



Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	10	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.500
Ratio-R	0.400	Preferred Cover Depth (m)	0.900
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Width (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.011	5.00	6.150	450		495933.467	104127.265	1.050
2	0.030	5.00	6.075	450		495923.578	104123.184	1.050
3	0.019	5.00	4.725	450		495907.961	104131.486	1.325
4	0.013	5.00	5.200	450		495918.506	104134.944	1.700
5	0.040	5.00	5.300	1200		495930.678	104157.802	1.950
6	0.026	5.00	3.550	750	675	495905.331	104171.299	1.275
7			3.200	750	675	495896.700	104162.798	1.050
7_OUT	0.018		3.100	450		495894.373	104160.505	1.040
8		5.00	3.100	450		495883.666	104144.622	1.050
9			3.100	1200		495880.524	104146.678	1.075
9_OUT			2.175	450		495860.932	104155.034	0.675
10			3.100	450		495886.159	104140.790	1.040
11			4.725	450		495889.383	104139.414	2.575
12			2.175	450		495862.607	104154.320	0.650

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
7	7	7_OUT	3.267	0.600	2.150	2.100	0.050	65.3	300	5.95	50.0
6	6	7	12.115	0.600	2.275	2.150	0.125	96.9	300	5.92	50.0
5	5	6	28.717	0.600	3.350	2.350	1.000	28.7	225	5.79	50.0
4	4	5	25.897	0.600	3.500	3.350	0.150	172.6	225	5.60	50.0
1	1	4	16.817	0.600	5.100	4.600	0.500	33.6	150	5.16	50.0
2	2	4	12.807	0.600	5.025	4.525	0.500	25.6	150	5.11	50.0
11	11	10	3.505	0.600	2.150	2.100	0.050	70.1	150	5.18	50.0
3	3	11	20.199	0.600	3.400	2.150	1.250	16.2	150	5.13	50.0
12	12	9_OUT	1.821	0.600	1.525	1.500	0.025	72.8	150	5.30	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
7	1.948	137.7	17.9	0.750	0.700	0.120	0.0	72	1.355
6	1.597	112.9	17.9	0.975	0.750	0.120	0.0	81	1.178
5	2.450	97.4	14.0	1.725	0.975	0.094	0.0	58	1.757
4	0.992	39.4	8.1	1.475	1.725	0.054	0.0	69	0.784
1	1.741	30.8	1.6	0.900	0.450	0.011	0.0	24	0.932
2	1.997	35.3	4.5	0.900	0.525	0.030	0.0	36	1.375
11	1.202	21.2	2.8	2.425	0.850	0.019	0.0	37	0.841
3	2.518	44.5	2.8	1.175	2.425	0.019	0.0	25	1.411
12	1.179	20.8	0.0	0.500	0.525	0.000	0.0	0	0.000



Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
9	9	12	19.479	0.600	2.025	1.525	0.500	39.0	150	5.28	50.0
8	8	9	3.755	0.600	2.050	2.025	0.025	150.2	150	5.08	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
9	1.617	28.6	0.0	0.925	0.500	0.000	0.0	0	0.000
8	0.817	14.4	0.0	0.900	0.925	0.000	0.0	0	0.000

Pipeline Schedule

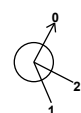
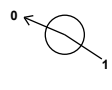
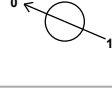
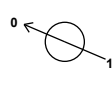
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
7	3.267	65.3	300	Circular	3.200	2.150	0.750	3.100	2.100	0.700
6	12.115	96.9	300	Circular	3.550	2.275	0.975	3.200	2.150	0.750
5	28.717	28.7	225	Circular	5.300	3.350	1.725	3.550	2.350	0.975
4	25.897	172.6	225	Circular	5.200	3.500	1.475	5.300	3.350	1.725
1	16.817	33.6	150	Circular	6.150	5.100	0.900	5.200	4.600	0.450
2	12.807	25.6	150	Circular	6.075	5.025	0.900	5.200	4.525	0.525
11	3.505	70.1	150	Circular	4.725	2.150	2.425	3.100	2.100	0.850
3	20.199	16.2	150	Circular	4.725	3.400	1.175	4.725	2.150	2.425
12	1.821	72.8	150	Circular	2.175	1.525	0.500	2.175	1.500	0.525
9	19.479	39.0	150	Circular	3.100	2.025	0.925	2.175	1.525	0.500
8	3.755	150.2	150	Circular	3.100	2.050	0.900	3.100	2.025	0.925

Link	US Node	Dia (mm)	Width (mm)	Node Type	MH Type	DS Node	Dia (mm)	Width (mm)	Node Type	MH Type
7	7	750	675	Manhole	Adoptable	7_OUT	450		Manhole	Adoptable
6	6	750	675	Manhole	Adoptable	7	750	675	Manhole	Adoptable
5	5	1200		Manhole	Adoptable	6	750	675	Manhole	Adoptable
4	4	450		Manhole	Adoptable	5	1200		Manhole	Adoptable
1	1	450		Manhole	Adoptable	4	450		Manhole	Adoptable
2	2	450		Manhole	Adoptable	4	450		Manhole	Adoptable
11	11	450		Manhole	Adoptable	10	450		Manhole	Adoptable
3	3	450		Manhole	Adoptable	11	450		Manhole	Adoptable
12	12	450		Manhole	Adoptable	9_OUT	450		Manhole	Adoptable
9	9	1200		Manhole	Adoptable	12	450		Manhole	Adoptable
8	8	450		Manhole	Adoptable	9	1200		Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Width (mm)	Connections	Link	IL (m)	Dia (mm)
1	495933.467	104127.265	6.150	1.050	450					
							0	1	5.100	150
2	495923.578	104123.184	6.075	1.050	450					
							0	2	5.025	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Width (mm)	Connections	Link	IL (m)	Dia (mm)	
3	495907.961	104131.486	4.725	1.325	450			0	3	3.400	150
4	495918.506	104134.944	5.200	1.700	450			1 2 0	2 1 4	4.525 4.600 3.500	150 150 225
5	495930.678	104157.802	5.300	1.950	1200			1 0	4 5	3.350 3.350	225 225
6	495905.331	104171.299	3.550	1.275	750	675		1 0	5 6	2.350 2.275	225 300
7	495896.700	104162.798	3.200	1.050	750	675		1 0	6 7	2.150 2.150	300 300
7_OUT	495894.373	104160.505	3.100	1.040	450			1	7	2.100	300
8	495883.666	104144.622	3.100	1.050	450			0	8	2.050	150
9	495880.524	104146.678	3.100	1.075	1200			1 0	8 9	2.025 2.025	150 150
9_OUT	495860.932	104155.034	2.175	0.675	450			1	12	1.500	150
10	495886.159	104140.790	3.100	1.040	450			1	11	2.100	150
11	495889.383	104139.414	4.725	2.575	450			1 0	3 11	2.150 2.150	150 150
12	495862.607	104154.320	2.175	0.650	450			1 0	9 12	1.525 1.525	150 150



Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	20.000	Additional Storage (m ³ /ha)	20.0
Ratio-R	0.360	Check Discharge Rate(s)	x
Winter CV	1.000	Check Discharge Volume	x
Analysis Speed	Normal		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	40	0	0
30	40	0	0
100	40	10	0

Node 9 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	2.025	Product Number	CTL-SHE-0067-2000-1000-2000
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node 7_OUT Online Orifice Control

Flap Valve	x	Invert Level (m)	2.060	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.300		

Node 10 Online Orifice Control

Flap Valve	x	Invert Level (m)	2.060	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.150		

Node 8 Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Main Channel Length (m)	10.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	2.050	Main Channel Slope (1:X)	1000.0
Safety Factor	2.0	Time to half empty (mins)		Main Channel n	0.025

Inlets

7_OUT	10
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Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	106.6	0.0	1.000	285.2	0.0

Results for 2 year +40% CC Critical Storm Duration. Lowest mass balance: 98.09%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	5.133	0.033	3.2	0.0122	0.0000	OK
15 minute winter	2	10	5.078	0.053	8.8	0.0388	0.0000	OK
15 minute winter	3	10	3.436	0.036	5.6	0.0160	0.0000	OK
15 minute winter	4	10	3.602	0.102	15.7	0.0317	0.0000	OK
15 minute winter	5	10	3.433	0.083	27.2	0.1280	0.0000	OK
15 minute winter	6	10	2.402	0.127	34.2	0.1158	0.0000	OK
240 minute winter	7	192	2.306	0.156	7.3	0.0788	0.0000	OK
240 minute winter	7_OUT	192	2.306	0.246	8.3	0.1244	0.0000	OK
240 minute winter	8	192	2.306	0.256	5.8	0.0407	0.0000	SURCHARGED
240 minute winter	9	192	2.305	0.280	2.0	0.3165	0.0000	SURCHARGED
240 minute winter	9_OUT	192	1.531	0.031	2.0	0.0000	0.0000	OK
240 minute winter	10	192	2.306	0.246	1.6	0.0391	0.0000	OK
240 minute winter	11	192	2.306	0.156	1.3	0.0248	0.0000	SURCHARGED
240 minute winter	12	192	1.560	0.035	2.0	0.0055	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1	4	3.1	1.109	0.102	0.0477	
15 minute winter	2	2	4	8.7	1.610	0.247	0.0694	
15 minute winter	3	3	11	5.5	1.175	0.125	0.0964	
15 minute winter	4	4	5	15.5	1.008	0.392	0.3977	
15 minute winter	5	5	6	26.7	2.061	0.274	0.3722	
15 minute winter	6	6	7	34.1	1.101	0.302	0.3810	
240 minute winter	7	7	7_OUT	7.2	0.849	0.052	0.1441	
240 minute winter	7_OUT	Flow through pond	8	5.8	0.023	0.000	32.3885	
240 minute winter	8	8	9	2.0	0.275	0.138	0.0661	
240 minute winter	9	Hydro-Brake®	12	2.0				
240 minute winter	10	Flow through pond	8	5.8	0.023	0.000	32.3885	
240 minute winter	11	11	10	1.6	0.528	0.076	0.0617	
240 minute winter	12	12	9_OUT	2.0	0.688	0.094	0.0052	47.3

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 98.09%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	5.146	0.046	6.1	0.0171	0.0000	OK
15 minute winter	2	10	5.102	0.077	16.7	0.0564	0.0000	OK
15 minute winter	3	10	3.450	0.050	10.6	0.0222	0.0000	OK
15 minute winter	4	10	3.651	0.151	29.8	0.0471	0.0000	OK
15 minute winter	5	10	3.470	0.120	51.7	0.1854	0.0000	OK
360 minute winter	6	344	2.538	0.263	9.9	0.2402	0.0000	OK
360 minute winter	7	344	2.538	0.388	9.8	0.1962	0.0000	SURCHARGED
360 minute winter	7_OUT	352	2.539	0.479	11.1	0.2418	0.0000	OK
360 minute winter	8	344	2.537	0.487	7.4	0.0775	0.0000	SURCHARGED
360 minute winter	9	344	2.537	0.512	2.0	0.5787	0.0000	SURCHARGED
15 minute winter	9_OUT	17	1.531	0.031	2.0	0.0000	0.0000	OK
360 minute winter	10	344	2.537	0.477	1.5	0.0759	0.0000	OK
360 minute winter	11	344	2.537	0.387	1.6	0.0616	0.0000	SURCHARGED
15 minute winter	12	17	1.560	0.035	2.0	0.0055	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1	4	6.0	1.330	0.196	0.0763	
15 minute winter	2	2	4	16.6	1.888	0.469	0.1123	
15 minute winter	3	3	11	10.5	1.305	0.237	0.2135	
15 minute winter	4	4	5	29.4	1.185	0.746	0.6459	
15 minute winter	5	5	6	51.4	2.335	0.527	0.6363	
360 minute winter	6	6	7	9.8	0.842	0.087	0.8229	
360 minute winter	7	7	7_OUT	9.6	0.759	0.070	0.2301	
360 minute winter	7_OUT	Flow through pond	8	7.4	0.019	0.001	72.2352	
360 minute winter	8	8	9	2.0	0.263	0.140	0.0661	
360 minute winter	9	Hydro-Brake®	12	2.0				
360 minute winter	10	Flow through pond	8	7.4	0.019	0.001	72.2352	
360 minute winter	11	11	10	1.5	0.455	0.070	0.0617	
15 minute winter	12	12	9_OUT	2.0	0.688	0.094	0.0052	28.2

Results for 100 year +40% CC +10% A Critical Storm Duration. Lowest mass balance: 98.09%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	5.156	0.056	8.7	0.0219	0.0000	OK
15 minute winter	2	10	5.123	0.098	23.8	0.0772	0.0000	OK
15 minute winter	3	10	3.460	0.060	15.1	0.0286	0.0000	OK
15 minute winter	4	11	3.703	0.203	42.5	0.0664	0.0000	OK
15 minute winter	5	11	3.505	0.155	73.1	0.2444	0.0000	OK
15 minute winter	6	11	2.761	0.486	92.1	0.4641	0.0000	SURCHARGED
480 minute winter	7	464	2.745	0.595	10.7	0.3012	0.0000	SURCHARGED
480 minute winter	7_OUT	472	2.746	0.686	12.3	0.3706	0.0000	OK
480 minute winter	8	464	2.745	0.695	7.9	0.1105	0.0000	SURCHARGED
480 minute winter	9	464	2.744	0.719	2.0	0.8136	0.0000	SURCHARGED
15 minute winter	9_OUT	159	1.531	0.031	2.0	0.0000	0.0000	OK
480 minute winter	10	464	2.745	0.685	1.7	0.1089	0.0000	OK
480 minute winter	11	464	2.745	0.595	1.8	0.0946	0.0000	SURCHARGED
15 minute winter	12	159	1.560	0.035	2.0	0.0055	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1	4	8.6	1.461	0.279	0.0989	
15 minute winter	2	2	4	23.6	2.036	0.669	0.1485	
15 minute winter	3	3	11	15.0	1.348	0.338	0.2444	
15 minute winter	4	4	5	41.4	1.251	1.050	0.8653	
15 minute winter	5	5	6	71.6	2.341	0.735	0.9884	
15 minute winter	6	6	7	90.0	1.278	0.797	0.8531	
480 minute winter	7	7	7_OUT	10.6	0.711	0.077	0.2301	
480 minute winter	7_OUT	Flow through pond	8	7.9	0.020	0.001	116.0809	
480 minute winter	8	8	9	2.0	0.281	0.140	0.0661	
480 minute winter	9	Hydro-Brake®	12	2.0				
480 minute winter	10	Flow through pond	8	7.9	0.020	0.001	116.0809	
480 minute winter	11	11	10	1.7	0.423	0.079	0.0617	
15 minute winter	12	12	9_OUT	2.0	0.688	0.094	0.0052	29.0