Hydro-Brake® Optimum

Minimum Outlet Pipe Diameter (mm) 100
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.200	3.2
Flush-Flo™	0.312	2.3
Kick-Flo®	0.637	1.8
Mean Flow over Head Range	-	2.4

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.8	1.200	2.4	3.000	3.7	7.000	5.5
0.200	2.2	1.400	2.6	3.500	4.0	7.500	5.7
0.300	2.3	1.600	2.8	4.000	4.2	8.000	5.9
0.400	2.2	1.800	2.9	4.500	4.5	8.500	6.0
0.500	2.1	2.000	3.1	5.000	4.7	9.000	6.2
0.600	1.9	2.200	3.2	5.500	4.9	9.500	6.4
0.800	2.0	2.400	3.3	6.000	5.1		
1.000	2.2	2.600	3.5	6.500	5.3		

Hydro-Brake® Optimum

Unit Reference	MD-SHE-0140-9000-0900-9000
Design Head (m)	0.900
Design Flow (l/s)	9.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	140
Invert Level (m)	34.823
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.900	9.0
Flush-Flo™	0.278	9.0
Kick-Flo®	0.617	7.5
Mean Flow over Head Range	-	7.7

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

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Hydro-Brake® Optimum

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.1	1.200	10.3	3.000	15.9	7.000	23.9
0.200	8.8	1.400	11.1	3.500	17.1	7.500	24.7
0.300	9.0	1.600	11.8	4.000	18.2	8.000	25.5
0.400	8.8	1.800	12.5	4.500	19.3	8.500	26.2
0.500	8.5	2.000	13.1	5.000	20.3	9.000	26.9
0.600	7.8	2.200	13.7	5.500	21.3	9.500	27.6
0.800	8.5	2.400	14.3	6.000	22.2		
1.000	9.5	2.600	14.9	6.500	23.0		

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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 Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	2013
Site Location	GB 506100 181400 TQ 06100 81400
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, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	15 Winter	2	+0%				
S1.001	S2	15 Winter	2	+0%	100/15 Summer			
S1.002	S3	15 Winter	2	+0%	100/15 Summer			
S1.003	S4	240 Winter	2	+0%	30/30 Summer			
S1.004	S5	360 Winter	2	+0%	30/15 Summer			
S1.005	S6	15 Winter	2	+0%	100/360 Winter			
S1.006	S7	15 Winter	2	+0%	100/360 Winter			
S2.000	S8	15 Winter	2	+0%	100/600 Winter			
S1.007	S9	2160 Winter	2	+0%	30/360 Summer			
S1.008	S10	2160 Winter	2	+0%	30/240 Winter			
S1.009	S11	2160 Winter	2	+0%	30/240 Winter			
S1.010	S12	2160 Winter	2	+0%	2/180 Summer			
S1.011	S13	2160 Winter	2	+0%	2/180 Summer			
S1.012	S14	240 Winter	2	+0%				

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	38.642	-0.345	0.000	0.12		57.7	OK	
S1.001	S2	37.212	-0.326	0.000	0.17		102.3	OK	
S1.002	S3	35.452	-0.277	0.000	0.31		157.3	OK	
S1.003	S4	34.843	-0.069	0.000	0.24		11.8	OK	
S1.004	S5	34.845	-0.043	0.000	0.07		10.0	OK	
S1.005	S6	34.410	-0.342	0.000	0.12		16.4	OK	
S1.006	S7	34.330	-0.342	0.000	0.13		18.8	OK	
S2.000	S8	34.617	-0.553	0.000	0.02		11.1	OK	
S1.007	S9	34.076	-0.141	0.000	0.05		11.9	OK	
S1.008	S10	34.075	-0.066	0.000	0.03		11.6	OK	
S1.009	S11	34.075	-0.033	0.000	0.05		11.4	OK	
S1.010	S12	34.075	0.267	0.000	0.27		5.4	SURCHARGED	
S1.011	S13	34.156	0.348	0.000	0.04		2.3	SURCHARGED	
S1.012	S14	33.491	-0.264	0.000	0.03		2.3	OK	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	2013
Site Location	GB 506100 181400 TQ 06100 81400
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, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	15 Winter	30	+0%				
S1.001	S2	15 Winter	30	+0%	100/15 Summer			
S1.002	S3	15 Winter	30	+0%	100/15 Summer			
S1.003	S4	240 Winter	30	+0%	30/30 Summer			
S1.004	S5	240 Winter	30	+0%	30/15 Summer			
S1.005	S6	2160 Winter	30	+0%	100/360 Winter			
S1.006	S7	2160 Winter	30	+0%	100/360 Winter			
S2.000	S8	15 Winter	30	+0%	100/600 Winter			
S1.007	S9	2160 Winter	30	+0%	30/360 Summer			
S1.008	S10	2160 Winter	30	+0%	30/240 Winter			
S1.009	S11	2160 Winter	30	+0%	30/240 Winter			
S1.010	S12	2160 Winter	30	+0%	2/180 Summer			
S1.011	S13	2160 Winter	30	+0%	2/180 Summer			
S1.012	S14	4320 Summer	30	+0%				

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	38.707	-0.280	0.000	0.30		140.9	OK	
S1.001	S2	37.302	-0.236	0.000	0.45		277.2	OK	
S1.002	S3	35.618	-0.111	0.000	0.84		426.9	OK	
S1.003	S4	35.176	0.264	0.000	0.20		9.8	SURCHARGED	
S1.004	S5	35.172	0.284	0.000	0.07		10.0	SURCHARGED	
S1.005	S6	34.624	-0.128	0.000	0.08		10.5	OK	
S1.006	S7	34.623	-0.049	0.000	0.08		10.7	OK	
S2.000	S8	34.647	-0.523	0.000	0.04		27.0	OK	
S1.007	S9	34.622	0.405	0.000	0.07		16.6	SURCHARGED	
S1.008	S10	34.622	0.481	0.000	0.05		16.7	SURCHARGED	
S1.009	S11	34.622	0.514	0.000	0.08		16.4	SURCHARGED	
S1.010	S12	34.622	0.814	0.000	0.26		5.1	SURCHARGED	
S1.011	S13	34.673	0.865	0.000	0.04		2.3	SURCHARGED	
S1.012	S14	33.493	-0.262	0.000	0.03		2.3	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 Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 2
Number of Online Controls 2 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH
FEH Rainfall Version 2013
Site Location GB 506100 181400 TQ 06100 81400
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, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 2, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	15 Winter	100	+40%					38.778
S1.001	S2	15 Winter	100	+40%	100/15 Summer				37.713
S1.002	S3	15 Winter	100	+40%	100/15 Summer				36.600
S1.003	S4	480 Winter	100	+40%	30/30 Summer				35.834
S1.004	S5	720 Winter	100	+40%	30/15 Summer				35.838
S1.005	S6	720 Winter	100	+40%	100/360 Winter				35.769
S1.006	S7	720 Winter	100	+40%	100/360 Winter				35.768
S2.000	S8	720 Winter	100	+40%	100/600 Winter				35.767
S1.007	S9	720 Winter	100	+40%	30/360 Summer				35.768
S1.008	S10	720 Winter	100	+40%	30/240 Winter				35.766
S1.009	S11	720 Winter	100	+40%	30/240 Winter				35.766
S1.010	S12	720 Winter	100	+40%	2/180 Summer				35.765
S1.011	S13	720 Winter	100	+40%	2/180 Summer				35.753
S1.012	S14	720 Winter	100	+40%					33.541

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	-0.209	0.000	0.55		259.0	OK	
S1.001	S2	0.175	0.000	0.79		483.5	SURCHARGED	
S1.002	S3	0.871	0.000	1.47		743.1	SURCHARGED	
S1.003	S4	0.922	0.000	0.25		12.3	SURCHARGED	
S1.004	S5	0.950	0.000	0.07		10.0	SURCHARGED	
S1.005	S6	1.017	0.000	0.09		12.7	SURCHARGED	
S1.006	S7	1.096	0.000	0.10		13.9	SURCHARGED	
S2.000	S8	0.597	0.000	0.01		4.2	FLOOD RISK	
S1.007	S9	1.551	0.000	0.18		43.9	SURCHARGED	
S1.008	S10	1.625	0.000	0.13		43.9	SURCHARGED	
S1.009	S11	1.658	0.000	0.20		43.5	SURCHARGED	
S1.010	S12	1.957	0.000	0.64		12.6	FLOOD RISK	
S1.011	S13	1.945	0.000	0.21		12.2	SURCHARGED	
S1.012	S14	-0.214	0.000	0.18		12.2	OK	

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Existing Network Details for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type
S4.000	4.483	0.023	194.9	0.117	5.00	0.0	0.600		o	300	Pipe/Conduit
S4.001	10.938	0.044	248.6	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit
S4.002	19.458	0.078	249.5	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit
S4.003	40.619	0.102	398.2	0.042	0.00	0.0	0.600		o	300	Pipe/Conduit
S4.004	6.073	0.010	607.3	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit
S4.005	20.400	0.715	28.5	0.080	0.00	0.0		0.045	3 \=/	2000	1:3 Swale
S4.006	5.124	0.025	205.0	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit
S4.007	6.211	0.075	82.8	0.030	0.00	0.0		0.045	3 \=/	3000	1:3 Swale
S4.008	5.042	0.575	8.8	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit
S4.009	23.365	0.000	0.0	0.000	0.00	0.0	0.600		ooo	300	Triple Pipe
S4.010	13.499	0.000	0.0	0.000	0.00	0.0	0.600		ooo	300	Triple Pipe
S4.011	6.827	0.875	7.8	0.080	0.00	0.0	0.600		ooo	300	Triple Pipe
S4.012	22.688	0.000	0.0	0.000	0.00	0.0	0.600		ooo	300	Triple Pipe
S5.000	36.997	0.737	50.2	0.092	5.00	0.0	0.600		o	300	Pipe/Conduit
S5.001	50.906	0.951	53.5	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit
S5.002	22.132	0.114	194.1	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit
S5.003	6.787	0.026	261.0	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit
S5.004	23.821	0.068	350.3	0.000	0.00	0.0	0.600		o	375	Pipe/Conduit
S4.013	22.688	0.045	504.2	0.457	0.00	0.0	0.600		oo	300	Double Pipe
S4.014	9.692	0.080	121.2	0.000	0.00	0.0	0.600		oo	300	Double Pipe

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
S4.000	39.284	0.117	0.0	1.12	79.4
S4.001	38.374	0.117	0.0	0.99	70.2
S4.002	38.330	0.117	0.0	0.99	70.0
S4.003	38.252	0.160	0.0	0.78	55.3
S4.004	38.150	0.160	0.0	0.63	44.6
S4.005	38.140	0.239	0.0	2.02	3539.6
S4.006	37.425	0.239	0.0	1.09	77.4
S4.007	37.400	0.269	0.0	1.14	2073.2
S4.008	37.325	0.269	0.0	5.34	377.5
S4.009	36.750	0.269	0.0	0.00	0.0
S4.010	36.750	0.269	0.0	0.00	0.0
S4.011	36.750	0.349	0.0	5.66	1200.7
S4.012	35.875	0.349	0.0	0.00	0.0
S5.000	37.771	0.092	0.0	2.22	157.2
S5.001	37.034	0.092	0.0	2.15	152.2
S5.002	36.083	0.092	0.0	1.12	79.5
S5.003	35.969	0.092	0.0	0.97	68.5
S5.004	35.943	0.092	0.0	0.96	106.3
S4.013	35.875	0.898	0.0	0.69	98.0
S4.014	35.830	0.898	0.0	1.43	201.8

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Existing Network Details for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type
S4.015	31.222	0.716	43.6	0.000	0.00	0.0	0.600		ooo	300	Triple Pipe
S6.000	17.972	0.000	0.0	0.049	5.00	0.0	0.600		o	300	Pipe/Conduit
S6.001	7.636	0.900	8.5	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit
S6.002	8.579	0.566	15.2	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit
S4.016	16.806	0.212	79.3	0.284	0.00	0.0	0.600		o	375	Pipe/Conduit
S4.017	13.428	0.090	149.2	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
S4.015	35.750	0.898	0.0	2.39	506.3
S6.000	36.500	0.049	0.0	0.00	0.0
S6.001	36.500	0.049	0.0	5.43	383.8
S6.002	35.600	0.049	0.0	4.06	286.9
S4.016	35.034	1.231	0.0	2.04	224.9
S4.017	34.822	1.231	0.0	1.28	90.8

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S16	39.900	0.616	Open Manhole	300	S4.000	39.284	300				
S17	39.874	1.500	Open Manhole	300	S4.001	38.374	300	S4.000	39.261	300	887
S18	39.626	1.296	Open Manhole	300	S4.002	38.330	300	S4.001	38.330	300	
S19	39.231	0.979	Open Manhole	300	S4.003	38.252	300	S4.002	38.252	300	
S20	38.739	0.589	Open Manhole	1200	S4.004	38.150	300	S4.003	38.150	300	
S21	38.640	0.500	Open Manhole	300	S4.005	38.140	2000	S4.004	38.140	300	
S22	37.925	0.500	Open Manhole	300	S4.006	37.425	300	S4.005	37.425	2000	
S23	37.825	0.425	Open Manhole	300	S4.007	37.400	3000	S4.006	37.400	300	
S24	37.825	0.500	Open Manhole	300	S4.008	37.325	300	S4.007	37.325	3000	
S25	37.050	0.300	Open Manhole	1800	S4.009	36.750	300	S4.008	36.750	300	
S26	37.050	0.300	Open Manhole	500	S4.010	36.750	300	S4.009	36.750	300	
S27	37.050	0.300	Open Manhole	1200	S4.011	36.750	300	S4.010	36.750	300	
S28	37.070	1.195	Open Manhole	1200	S4.012	35.875	300	S4.011	35.875	300	
S11	39.271	1.500	Open Manhole	1200	S5.000	37.771	300				
S12	38.534	1.500	Open Manhole	1200	S5.001	37.034	300	S5.000	37.034	300	
S13	37.038	0.955	Open Manhole	1200	S5.002	36.083	300	S5.001	36.083	300	
S14	37.038	1.069	Open Manhole	1200	S5.003	35.969	300	S5.002	35.969	300	
S15	37.070	1.127	Open Manhole	1200	S5.004	35.943	375	S5.003	35.943	300	
S29	36.901	1.026	Open Manhole	500	S4.013	35.875	300	S4.012	35.875	300	
								S5.004	35.875	375	
S30	36.901	1.071	Open Manhole	1200	S4.014	35.830	300	S4.013	35.830	300	
S31	36.534	0.784	Open Manhole	1200	S4.015	35.750	300	S4.014	35.750	300	
S32	37.000	0.500	Open Manhole	500	S6.000	36.500	300				
S33	37.000	0.500	Open Manhole	1200	S6.001	36.500	300	S6.000	36.500	300	
S34	36.534	0.934	Open Manhole	1200	S6.002	35.600	300	S6.001	35.600	300	
S35	36.534	1.500	Open Manhole	1350	S4.016	35.034	375	S4.015	35.034	300	
								S6.002	35.034	300	
S36	36.567	1.745	Open Manhole	1800	S4.017	34.822	300	S4.016	34.822	375	
S	36.581	1.849	Open Manhole	0		OUTFALL		S4.017	34.732	300	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S16	506727.348	182020.201	506727.348	182020.201	Required	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S17	506726.334	182015.834	506726.334	182015.834	Required	
S18	506723.196	182005.356	506723.196	182005.356	Required	
S19	506717.096	181986.879	506717.096	181986.879	Required	
S20	506708.521	181947.176	506708.521	181947.176	Required	
S21	506705.890	181941.703	506705.890	181941.703	Required	
S22	506696.868	181923.407	506696.868	181923.407	Required	
S23	506693.749	181919.341	506693.749	181919.341	Required	
S24	506690.425	181914.095	506690.425	181914.095	Required	
S25	506688.212	181909.564	506688.212	181909.564	Required	
S26	506676.839	181889.154	506676.839	181889.154	Required	
S27	506670.629	181877.168	506670.629	181877.168	Required	
S28	506667.716	181870.993	506667.716	181870.993	Required	
S11	506721.722	181973.289	506721.722	181973.289	Required	
S12	506710.006	181938.197	506710.006	181938.197	Required	
S13	506684.592	181894.089	506684.592	181894.089	Required	

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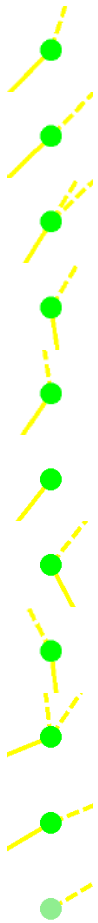
Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S14	506677.747	181873.041	506677.747	181873.041	Required	
S15	506672.983	181868.208	506672.983	181868.208	Required	
S29	506655.856	181851.652	506655.856	181851.652	Required	
S30	506643.995	181832.312	506643.995	181832.312	Required	
S31	506645.455	181822.730	506645.455	181822.730	Required	
S32	506634.505	181826.240	506634.505	181826.240	Required	
S33	506623.329	181812.166	506623.329	181812.166	Required	
S34	506626.883	181805.408	506626.883	181805.408	Required	
S35	506627.927	181796.893	506627.927	181796.893	Required	
S36	506612.362	181790.556	506612.362	181790.556	Required	
S	506600.816	181783.698			No Entry	



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)
S4.017	S	36.581	34.732	0.000	0	0

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Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	6
Number of Online Controls	1	Number of Time/Area Diagrams	4
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.401		

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Online Controls for Storm

Complex Manhole: S36, DS/PN: S4.017, Volume (m³): 6.1

Hydro-Brake® Optimum

Unit Reference	MD-SHE-0070-2000-0800-2000
Design Head (m)	0.800
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	70
Invert Level (m)	34.822
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	2.0
Flush-Flo™	0.240	2.0
Kick-Flo®	0.504	1.6
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)
0.100	1.8	1.200	2.4	3.000	3.7	7.000	5.5
0.200	2.0	1.400	2.6	3.500	3.9	7.500	5.6
0.300	2.0	1.600	2.7	4.000	4.2	8.000	5.8
0.400	1.9	1.800	2.9	4.500	4.4	8.500	6.0
0.500	1.6	2.000	3.0	5.000	4.7	9.000	6.2
0.600	1.8	2.200	3.2	5.500	4.9	9.500	6.3
0.800	2.0	2.400	3.3	6.000	5.1		
1.000	2.2	2.600	3.4	6.500	5.3		

Hydro-Brake® Optimum

Unit Reference	MD-SHE-0092-3500-0800-3500
Design Head (m)	0.800
Design Flow (l/s)	3.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	92
Invert Level (m)	35.622

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Hydro-Brake® Optimum

Minimum Outlet Pipe Diameter (mm) 150
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	3.5
Flush-Flo™	0.238	3.5
Kick-Flo®	0.521	2.9
Mean Flow over Head Range	-	3.0

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	2.9	1.200	4.2	3.000	6.5	7.000	9.7
0.200	3.5	1.400	4.5	3.500	7.0	7.500	10.0
0.300	3.5	1.600	4.8	4.000	7.4	8.000	10.3
0.400	3.3	1.800	5.1	4.500	7.8	8.500	10.6
0.500	3.0	2.000	5.3	5.000	8.2	9.000	10.9
0.600	3.1	2.200	5.6	5.500	8.6	9.500	11.2
0.800	3.5	2.400	5.8	6.000	9.0		
1.000	3.9	2.600	6.0	6.500	9.3		

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 6
Number of Online Controls 1 Number of Time/Area Diagrams 4
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH
FEH Rainfall Version 2013
Site Location GB 506100 181400 TQ 06100 81400
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 ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320
Return Period(s) (years) 2, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S4.000	S16	15 Winter	2	+0%	100/15 Summer				39.412
S4.001	S17	15 Winter	2	+0%	30/15 Summer				38.496
S4.002	S18	15 Winter	2	+0%	30/15 Winter				38.445
S4.003	S19	15 Winter	2	+0%	30/15 Summer				38.390
S4.004	S20	15 Winter	2	+0%	30/15 Winter				38.293
S4.005	S21	15 Winter	2	+0%					38.173
S4.006	S22	15 Winter	2	+0%	30/15 Summer				37.581
S4.007	S23	15 Winter	2	+0%					37.437
S4.008	S24	15 Winter	2	+0%					37.405
S4.009	S25	30 Winter	2	+0%					36.850
S4.010	S26	30 Winter	2	+0%					36.819
S4.011	S27	30 Winter	2	+0%					36.779
S4.012	S28	120 Winter	2	+0%	30/15 Summer				36.061
S5.000	S11	15 Winter	2	+0%					37.835
S5.001	S12	15 Winter	2	+0%					37.099

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S4.000	S16	-0.172	0.000	0.37		18.8	OK	
S4.001	S17	-0.178	0.000	0.34		18.9	OK	
S4.002	S18	-0.185	0.000	0.31		18.9	OK	
S4.003	S19	-0.162	0.000	0.41		20.9	OK	
S4.004	S20	-0.157	0.000	0.46		20.2	OK	
S4.005	S21	-0.467	0.000	0.01		27.7	OK	
S4.006	S22	-0.144	0.000	0.53		27.4	OK	
S4.007	S23	-0.388	0.000	0.02		30.1	OK	
S4.008	S24	-0.220	0.000	0.16		30.1	OK	
S4.009	S25	-0.200	0.000	0.29		18.6	FLOOD RISK	
S4.010	S26	-0.231	0.000	0.27		18.6	FLOOD RISK	
S4.011	S27	-0.271	0.000	0.03		21.5	FLOOD RISK	
S4.012	S28	-0.114	0.000	0.30		18.4	OK	
S5.000	S11	-0.236	0.000	0.10		14.8	OK	
S5.001	S12	-0.235	0.000	0.10		14.8	OK	

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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	Overflow Act.	Water Level (m)
S5.002	S13	15 Winter	2	+0%	30/15 Winter				36.176
S5.003	S14	120 Winter	2	+0%	30/15 Summer				36.100
S5.004	S15	120 Winter	2	+0%	30/30 Winter				36.088
S4.013	S29	120 Winter	2	+0%	30/15 Summer				36.053
S4.014	S30	120 Winter	2	+0%	100/15 Summer				35.951
S4.015	S31	120 Winter	2	+0%	100/30 Winter				35.818
S6.000	S32	15 Winter	2	+0%					36.600
S6.001	S33	15 Winter	2	+0%					36.529
S6.002	S34	720 Winter	2	+0%	30/180 Winter				35.643
S4.016	S35	720 Winter	2	+0%	2/120 Summer				35.643
S4.017	S36	720 Winter	2	+0%	2/15 Summer				35.645

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S5.002	S13	-0.207	0.000	0.21		14.6	OK	
S5.003	S14	-0.169	0.000	0.30		14.6	OK	
S5.004	S15	-0.230	0.000	0.22		20.4	OK	
S4.013	S29	-0.122	0.000	0.68		56.3	OK	
S4.014	S30	-0.179	0.000	0.40		56.3	OK	
S4.015	S31	-0.232	0.000	0.12		56.2	OK	
S6.000	S32	-0.200	0.000	0.24		4.8	OK	
S6.001	S33	-0.271	0.000	0.02		4.8	OK	
S6.002	S34	-0.257	0.000	0.00		0.8	OK	
S4.016	S35	0.234	0.000	0.02		4.1	SURCHARGED	
S4.017	S36	0.523	0.000	0.03		2.2	SURCHARGED	

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 6
Number of Online Controls 1 Number of Time/Area Diagrams 4
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH
FEH Rainfall Version 2013
Site Location GB 506100 181400 TQ 06100 81400
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 ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320
Return Period(s) (years) 2, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S4.000	S16	15 Winter	30	+0%	100/15 Summer				39.504
S4.001	S17	15 Winter	30	+0%	30/15 Summer				38.727
S4.002	S18	15 Winter	30	+0%	30/15 Winter				38.655
S4.003	S19	15 Winter	30	+0%	30/15 Summer				38.574
S4.004	S20	15 Winter	30	+0%	30/15 Winter				38.462
S4.005	S21	15 Winter	30	+0%					38.198
S4.006	S22	15 Winter	30	+0%	30/15 Summer				37.760
S4.007	S23	15 Winter	30	+0%					37.468
S4.008	S24	15 Winter	30	+0%					37.453
S4.009	S25	30 Winter	30	+0%					36.908
S4.010	S26	30 Winter	30	+0%					36.863
S4.011	S27	30 Winter	30	+0%					36.800
S4.012	S28	30 Winter	30	+0%	30/15 Summer				36.282
S5.000	S11	15 Winter	30	+0%					37.873
S5.001	S12	15 Winter	30	+0%					37.137

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S4.000	S16	-0.080	0.000	0.88		45.0	OK	
S4.001	S17	0.053	0.000	0.80		44.8	SURCHARGED	
S4.002	S18	0.025	0.000	0.72		43.9	SURCHARGED	
S4.003	S19	0.022	0.000	1.06		54.4	SURCHARGED	
S4.004	S20	0.012	0.000	1.24		54.7	FLOOD RISK	
S4.005	S21	-0.442	0.000	0.02		72.4	OK	
S4.006	S22	0.035	0.000	1.30		67.3	FLOOD RISK	
S4.007	S23	-0.357	0.000	0.04		71.7	OK	
S4.008	S24	-0.172	0.000	0.38		72.0	OK	
S4.009	S25	-0.142	0.000	0.94		59.4	FLOOD RISK	
S4.010	S26	-0.187	0.000	0.85		59.3	FLOOD RISK	
S4.011	S27	-0.250	0.000	0.09		66.4	FLOOD RISK	
S4.012	S28	0.107	0.000	1.07		66.3	SURCHARGED	
S5.000	S11	-0.198	0.000	0.25		36.1	OK	
S5.001	S12	-0.197	0.000	0.25		36.0	OK	

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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.	Water Level (m)
S5.002	S13	60 Winter	30	+0%	30/15 Winter				36.498
S5.003	S14	60 Winter	30	+0%	30/15 Summer				36.403
S5.004	S15	60 Winter	30	+0%	30/30 Winter				36.337
S4.013	S29	30 Winter	30	+0%	30/15 Summer				36.258
S4.014	S30	60 Winter	30	+0%	100/15 Summer				36.090
S4.015	S31	600 Winter	30	+0%	100/30 Winter				36.020
S6.000	S32	15 Winter	30	+0%					36.672
S6.001	S33	15 Winter	30	+0%					36.544
S6.002	S34	600 Winter	30	+0%	30/180 Winter				36.016
S4.016	S35	600 Winter	30	+0%	2/120 Summer				36.016
S4.017	S36	600 Winter	30	+0%	2/15 Summer				36.025

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S5.002	S13	0.115	0.000	0.45		31.6	SURCHARGED	
S5.003	S14	0.134	0.000	0.79		38.9	SURCHARGED	
S5.004	S15	0.019	0.000	0.59		54.2	SURCHARGED	
S4.013	S29	0.083	0.000	1.88		154.4	SURCHARGED	
S4.014	S30	-0.040	0.000	1.09		154.3	OK	
S4.015	S31	-0.030	0.000	0.10		46.2	OK	
S6.000	S32	-0.128	0.000	0.62		12.3	OK	
S6.001	S33	-0.256	0.000	0.05		12.2	OK	
S6.002	S34	0.116	0.000	0.01		1.8	SURCHARGED	
S4.016	S35	0.607	0.000	0.04		6.6	SURCHARGED	
S4.017	S36	0.903	0.000	0.08		5.8	SURCHARGED	

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 6
Number of Online Controls 1 Number of Time/Area Diagrams 4
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH
FEH Rainfall Version 2013
Site Location GB 506100 181400 TQ 06100 81400
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 ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320
Return Period(s) (years) 2, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S4.000	S16	15 Winter	100	+40%	100/15 Summer				39.654
S4.001	S17	15 Winter	100	+40%	30/15 Summer				39.154
S4.002	S18	15 Winter	100	+40%	30/15 Winter				39.046
S4.003	S19	15 Winter	100	+40%	30/15 Summer				38.923
S4.004	S20	15 Winter	100	+40%	30/15 Winter				38.567
S4.005	S21	15 Winter	100	+40%					38.225
S4.006	S22	15 Winter	100	+40%	30/15 Summer				37.920
S4.007	S23	15 Winter	100	+40%					37.518
S4.008	S24	15 Winter	100	+40%					37.509
S4.009	S25	30 Winter	100	+40%					36.961
S4.010	S26	30 Winter	100	+40%					36.905
S4.011	S27	30 Winter	100	+40%					36.822
S4.012	S28	30 Winter	100	+40%	30/15 Summer				36.628
S5.000	S11	15 Winter	100	+40%					37.915
S5.001	S12	15 Winter	100	+40%					37.201

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S4.000	S16	0.070	0.000	1.60		81.5	FLOOD RISK	
S4.001	S17	0.480	0.000	1.45		80.8	SURCHARGED	
S4.002	S18	0.416	0.000	1.33		80.8	SURCHARGED	
S4.003	S19	0.371	0.000	1.84		94.5	SURCHARGED	
S4.004	S20	0.117	0.000	2.14		94.4	FLOOD RISK	
S4.005	S21	-0.415	0.000	0.04		137.1	OK	
S4.006	S22	0.195	0.000	2.34		121.0	FLOOD RISK	
S4.007	S23	-0.307	0.000	0.08		131.2	OK	
S4.008	S24	-0.116	0.000	0.69		131.5	OK	
S4.009	S25	-0.089	0.000	1.79		112.9	FLOOD RISK	
S4.010	S26	-0.145	0.000	1.61		112.6	FLOOD RISK	
S4.011	S27	-0.228	0.000	0.18		128.1	FLOOD RISK	
S4.012	S28	0.453	0.000	2.06		127.2	SURCHARGED	
S5.000	S11	-0.156	0.000	0.46		66.4	OK	
S5.001	S12	-0.133	0.000	0.57		81.5	OK	

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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) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S5.002	S13	30 Winter	100	+40%	30/15 Winter				36.880
S5.003	S14	30 Winter	100	+40%	30/15 Summer				36.764
S5.004	S15	30 Winter	100	+40%	30/30 Winter				36.668
S4.013	S29	360 Winter	100	+40%	30/15 Summer				36.599
S4.014	S30	480 Winter	100	+40%	100/15 Summer				36.579
S4.015	S31	720 Winter	100	+40%	100/30 Winter				36.524
S6.000	S32	15 Winter	100	+40%					36.753
S6.001	S33	15 Winter	100	+40%					36.558
S6.002	S34	720 Winter	100	+40%	30/180 Winter				36.522
S4.016	S35	720 Winter	100	+40%	2/120 Summer				36.522
S4.017	S36	720 Winter	100	+40%	2/15 Summer				36.530

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S5.002	S13	0.497	0.000	1.10		77.2	FLOOD RISK	
S5.003	S14	0.495	0.000	1.86		91.7	FLOOD RISK	
S5.004	S15	0.350	0.000	1.31		120.1	SURCHARGED	
S4.013	S29	0.424	0.000	1.49		122.7	SURCHARGED	
S4.014	S30	0.449	0.000	0.63		89.5	SURCHARGED	
S4.015	S31	0.474	0.000	0.14		63.8	FLOOD RISK	
S6.000	S32	-0.047	0.000	1.00		19.9	FLOOD RISK	
S6.001	S33	-0.242	0.000	0.08		19.9	OK	
S6.002	S34	0.622	0.000	0.02		2.8	FLOOD RISK	
S4.016	S35	1.113	0.000	0.04		7.3	FLOOD RISK	
S4.017	S36	1.408	0.000	0.09		6.5	FLOOD RISK	

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Existing Network Details 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
S7.000	18.156	0.000	0.0	0.042	5.00	0.0	0.600	o	150	Pipe/Conduit
S7.001	4.000	0.040	100.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit
S8.000	15.999	0.000	0.0	0.039	5.00	0.0	0.600	o	150	Pipe/Conduit
S8.001	3.913	0.505	7.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit
S9.000	19.765	0.000	0.0	0.080	5.00	0.0	0.600	o	150	Pipe/Conduit
S9.001	4.597	0.046	99.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit
S10.000	27.057	0.000	0.0	0.075	5.00	0.0	0.600	o	150	Pipe/Conduit
S10.001	5.482	0.055	99.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit
S11.000	10.172	0.000	0.0	0.053	5.00	0.0	0.600	o	150	Pipe/Conduit
S12.000	16.532	0.000	0.0	0.052	5.00	0.0	0.600	o	150	Pipe/Conduit
S11.001	18.924	0.189	100.1	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit
S13.000	10.105	0.000	0.0	0.037	5.00	0.0	0.600	o	150	Pipe/Conduit
S13.001	2.885	0.029	99.5	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit
S11.002	6.744	0.061	110.6	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
S7.000	35.717	0.042	0.0	0.00	0.0
S7.001	34.982	0.042	0.0	1.00	17.8
S8.000	36.290	0.039	0.0	0.00	0.0
S8.001	35.505	0.039	0.0	3.64	64.4
S9.000	36.750	0.080	0.0	0.00	0.0
S9.001	36.015	0.080	0.0	1.01	17.8
S10.000	36.874	0.075	0.0	0.00	0.0
S10.001	36.138	0.075	0.0	1.01	17.8
S11.000	37.123	0.053	0.0	0.00	0.0
S12.000	37.824	0.052	0.0	0.00	0.0
S11.001	36.939	0.105	0.0	1.00	17.7
S13.000	37.723	0.037	0.0	0.00	0.0
S13.001	36.913	0.037	0.0	1.01	17.8
S11.002	36.750	0.142	0.0	0.96	16.9

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Existing Network Details 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
S14.000	15.253	0.000	0.0	0.044	5.00	0.0	0.600	o	150	Pipe/Conduit
S14.001	8.080	0.081	99.8	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit
S15.000	23.721	0.000	0.0	0.047	5.00	0.0	0.600	o	150	Pipe/Conduit
S15.001	5.815	0.446	13.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit
S16.000	20.531	0.000	0.0	0.054	5.00	0.0	0.600	o	150	Pipe/Conduit
S16.001	13.686	0.137	99.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
S14.000	37.453	0.044	0.0	0.00	0.0
S14.001	36.668	0.044	0.0	1.01	17.8
S15.000	35.511	0.047	0.0	0.00	0.0
S15.001	34.626	0.047	0.0	2.81	49.6
S16.000	36.695	0.054	0.0	0.00	0.0
S16.001	36.180	0.054	0.0	1.01	17.8

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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S55	36.332	0.615	Open Manhole	1200	S7.000	35.717	150				
S56	36.332	1.350	Open Manhole	1500	S7.001	34.982	150	S7.000	35.717	150	735
S	36.332	1.390	Open Manhole	0		OUTFALL		S7.001	34.942	150	
S57	36.855	0.565	Open Manhole	1200	S8.000	36.290	150				
S58	36.855	1.350	Open Manhole	1200	S8.001	35.505	150	S8.000	36.290	150	785
S	36.789	1.789	Open Manhole	0		OUTFALL		S8.001	35.000	150	
S59	37.365	0.615	Open Manhole	1200	S9.000	36.750	150				
S60	37.365	1.350	Open Manhole	1200	S9.001	36.015	150	S9.000	36.750	150	735
S	37.365	1.396	Open Manhole	0		OUTFALL		S9.001	35.969	150	
S61	37.489	0.615	Open Manhole	1200	S10.000	36.874	150				
S62	37.489	1.351	Open Manhole	1200	S10.001	36.138	150	S10.000	36.874	150	736
S	37.489	1.406	Open Manhole	0		OUTFALL		S10.001	36.083	150	
S63	38.103	0.980	Open Manhole	1200	S11.000	37.123	150				
S64	38.289	0.465	Open Manhole	1200	S12.000	37.824	150				
S65	38.289	1.350	Open Manhole	1200	S11.001	36.939	150	S11.000	37.123	150	184
								S12.000	37.824	150	885
S66	38.263	0.540	Open Manhole	1200	S13.000	37.723	150				
S67	38.263	1.350	Open Manhole	1500	S13.001	36.913	150	S13.000	37.723	150	810
S68	38.263	1.513	Open Manhole	1200	S11.002	36.750	150	S11.001	36.750	150	
								S13.001	36.884	150	134
S12	38.263	1.574	Open Manhole	1200		OUTFALL		S11.002	36.689	150	
S69	38.018	0.565	Open Manhole	1200	S14.000	37.453	150				
S70	38.018	1.350	Open Manhole	1200	S14.001	36.668	150	S14.000	37.453	150	785
S	38.018	1.431	Open Manhole	0		OUTFALL		S14.001	36.587	150	
S71	35.976	0.465	Open Manhole	1200	S15.000	35.511	150				
S72	35.976	1.350	Open Manhole	1200	S15.001	34.626	150	S15.000	35.511	150	885
S	35.976	1.796	Open Manhole	0		OUTFALL		S15.001	34.180	150	
S73	37.530	0.835	Open Manhole	1200	S16.000	36.695	150				
S74	37.530	1.350	Open Manhole	1500	S16.001	36.180	150	S16.000	36.695	150	515
S	37.530	1.487	Open Manhole	0		OUTFALL		S16.001	36.043	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S55	506868.406	181699.622			No Entry	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S56	506851.974	181691.900	506851.974	181691.900	Required	
S	506850.375	181695.566			No Entry	
S57	506876.478	181736.038			No Entry	
S58	506873.649	181720.291	506873.649	181720.291	Required	
S	506871.193	181717.246			No Entry	
S59	506916.045	181748.651			No Entry	
S60	506896.282	181748.329	506896.282	181748.329	Required	
S	506891.967	181746.743			No Entry	
S61	506928.399	181768.380			No Entry	
S62	506901.351	181767.686	506901.351	181767.686	Required	
S	506895.869	181767.619			No Entry	
S63	507009.921	181755.777			No Entry	
S64	507028.563	181774.002			No Entry	
S65	507014.953	181764.618	507014.953	181764.618	Required	
S66	507012.613	181784.205			No Entry	

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Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S67	507003.809	181779.245	507003.809	181779.245	Required	
S68	507001.337	181777.759	507001.337	181777.759	Required	
S12	506996.484	181782.443			No Entry	
S69	506999.394	181776.829			No Entry	
S70	506985.641	181770.233	506985.641	181770.233	Required	
S	506977.703	181771.742			No Entry	
S71	506829.399	181683.410			No Entry	
S72	506806.081	181679.053	506806.081	181679.053	Required	
S	506800.284	181678.598			No Entry	
S73	506966.009	181752.457			No Entry	
S74	506945.478	181752.508	506945.478	181752.508	Required	
S	506932.447	181748.324			No Entry	

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)
S7.001	S	36.332	34.942	0.000	0	0

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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)
S8.001	S	36.789	35.000	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)
S9.001	S	37.365	35.969	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)
S10.001	S	37.489	36.083	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)
S11.002	S12	38.263	36.689	0.000	1200	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)
S14.001	S	38.018	36.587	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)
S15.001	S	35.976	34.180	0.000	0	0

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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)
S16.001	S	37.530	36.043	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 Storage Structures	10
Number of Online Controls	9	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.402		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S56, DS/PN: S7.001, Volume (m³): 2.7

Unit Reference	MD-SHE-0020-2000-1000-2000
Design Head (m)	1.000
Design Flow (l/s)	0.2
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	20
Invert Level (m)	34.982
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	**Head (m)**	**Flow (l/s)**
Design Point (Calculated)	1.000	0.2
Flush-Flo™	0.084	0.1
Kick-Flo®	0.175	0.1
Mean Flow over Head Range	-	0.1

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

Depth (m)	**Flow (l/s)**	**Depth (m)**	**Flow (l/s)**	**Depth (m)**	**Flow (l/s)**	**Depth (m)**	**Flow (l/s)**
0.100	0.1	1.200	0.2	3.000	0.3	7.000	0.5
0.200	0.1	1.400	0.2	3.500	0.3	7.500	0.5
0.300	0.1	1.600	0.2	4.000	0.4	8.000	0.5
0.400	0.1	1.800	0.3	4.500	0.4	8.500	0.5
0.500	0.1	2.000	0.3	5.000	0.4	9.000	0.5
0.600	0.2	2.200	0.3	5.500	0.4	9.500	0.5
0.800	0.2	2.400	0.3	6.000	0.4		
1.000	0.2	2.600	0.3	6.500	0.4		

Hydro-Brake® Optimum Manhole: S58, DS/PN: S8.001, Volume (m³): 1.8

Unit Reference	MD-SHE-0020-2000-1000-2000
Design Head (m)	1.000
Design Flow (l/s)	0.2
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	20
Invert Level (m)	35.505
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

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Hydro-Brake® Optimum Manhole: S58, DS/PN: S8.001, Volume (m³): 1.8

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	0.2
Flush-Flo™	0.084	0.1
Kick-Flo®	0.175	0.1
Mean Flow over Head Range	-	0.1

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.1	1.200	0.2	3.000	0.3	7.000	0.5
0.200	0.1	1.400	0.2	3.500	0.3	7.500	0.5
0.300	0.1	1.600	0.2	4.000	0.4	8.000	0.5
0.400	0.1	1.800	0.3	4.500	0.4	8.500	0.5
0.500	0.1	2.000	0.3	5.000	0.4	9.000	0.5
0.600	0.2	2.200	0.3	5.500	0.4	9.500	0.5
0.800	0.2	2.400	0.3	6.000	0.4		
1.000	0.2	2.600	0.3	6.500	0.4		

Hydro-Brake® Optimum Manhole: S60, DS/PN: S9.001, Volume (m³): 1.9

Unit Reference	MD-SHE-0027-4000-1350-4000
Design Head (m)	1.350
Design Flow (l/s)	0.4
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	27
Invert Level (m)	36.015
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.350	0.4
Flush-Flo™	0.116	0.2
Kick-Flo®	0.239	0.2
Mean Flow over Head Range	-	0.3

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	0.2	0.300	0.2	0.500	0.3	0.800	0.3
0.200	0.2	0.400	0.2	0.600	0.3	1.000	0.3

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Hydro-Brake® Optimum Manhole: S60, DS/PN: S9.001, Volume (m³): 1.9

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
1.200	0.4	2.400	0.5	5.000	0.7	8.000	0.9
1.400	0.4	2.600	0.5	5.500	0.7	8.500	0.9
1.600	0.4	3.000	0.6	6.000	0.8	9.000	0.9
1.800	0.5	3.500	0.6	6.500	0.8	9.500	1.0
2.000	0.5	4.000	0.6	7.000	0.8		
2.200	0.5	4.500	0.7	7.500	0.9		

Hydro-Brake® Optimum Manhole: S62, DS/PN: S10.001, Volume (m³): 2.0

Unit Reference	MD-SHE-0027-4000-1350-4000
Design Head (m)	1.350
Design Flow (l/s)	0.4
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	27
Invert Level (m)	36.138
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.350	0.4
Flush-Flo™	0.116	0.2
Kick-Flo®	0.239	0.2
Mean Flow over Head Range	-	0.3

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	0.2	1.200	0.4	3.000	0.6	7.000	0.8
0.200	0.2	1.400	0.4	3.500	0.6	7.500	0.9
0.300	0.2	1.600	0.4	4.000	0.6	8.000	0.9
0.400	0.2	1.800	0.5	4.500	0.7	8.500	0.9
0.500	0.3	2.000	0.5	5.000	0.7	9.000	0.9
0.600	0.3	2.200	0.5	5.500	0.7	9.500	1.0
0.800	0.3	2.400	0.5	6.000	0.8		
1.000	0.3	2.600	0.5	6.500	0.8		

Hydro-Brake® Optimum Manhole: S65, DS/PN: S11.001, Volume (m³): 2.0

Unit Reference	MD-SHE-0030-5000-1350-5000
Design Head (m)	1.350
Design Flow (l/s)	0.5
Flush-Flo™	Calculated

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Hydro-Brake® Optimum Manhole: S65, DS/PN: S11.001, Volume (m³): 2.0

Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	30
Invert Level (m)	36.939
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	**Head (m)**	**Flow (l/s)**
Design Point (Calculated)	1.350	0.5
Flush-Flo™	0.131	0.3
Kick-Flo®	0.269	0.3
Mean Flow over Head Range	-	0.4

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

Depth (m)	**Flow (l/s)**	**Depth (m)**	**Flow (l/s)**	**Depth (m)**	**Flow (l/s)**	**Depth (m)**	**Flow (l/s)**
0.100	0.3	1.200	0.5	3.000	0.7	7.000	1.0
0.200	0.3	1.400	0.5	3.500	0.8	7.500	1.1
0.300	0.3	1.600	0.5	4.000	0.8	8.000	1.1
0.400	0.3	1.800	0.6	4.500	0.9	8.500	1.1
0.500	0.3	2.000	0.6	5.000	0.9	9.000	1.2
0.600	0.4	2.200	0.6	5.500	0.9	9.500	1.2
0.800	0.4	2.400	0.6	6.000	1.0		
1.000	0.4	2.600	0.7	6.500	1.0		

Hydro-Brake® Optimum Manhole: S67, DS/PN: S13.001, Volume (m³): 2.5

Unit Reference	MD-SHE-0020-2000-1000-2000
Design Head (m)	1.000
Design Flow (l/s)	0.2
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	20
Invert Level (m)	36.913
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	**Head (m)**	**Flow (l/s)**
Design Point (Calculated)	1.000	0.2
Flush-Flo™	0.084	0.1
Kick-Flo®	0.175	0.1
Mean Flow over Head Range	-	0.1

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a

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Hydro-Brake® Optimum Manhole: S67, DS/PN: S13.001, Volume (m³): 2.5

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	0.1	1.200	0.2	3.000	0.3	7.000	0.5
0.200	0.1	1.400	0.2	3.500	0.3	7.500	0.5
0.300	0.1	1.600	0.2	4.000	0.4	8.000	0.5
0.400	0.1	1.800	0.3	4.500	0.4	8.500	0.5
0.500	0.1	2.000	0.3	5.000	0.4	9.000	0.5
0.600	0.2	2.200	0.3	5.500	0.4	9.500	0.5
0.800	0.2	2.400	0.3	6.000	0.4		
1.000	0.2	2.600	0.3	6.500	0.4		

Hydro-Brake® Optimum Manhole: S70, DS/PN: S14.001, Volume (m³): 1.8

Unit Reference	MD-SHE-0020-2000-1000-2000
Design Head (m)	1.000
Design Flow (l/s)	0.2
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	20
Invert Level (m)	36.668
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	0.2
Flush-Flo™	0.084	0.1
Kick-Flo®	0.175	0.1
Mean Flow over Head Range	-	0.1

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.1	1.200	0.2	3.000	0.3	7.000	0.5
0.200	0.1	1.400	0.2	3.500	0.3	7.500	0.5
0.300	0.1	1.600	0.2	4.000	0.4	8.000	0.5
0.400	0.1	1.800	0.3	4.500	0.4	8.500	0.5
0.500	0.1	2.000	0.3	5.000	0.4	9.000	0.5
0.600	0.2	2.200	0.3	5.500	0.4	9.500	0.5
0.800	0.2	2.400	0.3	6.000	0.4		
1.000	0.2	2.600	0.3	6.500	0.4		

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Hydro-Brake® Optimum Manhole: S72, DS/PN: S15.001, Volume (m³): 1.9

Unit Reference	MD-SHE-0023-3000-1350-3000
Design Head (m)	1.350
Design Flow (l/s)	0.3
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	23
Invert Level (m)	34.626
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.350	0.3
Flush-Flo™	0.102	0.2
Kick-Flo®	0.205	0.1
Mean Flow over Head Range	-	0.2

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	0.2	1.200	0.3	3.000	0.4	7.000	0.6
0.200	0.1	1.400	0.3	3.500	0.5	7.500	0.6
0.300	0.2	1.600	0.3	4.000	0.5	8.000	0.7
0.400	0.2	1.800	0.3	4.500	0.5	8.500	0.7
0.500	0.2	2.000	0.4	5.000	0.5	9.000	0.7
0.600	0.2	2.200	0.4	5.500	0.6	9.500	0.7
0.800	0.2	2.400	0.4	6.000	0.6		
1.000	0.3	2.600	0.4	6.500	0.6		

Hydro-Brake® Optimum Manhole: S74, DS/PN: S16.001, Volume (m³): 2.7

Unit Reference	MD-SHE-0036-7000-1350-7000
Design Head (m)	1.350
Design Flow (l/s)	0.7
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	36
Invert Level (m)	36.180
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.350	0.7
Flush-Flo™	0.158	0.4

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Hydro-Brake® Optimum Manhole: S74, DS/PN: S16.001, Volume (m³): 2.7

Control Points	Head (m)	Flow (l/s)
Kick-Flo®	0.320	0.4
Mean Flow over Head Range	-	0.5

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	0.4	1.200	0.7	3.000	1.0	7.000	1.5
0.200	0.4	1.400	0.7	3.500	1.1	7.500	1.5
0.300	0.4	1.600	0.8	4.000	1.1	8.000	1.6
0.400	0.4	1.800	0.8	4.500	1.2	8.500	1.6
0.500	0.5	2.000	0.8	5.000	1.3	9.000	1.7
0.600	0.5	2.200	0.9	5.500	1.3	9.500	1.7
0.800	0.6	2.400	0.9	6.000	1.4		
1.000	0.6	2.600	0.9	6.500	1.4		

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 10
Number of Online Controls 9 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH
FEH Rainfall Version 2013
Site Location GB 506100 181400 TQ 06100 81400
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, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 2, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S7.000	S55	360 Winter	2	+0%	2/120 Winter				35.913
S7.001	S56	360 Winter	2	+0%	2/15 Summer				35.912
S8.000	S57	360 Winter	2	+0%	2/240 Winter				36.449
S8.001	S58	360 Winter	2	+0%	2/15 Summer				36.448
S9.000	S59	360 Winter	2	+0%	2/180 Winter				36.927
S9.001	S60	480 Winter	2	+0%	2/15 Summer				36.934
S10.000	S61	360 Winter	2	+0%	2/120 Winter				37.059
S10.001	S62	360 Winter	2	+0%	2/15 Summer				37.064
S11.000	S63	480 Winter	2	+0%	2/30 Winter				37.495
S12.000	S64	120 Summer	2	+0%	30/15 Summer				37.908
S11.001	S65	720 Winter	2	+0%	2/15 Summer				37.509
S13.000	S66	480 Winter	2	+0%	30/60 Winter				37.826
S13.001	S67	480 Winter	2	+0%	2/60 Winter				37.825
S11.002	S68	480 Winter	2	+0%					36.769

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S7.000	S55	0.046	0.000	0.25		1.1	SURCHARGED	
S7.001	S56	0.780	0.000	0.02		0.2	SURCHARGED	
S8.000	S57	0.009	0.000	0.20		0.9	SURCHARGED	
S8.001	S58	0.793	0.000	0.00		0.2	SURCHARGED	
S9.000	S59	0.027	0.000	0.33		1.3	SURCHARGED	
S9.001	S60	0.769	0.000	0.03		0.3	SURCHARGED	
S10.000	S61	0.035	0.000	0.30		1.4	SURCHARGED	
S10.001	S62	0.776	0.000	0.02		0.3	SURCHARGED	
S11.000	S63	0.222	0.000	0.13		0.7	SURCHARGED	
S12.000	S64	-0.066	0.000	0.60		2.7	OK	
S11.001	S65	0.420	0.000	0.02		0.3	SURCHARGED	
S13.000	S66	-0.047	0.000	0.15		0.8	OK	
S13.001	S67	0.762	0.000	0.02		0.2	SURCHARGED	
S11.002	S68	-0.131	0.000	0.04		0.5	OK	

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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	Overflow Act.	Water Level (m)
S14.000	S69	360 Winter	2	+0%	2/180 Winter				37.625
S14.001	S70	360 Winter	2	+0%	2/15 Summer				37.624
S15.000	S71	360 Winter	2	+0%	30/30 Summer				35.645
S15.001	S72	360 Winter	2	+0%	2/15 Summer				35.644
S16.000	S73	240 Winter	2	+0%	2/120 Summer				36.893
S16.001	S74	240 Winter	2	+0%	2/15 Summer				36.891

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S14.000	S69	0.022	0.000	0.21		1.0	SURCHARGED	
S14.001	S70	0.806	0.000	0.01		0.2	SURCHARGED	
S15.000	S71	-0.016	0.000	0.24		1.1	OK	
S15.001	S72	0.868	0.000	0.01		0.3	SURCHARGED	
S16.000	S73	0.048	0.000	0.42		1.7	SURCHARGED	
S16.001	S74	0.561	0.000	0.03		0.5	SURCHARGED	

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 10
Number of Online Controls 9 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH
FEH Rainfall Version 2013
Site Location GB 506100 181400 TQ 06100 81400
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, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 2, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S7.000	S55	480 Winter	30	+0%	2/120 Winter				36.086
S7.001	S56	480 Winter	30	+0%	2/15 Summer				36.085
S8.000	S57	360 Winter	30	+0%	2/240 Winter				36.585
S8.001	S58	360 Winter	30	+0%	2/15 Summer				36.585
S9.000	S59	480 Winter	30	+0%	2/180 Winter				37.052
S9.001	S60	600 Winter	30	+0%	2/15 Summer				37.055
S10.000	S61	480 Winter	30	+0%	2/120 Winter				37.196
S10.001	S62	480 Winter	30	+0%	2/15 Summer				37.194
S11.000	S63	600 Winter	30	+0%	2/30 Winter				37.727
S12.000	S64	30 Winter	30	+0%	30/15 Summer				38.001
S11.001	S65	480 Winter	30	+0%	2/15 Summer				37.727
S13.000	S66	480 Winter	30	+0%	30/60 Winter				37.963
S13.001	S67	480 Winter	30	+0%	2/60 Winter				37.963
S11.002	S68	480 Winter	30	+0%					36.770

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S7.000	S55	0.219	0.000	0.20		0.9	FLOOD RISK	
S7.001	S56	0.953	0.000	0.02		0.2	FLOOD RISK	
S8.000	S57	0.145	0.000	0.22		1.0	FLOOD RISK	
S8.001	S58	0.930	0.000	0.00		0.2	FLOOD RISK	
S9.000	S59	0.152	0.000	0.27		1.1	SURCHARGED	
S9.001	S60	0.890	0.000	0.03		0.4	SURCHARGED	
S10.000	S61	0.172	0.000	0.24		1.1	FLOOD RISK	
S10.001	S62	0.906	0.000	0.02		0.4	FLOOD RISK	
S11.000	S63	0.454	0.000	0.08		0.5	SURCHARGED	
S12.000	S64	0.027	0.000	1.65		7.4	FLOOD RISK	
S11.001	S65	0.638	0.000	0.02		0.4	SURCHARGED	
S13.000	S66	0.090	0.000	0.22		1.2	FLOOD RISK	
S13.001	S67	0.900	0.000	0.02		0.2	SURCHARGED	
S11.002	S68	-0.130	0.000	0.04		0.6	OK	

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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.	Water Level (m)
S14.000	S69	480 Winter	30	+0%	2/180 Winter				37.757
S14.001	S70	480 Winter	30	+0%	2/15 Summer				37.758
S15.000	S71	360 Winter	30	+0%	30/30 Summer				35.760
S15.001	S72	360 Winter	30	+0%	2/15 Summer				35.759
S16.000	S73	240 Winter	30	+0%	2/120 Summer				37.093
S16.001	S74	240 Winter	30	+0%	2/15 Summer				37.090

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S14.000	S69	0.154	0.000	0.17		0.8	FLOOD RISK	
S14.001	S70	0.940	0.000	0.01		0.2	FLOOD RISK	
S15.000	S71	0.099	0.000	0.26		1.2	FLOOD RISK	
S15.001	S72	0.983	0.000	0.01		0.3	FLOOD RISK	
S16.000	S73	0.248	0.000	0.47		1.9	SURCHARGED	
S16.001	S74	0.760	0.000	0.04		0.6	SURCHARGED	

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