	S33		30.890	0.790	0.000	0.17	0.9	SURCHARGED	
S3.008	S17		30.908	2.014	0.000	0.07	6.0	SURCHARGED	
S7.000	S19		27.796	-0.104	0.000	0.20	4.1	OK	
S7.001	S20		27.543	0.578	0.000	0.09	4.3	SURCHARGED	
S7.002	S36		27.533	0.758	0.000	0.15	4.2	SURCHARGED	
S8.000	S37	0	26.800	-0.100	0.000	0.00	0.0	0.0	OK
S8.001	S21		26.800	-0.725	0.000	0.00	0.0	OK	
S7.003	S21		27.530	0.843	0.000	0.14	1.8	SURCHARGED	
S7.004	S39		26.456	-0.190	0.000	0.06	1.8	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 Coefficient	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	16
Number of Online Controls	9	Number of Time/Area Diagrams	0
Number of Offline Controls	7	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	2013
Site Location	GB 528850 184100 TQ 28850 84100
Data Type	Catchment
Cv (Summer)	0.750
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	OFF

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 (%)	40, 40, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S2	15 Winter	30	+40%	100/15 Summer			
S1.001	S1	15 Winter	30	+40%				
S1.002	S2	240 Winter	30	+40%	30/15 Summer			
S1.003	S3	240 Winter	30	+40%	2/240 Winter			
S2.000	S5	360 Winter	30	+40%			2/1440 Winter	30
S2.001	S6	60 Winter	30	+40%	100/15 Winter		2/15 Winter	53
S2.002	S6	15 Winter	30	+40%	30/15 Summer		2/15 Summer	54
S2.003	S7	60 Winter	30	+40%	30/30 Winter			
S2.004	S8	60 Winter	30	+40%	30/60 Winter			
S1.004	S3	240 Winter	30	+40%	2/120 Summer			
S1.005	S4	240 Winter	30	+40%	2/60 Winter			
S1.006	S5	240 Winter	30	+40%	2/15 Summer			
S1.007	S6	15 Winter	30	+40%	30/15 Summer			
S1.008	S7	960 Winter	30	+40%	2/120 Summer			
S1.009	S8	960 Winter	30	+40%	2/120 Summer			
S1.010	S11	960 Winter	30	+40%	2/120 Winter			

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
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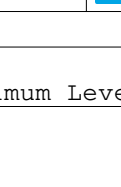
PN	US/MH Name	Water		Surcharged		Flooded		Pipe		Status	Level Exceeded
		Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)				
S1.000	S2	33.913	-0.087	0.000	0.82		67.6			OK	
S1.001	S1	33.600	-0.125	0.000	0.77		83.1			OK	
S1.002	S2	31.852	1.381	0.000	0.18		19.7			SURCHARGED	
S1.003	S3	31.849	1.488	0.000	0.33		37.5			SURCHARGED	
S2.000	S5	34.187	-0.113	0.000	0.14	0.5	1.1			OK	
S2.001	S6	34.193	-0.057	0.000	0.70	9.8	6.2			OK	
S2.002	S6	33.911	0.011	0.000	1.00	21.2	14.9			SURCHARGED	
S2.003	S7	33.819	0.219	0.000	1.73		19.1			SURCHARGED	
S2.004	S8	33.565	0.115	0.000	1.15		33.4			SURCHARGED	
S1.004	S3	31.842	1.691	0.000	0.64		38.3			SURCHARGED	
S1.005	S4	31.829	1.745	0.000	0.29		17.8			SURCHARGED	
S1.006	S5	31.825	2.366	0.000	0.48		14.9			SURCHARGED	
S1.007	S6	29.733	0.683	0.000	2.54		96.3			SURCHARGED	
S1.008	S7	27.706	1.406	0.000	0.40		18.2			SURCHARGED	
S1.009	S8	27.701	1.423	0.000	0.34		18.1			SURCHARGED	
S1.010	S11	27.694	1.377	0.000	0.28		17.2			SURCHARGED	

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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.	
S1.011	S9	960 Winter	30	+40%	2/15 Summer				
S1.012	S10	960 Winter	30	+40%	2/120 Summer				
S1.013	S13	960 Winter	30	+40%	2/60 Winter				
S1.014	S11	960 Winter	30	+40%	2/60 Summer				
S3.000	S12	480 Winter	30	+40%	30/120 Winter	100/960 Winter			
S3.001	S22	480 Winter	30	+40%	30/120 Summer				
S3.002	S13	480 Winter	30	+40%	30/60 Winter				
S4.000	S21	15 Winter	30	+40%	30/15 Summer		2/15 Summer		54
S4.001	S22	15 Winter	30	+40%	30/15 Summer				
S4.002	S23	15 Winter	30	+40%	2/15 Summer				
S3.003	S26	480 Winter	30	+40%	2/240 Winter				
S3.004	S16	480 Winter	30	+40%	2/60 Winter				
S3.005	S14	480 Winter	30	+40%	2/15 Summer				
S3.006	S15	480 Winter	30	+40%	2/15 Summer				
S3.007	S16	480 Winter	30	+40%	2/15 Summer				
S5.000	S29	120 Winter	30	+40%	100/120 Winter				
S5.001	S17	120 Winter	30	+40%	100/30 Winter		2/15 Summer		53
S5.002	S18	15 Winter	30	+40%	2/15 Summer				
S6.000	S33	480 Winter	30	+40%	2/15 Summer				
S3.008	S17	480 Winter	30	+40%	2/15 Summer				
S7.000	S19	15 Winter	30	+40%	30/15 Winter				
S7.001	S20	15 Winter	30	+40%	2/15 Summer				
S7.002	S36	15 Winter	30	+40%	2/15 Summer				
S8.000	S37	360 Winter	30	+40%	30/30 Winter				0
S8.001	S21	360 Winter	30	+40%					
S7.003	S21	15 Winter	30	+40%	2/15 Summer				
S7.004	S39	15 Winter	30	+40%					
Water Surcharged Flooded Pipe									
PN	US/MH Name	Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)	Status	Level Exceeded
S1.011	S9	27.696	1.601	0.000	0.33		16.6	SURCHARGED	
S1.012	S10	27.507	1.444	0.000	0.61		16.5	SURCHARGED	
S1.013	S13	27.490	1.466	0.000	0.57		13.2	SURCHARGED	
S1.014	S11	27.474	1.484	0.000	0.40		13.0	SURCHARGED	
S3.000	S12	32.293	0.918	0.000	0.01		1.0	SURCHARGED	1
S3.001	S22	32.293	0.998	0.000	0.01		0.9	SURCHARGED	
S3.002	S13	32.294	1.079	0.000	0.05		12.5	SURCHARGED	
S4.000	S21	34.109	0.034	0.000	0.38	76.0	11.7	SURCHARGED	
S4.001	S22	34.094	0.094	0.000	1.00		11.9	SURCHARGED	
S4.002	S23	34.041	0.316	0.000	2.86		33.6	FLOOD RISK	
S3.003	S26	32.294	1.499	0.000	0.11		28.0	SURCHARGED	
S3.004	S16	32.291	1.916	0.000	0.10		17.1	SURCHARGED	
S3.005	S14	32.319	3.224	0.000	0.14		14.9	SURCHARGED	
S3.006	S15	32.326	3.309	0.000	0.12		12.7	SURCHARGED	
S3.007	S16	32.329	3.370	0.000	0.10		9.9	SURCHARGED	
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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Water	Surcharged	Flooded			Pipe	Status	Level
		Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		Exceeded
S5.000	S29	34.063	-0.087	0.000	0.11		3.1	OK	
S5.001	S17	34.064	-0.048	0.000	0.04	5.1	2.9	OK	
S5.002	S18	34.188	0.238	0.000	0.03		3.0	FLOOD RISK	
S6.000	S33	32.304	2.204	0.000	0.17		0.9	SURCHARGED	
S3.008	S17	32.326	3.432	0.000	0.12		10.0	SURCHARGED	
S7.000	S19	27.902	0.002	0.000	0.51		10.4	SURCHARGED	
S7.001	S20	27.762	0.797	0.000	0.43		20.1	SURCHARGED	
S7.002	S36	27.712	0.937	0.000	0.76		20.8	SURCHARGED	
S8.000	S37	27.124	0.224	0.000	0.00	0.0	0.0	SURCHARGED	
S8.001	S21	27.124	-0.401	0.000	0.00		0.0	OK	
S7.003	S21	27.696	1.009	0.000	0.15		1.9	SURCHARGED	
S7.004	S39	26.458	-0.188	0.000	0.06		1.9	OK	

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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 Coefficient	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	16
Number of Online Controls	9	Number of Time/Area Diagrams	0
Number of Offline Controls	7	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	2013
Site Location	GB 528850 184100 TQ 28850 84100
Data Type	Catchment
Cv (Summer)	0.750
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	OFF

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 (%)	40, 40, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S2	15 Winter	100	+40%	100/15 Summer			
S1.001	S1	360 Winter	100	+40%				
S1.002	S2	360 Winter	100	+40%	30/15 Summer			
S1.003	S3	360 Winter	100	+40%	2/240 Winter			
S2.000	S5	120 Winter	100	+40%			2/1440 Winter	30
S2.001	S6	30 Winter	100	+40%	100/15 Winter		2/15 Winter	53
S2.002	S6	60 Winter	100	+40%	30/15 Summer		2/15 Summer	54
S2.003	S7	60 Winter	100	+40%	30/30 Winter			
S2.004	S8	60 Winter	100	+40%	30/60 Winter			
S1.004	S3	360 Winter	100	+40%	2/120 Summer			
S1.005	S4	360 Winter	100	+40%	2/60 Winter			
S1.006	S5	360 Winter	100	+40%	2/15 Summer			
S1.007	S6	15 Winter	100	+40%	30/15 Summer			
S1.008	S7	960 Winter	100	+40%	2/120 Summer			
S1.009	S8	960 Winter	100	+40%	2/120 Summer			
S1.010	S11	960 Winter	100	+40%	2/120 Winter			

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

PN	US/MH Name	Water	Surcharged	Flooded	Pipe		Status	Level Exceeded
		Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)		
S1.000	S2	34.070	0.070	0.000	1.06	87.4	SURCHARGED	
S1.001	S1	33.711	-0.014	0.000	0.16	17.1	OK	
S1.002	S2	33.710	3.239	0.000	0.13	14.2	FLOOD RISK	
S1.003	S3	33.706	3.345	0.000	0.25	28.0	SURCHARGED	
S2.000	S5	34.225	-0.075	0.000	0.44	1.8 3.4	FLOOD RISK	
S2.001	S6	34.373	0.123	0.000	1.50	27.4 13.1	FLOOD RISK	
S2.002	S6	34.312	0.412	0.000	1.02	27.5 15.2	FLOOD RISK	
S2.003	S7	34.308	0.708	0.000	1.86	20.5	FLOOD RISK	
S2.004	S8	34.012	0.562	0.000	1.59	46.2	SURCHARGED	
S1.004	S3	33.698	3.547	0.000	0.63	37.5	SURCHARGED	
S1.005	S4	33.681	3.597	0.000	0.31	19.0	SURCHARGED	
S1.006	S5	33.661	4.202	0.000	0.62	19.3	SURCHARGED	
S1.007	S6	30.121	1.071	0.000	3.17	120.1	SURCHARGED	
S1.008	S7	28.532	2.232	0.000	0.47	21.5	SURCHARGED	
S1.009	S8	28.525	2.247	0.000	0.40	21.4	SURCHARGED	
S1.010	S11	28.514	2.197	0.000	0.31	18.6	SURCHARGED	

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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) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.011	S9	960 Winter	100	+40%	2/15 Summer			
S1.012	S10	960 Winter	100	+40%	2/120 Summer			
S1.013	S13	960 Winter	100	+40%	2/60 Winter			
S1.014	S11	960 Winter	100	+40%	2/60 Summer			
S3.000	S12	960 Winter	100	+40%	30/120 Winter	100/960 Winter		
S3.001	S22	960 Winter	100	+40%	30/120 Summer			
S3.002	S13	480 Winter	100	+40%	30/60 Winter			
S4.000	S21	15 Winter	100	+40%	30/15 Summer		2/15 Summer	54
S4.001	S22	15 Winter	100	+40%	30/15 Summer			
S4.002	S23	15 Winter	100	+40%	2/15 Summer			
S3.003	S26	480 Winter	100	+40%	2/240 Winter			
S3.004	S16	480 Winter	100	+40%	2/60 Winter			
S3.005	S14	480 Winter	100	+40%	2/15 Summer			
S3.006	S15	480 Winter	100	+40%	2/15 Summer			
S3.007	S16	480 Winter	100	+40%	2/15 Summer			
S5.000	S29	240 Winter	100	+40%	100/120 Winter			
S5.001	S17	240 Winter	100	+40%	100/30 Winter		2/15 Summer	53
S5.002	S18	15 Summer	100	+40%	2/15 Summer			
S6.000	S33	480 Winter	100	+40%	2/15 Summer			
S3.008	S17	480 Winter	100	+40%	2/15 Summer			
S7.000	S19	15 Winter	100	+40%	30/15 Winter			
S7.001	S20	15 Winter	100	+40%	2/15 Summer			
S7.002	S36	15 Winter	100	+40%	2/15 Summer			
S8.000	S37	360 Winter	100	+40%	30/30 Winter			0
S8.001	S21	360 Winter	100	+40%				
S7.003	S21	15 Winter	100	+40%	2/15 Summer			
S7.004	S39	15 Winter	100	+40%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Pipe Flow / Overflow Cap. (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.011	S9	28.503	2.408	0.000	0.37	18.4	SURCHARGED	
S1.012	S10	28.058	1.995	0.000	0.68	18.4	SURCHARGED	
S1.013	S13	28.034	2.010	0.000	0.83	19.2	SURCHARGED	
S1.014	S11	28.009	2.019	0.000	0.60	19.2	FLOOD RISK	
S3.000	S12	33.601	2.226	0.682	0.06	6.3	FLOOD	1
S3.001	S22	33.631	2.336	0.000	0.07	7.8	SURCHARGED	
S3.002	S13	34.020	2.805	0.000	0.06	16.0	FLOOD RISK	
S4.000	S21	34.176	0.101	0.000	0.44	109.9	FLOOD RISK	
S4.001	S22	34.170	0.170	0.000	1.13	13.5	SURCHARGED	
S4.002	S23	34.151	0.426	0.000	3.25	38.2	FLOOD RISK	
S3.003	S26	34.019	3.224	0.000	0.15	36.5	SURCHARGED	
S3.004	S16	34.017	3.642	0.000	0.12	19.0	SURCHARGED	
S3.005	S14	34.012	4.917	0.000	0.18	19.2	FLOOD RISK	
S3.006	S15	34.010	4.993	0.000	0.19	20.6	FLOOD RISK	
S3.007	S16	34.007	5.048	0.000	0.13	13.0	FLOOD RISK	

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

PN	US/MH Name	Water	Surcharged	Flooded			Pipe	Status	Level
		Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		Exceeded
S5.000	S29	34.162	0.012	0.000	0.13		3.6	SURCHARGED	
S5.001	S17	34.160	0.048	0.000	0.04	7.5	2.9	FLOOD RISK	
S5.002	S18	34.226	0.276	0.000	0.03		3.0	FLOOD RISK	
S6.000	S33	33.992	3.892	0.000	0.16		0.9	SURCHARGED	
S3.008	S17	34.011	5.117	0.000	0.16		14.0	SURCHARGED	
S7.000	S19	28.174	0.274	0.000	0.66		13.6	SURCHARGED	
S7.001	S20	27.950	0.985	0.000	0.56		26.0	FLOOD RISK	
S7.002	S36	27.877	1.102	0.000	1.01		27.7	FLOOD RISK	
S8.000	S37	27.396	0.496	0.000	0.00	0.0	0.0	SURCHARGED	
S8.001	S21	27.396	-0.129	0.000	0.02		1.6	OK	
S7.003	S21	27.821	1.134	0.000	0.16		2.0	SURCHARGED	
S7.004	S39	26.459	-0.187	0.000	0.07		2.0	OK	