

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	0.600
CV	0.750	Include Intermediate Ground	x
Time of Entry (mins)	4.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Add Inflow (l/s)	Cover Level (m)	Diameter (mm)	Depth (m)
SIC1	0.116	4.00		1.000	1200	0.825
SIC2	0.149	4.00		1.000	1200	1.032
SIC3	0.032	4.00		1.000	1200	0.825
SIC4	0.000	4.00		1.000	1200	1.181
SIC5	0.030	4.00		1.000	1200	0.750
SIC6	0.019	4.00		1.000	1200	0.971
SIC7	0.000	4.00		1.000	1200	1.205
SIC8	0.010	4.00		1.000	1200	0.760
SIC9	0.000	4.00		1.000	1200	0.881
SIC10	0.015	4.00		1.000	1200	0.548
SIC11	0.000	4.00		1.000	1200	0.657
SIC12	0.043	4.00		1.000	1200	1.041
MH1	0.027	4.00	1.0	1.000	1200	1.165
Pond	0.096	4.00		1.000	1350	1.360
PS1	0.000	4.00		1.000	1350	1.371
MH2	0.000	4.00		1.000	1350	1.530

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)
1.000	SIC1	SIC2	29.765	0.600	0.175	0.043	0.132	225.0	225	4.57	50.0
1.001	SIC2	SIC4	29.765	0.600	-0.032	-0.131	0.099	300.0	300	5.12	50.0
2.000	SIC3	SIC4	8.132	0.600	0.175	-0.031	0.206	39.5	150	4.08	50.0
1.002	SIC4	SIC7	7.175	0.600	-0.181	-0.205	0.024	300.0	300	5.25	50.0
3.000	SIC5	SIC6	33.190	0.600	0.250	0.029	0.221	150.0	150	4.68	50.0
3.001	SIC6	SIC7	8.141	0.600	0.029	-0.025	0.054	150.0	150	4.84	50.0
1.003	SIC7	Pond	23.895	0.600	-0.205	-0.285	0.080	300.0	300	5.70	50.0
4.000	SIC8	SIC9	18.198	0.600	0.240	0.119	0.121	150.0	150	4.37	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)
1.000	0.867	34.5	15.7	0.600	0.732	0.116	0.0	107	0.848
1.001	0.902	63.8	35.9	0.732	0.831	0.265	0.0	161	0.929
2.000	1.606	28.4	4.3	0.675	0.881	0.032	0.0	40	1.165
1.002	0.902	63.8	40.3	0.881	0.905	0.297	0.0	173	0.953
3.000	0.818	14.5	4.1	0.600	0.821	0.030	0.0	54	0.702
3.001	0.818	14.5	6.6	0.821	0.875	0.049	0.0	71	0.800
1.003	0.902	63.8	46.9	0.905	0.985	0.346	0.0	192	0.984
4.000	0.818	14.5	1.4	0.610	0.731	0.010	0.0	31	0.511

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)
4.001	SIC9	SIC12	12.687	0.600	0.119	0.034	0.085	150.0	150	4.63	50.0
5.000	SIC10	SIC11	16.360	0.600	0.452	0.343	0.109	150.0	150	4.33	50.0
5.001	SIC11	SIC12	10.405	0.600	0.343	0.034	0.309	33.7	150	4.43	50.0
4.002	SIC12	MH1	27.933	0.600	-0.041	-0.165	0.124	225.0	225	5.17	50.0
4.003	MH1	Pond	3.500	0.600	-0.165	-0.188	0.023	150.0	225	5.22	50.0
1.004	Pond	PS1	3.500	0.600	-0.360	-0.371	0.011	318.2	375	5.75	50.0
1.005	PS1	MH2	51.561	0.600	-0.371	-0.530	0.159	324.3	375	6.61	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)
4.001	0.818	14.5	1.4	0.731	0.816	0.010	0.0	31	0.511
5.000	0.818	14.5	2.0	0.398	0.507	0.015	0.0	38	0.577
5.001	1.740	30.8	2.0	0.507	0.816	0.015	0.0	26	0.987
4.002	0.867	34.5	9.2	0.816	0.940	0.068	0.0	80	0.738
4.003	1.065	42.3	13.9	0.940	0.963	0.095	1.0	88	0.955
1.004	1.010	111.6	73.8	0.985	0.996	0.537	1.0	223	1.077
1.005	1.000	110.5	73.8	0.996	1.155	0.537	1.0	224	1.069

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)
1.000	29.765	225.0	225	Circular	1.000	0.175	0.600	1.000	0.043	0.732
1.001	29.765	300.0	300	Circular	1.000	-0.032	0.732	1.000	-0.131	0.831
2.000	8.132	39.5	150	Circular	1.000	0.175	0.675	1.000	-0.031	0.881
1.002	7.175	300.0	300	Circular	1.000	-0.181	0.881	1.000	-0.205	0.905
3.000	33.190	150.0	150	Circular	1.000	0.250	0.600	1.000	0.029	0.821
3.001	8.141	150.0	150	Circular	1.000	0.029	0.821	1.000	-0.025	0.875
1.003	23.895	300.0	300	Circular	1.000	-0.205	0.905	1.000	-0.285	0.985
4.000	18.198	150.0	150	Circular	1.000	0.240	0.610	1.000	0.119	0.731
4.001	12.687	150.0	150	Circular	1.000	0.119	0.731	1.000	0.034	0.816
5.000	16.360	150.0	150	Circular	1.000	0.452	0.398	1.000	0.343	0.507
5.001	10.405	33.7	150	Circular	1.000	0.343	0.507	1.000	0.034	0.816
4.002	27.933	225.0	225	Circular	1.000	-0.041	0.816	1.000	-0.165	0.940
4.003	3.500	150.0	225	Circular	1.000	-0.165	0.940	1.000	-0.188	0.963

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	SIC1	1200	Manhole	Private	SIC2	1200	Manhole	Private
1.001	SIC2	1200	Manhole	Private	SIC4	1200	Manhole	Private
2.000	SIC3	1200	Manhole	Private	SIC4	1200	Manhole	Private
1.002	SIC4	1200	Manhole	Private	SIC7	1200	Manhole	Private
3.000	SIC5	1200	Manhole	Private	SIC6	1200	Manhole	Private
3.001	SIC6	1200	Manhole	Private	SIC7	1200	Manhole	Private
1.003	SIC7	1200	Manhole	Private	Pond	1350	Manhole	Private
4.000	SIC8	1200	Manhole	Private	SIC9	1200	Manhole	Private
4.001	SIC9	1200	Manhole	Private	SIC12	1200	Manhole	Private
5.000	SIC10	1200	Manhole	Private	SIC11	1200	Manhole	Private
5.001	SIC11	1200	Manhole	Private	SIC12	1200	Manhole	Private
4.002	SIC12	1200	Manhole	Private	MH1	1200	Manhole	Private
4.003	MH1	1200	Manhole	Private	Pond	1350	Manhole	Private

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)
1.004	3.500	318.2	375	Circular	1.000	-0.360	0.985	1.000	-0.371	0.996
1.005	51.561	324.3	375	Circular	1.000	-0.371	0.996	1.000	-0.530	1.155

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.004	Pond	1350	Manhole	Private	PS1	1350	Manhole	Private
1.005	PS1	1350	Manhole	Private	MH2	1350	Manhole	Private

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
SIC1	1.000	0.825	1200				
				0	1.000	0.175	225
SIC2	1.000	1.032	1200				
				1	1.000	0.043	225
				0	1.001	-0.032	300
SIC3	1.000	0.825	1200				
				0	2.000	0.175	150
SIC4	1.000	1.181	1200				
				1	2.000	-0.031	150
				2	1.001	-0.131	300
				0	1.002	-0.181	300
SIC5	1.000	0.750	1200				
				0	3.000	0.250	150
SIC6	1.000	0.971	1200				
				1	3.000	0.029	150
				0	3.001	0.029	150
SIC7	1.000	1.205	1200				
				1	3.001	-0.025	150
				2	1.002	-0.205	300
				0	1.003	-0.205	300
SIC8	1.000	0.760	1200				
				0	4.000	0.240	150
SIC9	1.000	0.881	1200				
				1	4.000	0.119	150
				0	4.001	0.119	150
SIC10	1.000	0.548	1200				
				0	5.000	0.452	150

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
SIC11	1.000	0.657	1200	1	5.000	0.343	150
				0	5.001	0.343	150
SIC12	1.000	1.041	1200	1	5.001	0.034	150
				2	4.001	0.034	150
				0	4.002	-0.041	225
MH1	1.000	1.165	1200	1	4.002	-0.165	225
				0	4.003	-0.165	225
Pond	1.000	1.360	1350	1	4.003	-0.188	225
				2	1.003	-0.285	300
				0	1.004	-0.360	375
PS1	1.000	1.371	1350	1	1.004	-0.371	375
				0	1.005	-0.371	375
MH2	1.000	1.530	1350	1	1.005	-0.530	375

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440

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

Node PS1 Online Pump Control

Flap Valve	x	Design Depth (m)	1.500	Switch off depth (m)	0.050
Replaces Downstream Link	✓	Design Flow (l/s)	1.7		
Invert Level (m)	-0.371	Switch on depth (m)	0.100		

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.700	1.500	1.700

Node SIC2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.570	Slope (1:X)	202.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	3	Depth (m)	0.300
Safety Factor	2.0	Width (m)	30.100	Inf Depth (m)	
Porosity	0.30	Length (m)	30.300		

Node SIC3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.570	Slope (1:X)	202.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	0.300
Safety Factor	2.0	Width (m)	38.400	Inf Depth (m)	
Porosity	0.30	Length (m)	30.300		

Node Pond Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	-0.360
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	407.0	0.0	1.360	800.0	0.0

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.85%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	SIC1	10	0.312	0.137	22.4	0.5416	0.0000	OK
15 minute winter	SIC2	10	0.180	0.212	51.0	0.8533	0.0000	OK
15 minute summer	SIC3	9	0.224	0.049	6.2	0.0932	0.0000	OK
15 minute winter	SIC4	11	0.080	0.261	55.7	0.2953	0.0000	OK
15 minute winter	SIC5	10	0.315	0.065	5.8	0.1265	0.0000	OK
15 minute winter	SIC6	10	0.123	0.094	9.4	0.1430	0.0000	OK
15 minute winter	SIC7	11	0.043	0.248	63.2	0.2807	0.0000	OK
15 minute summer	SIC8	10	0.277	0.037	1.9	0.0522	0.0000	OK
15 minute winter	SIC9	11	0.156	0.037	1.9	0.0415	0.0000	OK
15 minute summer	SIC10	10	0.500	0.048	2.9	0.0808	0.0000	OK
15 minute winter	SIC11	10	0.375	0.032	2.9	0.0361	0.0000	OK
15 minute winter	SIC12	10	0.053	0.094	13.0	0.1844	0.0000	OK
1440 minute winter	MH1	1350	-0.046	0.119	1.8	0.1896	0.0000	OK
1440 minute winter	Pond	1350	-0.046	0.314	6.0	142.8858	0.0000	OK
1440 minute winter	PS1	1350	-0.046	0.325	1.7	0.4649	0.0000	OK
15 minute summer	MH2	1	-0.530	0.000	1.7	0.0000	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	SIC1	1.000	SIC2	22.3	0.880	0.648	0.7553	
15 minute winter	SIC2	1.001	SIC4	49.5	0.959	0.776	1.5608	
15 minute summer	SIC3	2.000	SIC4	6.2	1.136	0.218	0.0730	
15 minute winter	SIC4	1.002	SIC7	54.3	0.873	0.851	0.4571	
15 minute winter	SIC5	3.000	SIC6	5.7	0.609	0.398	0.3152	
15 minute winter	SIC6	3.001	SIC7	9.1	0.828	0.632	0.0899	
15 minute winter	SIC7	1.003	Pond	63.8	1.138	1.000	1.3305	
15 minute summer	SIC8	4.000	SIC9	1.9	0.577	0.132	0.0612	
15 minute winter	SIC9	4.001	SIC12	1.8	0.557	0.126	0.0416	
15 minute summer	SIC10	5.000	SIC11	2.9	0.770	0.200	0.0622	
15 minute winter	SIC11	5.001	SIC12	2.9	1.073	0.093	0.0278	
15 minute winter	SIC12	4.002	MH1	12.8	0.694	0.372	0.5167	
1440 minute winter	MH1	4.003	Pond	1.8	0.510	0.043	0.0834	
1440 minute winter	Pond	1.004	PS1	1.7	0.077	0.015	0.3500	
1440 minute winter	PS1	Pump	MH2	1.7				133.1

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.85%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	SIC1	11	0.731	0.556	42.4	2.1910	0.0000	FLOOD RISK
15 minute winter	SIC2	11	0.555	0.587	88.4	2.3585	0.0000	SURCHARGED
15 minute winter	SIC3	11	0.380	0.205	11.7	0.3905	0.0000	SURCHARGED
15 minute winter	SIC4	11	0.345	0.526	93.4	0.5943	0.0000	SURCHARGED
15 minute winter	SIC5	11	0.391	0.141	11.0	0.2725	0.0000	OK
15 minute winter	SIC6	11	0.317	0.288	17.3	0.4383	0.0000	SURCHARGED
15 minute winter	SIC7	11	0.247	0.452	107.4	0.5110	0.0000	SURCHARGED
15 minute summer	SIC8	10	0.293	0.053	3.7	0.0740	0.0000	OK
15 minute winter	SIC9	10	0.170	0.051	3.7	0.0579	0.0000	OK
15 minute summer	SIC10	10	0.520	0.068	5.5	0.1138	0.0000	OK
15 minute winter	SIC11	10	0.386	0.043	5.5	0.0486	0.0000	OK
1440 minute winter	SIC12	1410	0.165	0.206	1.1	0.4040	0.0000	OK
1440 minute winter	MH1	1410	0.165	0.330	2.5	0.5267	0.0000	SURCHARGED
1440 minute winter	Pond	1410	0.165	0.525	9.3	255.2325	0.0000	SURCHARGED
1440 minute winter	PS1	1410	0.165	0.536	1.7	0.7670	0.0000	SURCHARGED
15 minute summer	MH2	1	-0.530	0.000	1.7	0.0000	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	SIC1	1.000	SIC2	36.4	0.916	1.056	1.1838	
15 minute winter	SIC2	1.001	SIC4	83.5	1.186	1.310	2.0960	
15 minute winter	SIC3	2.000	SIC4	10.0	1.133	0.353	0.1432	
15 minute winter	SIC4	1.002	SIC7	93.4	1.326	1.464	0.5053	
15 minute winter	SIC5	3.000	SIC6	10.3	0.679	0.713	0.5774	
15 minute winter	SIC6	3.001	SIC7	14.7	0.867	1.018	0.1433	
15 minute winter	SIC7	1.003	Pond	107.2	1.535	1.681	1.5981	
15 minute summer	SIC8	4.000	SIC9	3.7	0.681	0.256	0.0989	
15 minute winter	SIC9	4.001	SIC12	3.7	0.635	0.253	0.0852	
15 minute summer	SIC10	5.000	SIC11	5.5	0.932	0.381	0.0972	
15 minute winter	SIC11	5.001	SIC12	5.5	1.097	0.179	0.0639	
1440 minute winter	SIC12	4.002	MH1	1.1	0.260	0.032	1.0887	
1440 minute winter	MH1	4.003	Pond	2.4	0.533	0.057	0.1392	
1440 minute winter	Pond	1.004	PS1	1.7	0.077	0.016	0.3860	
1440 minute winter	PS1	Pump	MH2	1.7				142.3

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.85%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	SIC1	9	1.000	0.825	77.1	3.2530	4.0154	FLOOD
15 minute winter	SIC2	13	0.696	0.728	152.0	17.4640	0.0000	SURCHARGED
15 minute winter	SIC3	11	0.584	0.409	21.3	1.0219	0.0000	SURCHARGED
1440 minute winter	SIC4	1410	0.511	0.692	8.1	0.7828	0.0000	SURCHARGED
15 minute winter	SIC5	11	0.961	0.711	19.9	1.3728	0.0000	FLOOD RISK
15 minute winter	SIC6	11	0.632	0.603	27.8	0.9178	0.0000	SURCHARGED
1440 minute winter	SIC7	1440	0.509	0.714	9.3	0.8076	0.0000	SURCHARGED
1440 minute winter	SIC8	1440	0.510	0.270	0.3	0.3769	0.0000	SURCHARGED
1440 minute winter	SIC9	1440	0.510	0.391	0.3	0.4424	0.0000	SURCHARGED
15 minute summer	SIC10	10	0.548	0.096	10.0	0.1616	0.0000	OK
1440 minute winter	SIC11	1440	0.510	0.167	0.4	0.1889	0.0000	SURCHARGED
1440 minute winter	SIC12	1440	0.510	0.551	1.9	1.0783	0.0000	SURCHARGED
1440 minute winter	MH1	1440	0.510	0.675	3.6	1.0756	0.0000	SURCHARGED
1440 minute winter	Pond	1440	0.510	0.870	15.4	465.7688	0.0000	SURCHARGED
1440 minute winter	PS1	1440	0.509	0.880	3.3	1.2596	0.0000	SURCHARGED
15 minute summer	MH2	1	-0.530	0.000	1.7	0.0000	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	SIC1	1.000	SIC2	52.9	1.331	1.535	1.1838	
15 minute winter	SIC2	1.001	SIC4	96.1	1.365	1.506	2.0960	
15 minute winter	SIC3	2.000	SIC4	18.3	1.173	0.643	0.1432	
1440 minute winter	SIC4	1.002	SIC7	8.1	0.451	0.126	0.5053	
15 minute winter	SIC5	3.000	SIC6	16.4	0.933	1.136	0.5843	
15 minute winter	SIC6	3.001	SIC7	27.1	1.541	1.877	0.1433	
1440 minute winter	SIC7	1.003	Pond	9.2	0.432	0.145	1.6827	
1440 minute winter	SIC8	4.000	SIC9	0.3	0.328	0.021	0.3204	
1440 minute winter	SIC9	4.001	SIC12	0.3	0.326	0.021	0.2234	
15 minute summer	SIC10	5.000	SIC11	10.0	1.089	0.692	0.1501	
1440 minute winter	SIC11	5.001	SIC12	0.4	0.602	0.013	0.1832	
1440 minute winter	SIC12	4.002	MH1	1.8	0.260	0.051	1.1109	
1440 minute winter	MH1	4.003	Pond	3.5	0.533	0.082	0.1392	
1440 minute winter	Pond	1.004	PS1	3.3	0.077	0.030	0.3860	
1440 minute winter	PS1	Pump	MH2	1.7				148.4