

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)	2.000
Ratio-R	0.400	Preferred Cover Depth (m)	0.900
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
SIC1	0.018	4.00	30.600	450	0.750
SIC2	0.040	4.00	30.550	450	1.540
SIC3	0.035	4.00	30.400	450	1.490
SMH1			30.300	1200	1.570
S1		4.00	30.700		1.600
PERM1	0.012	4.00	30.700		1.000
PERM2	0.009	4.00	30.550		1.000
EX MH			30.300	1200	1.790

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	16.174	0.600	29.850	29.010	0.840	19.3	150	4.12	50.0
1.001	SIC2	SIC3	10.324	0.600	29.010	28.910	0.100	103.2	225	4.25	50.0
1.002	SIC3	SMH1	17.736	0.600	28.910	28.730	0.180	98.5	225	4.48	50.0
1.003	SMH1	EX MH	1.000	0.600	28.730	28.510	0.220	4.5	150	4.48	50.0
2.000	S1	SIC2	8.617	0.600	29.100	29.010	0.090	95.7	225	4.11	50.0
3.000	PERM2	SIC2	3.300	0.600	29.550	29.135	0.415	8.0	100	4.02	50.0
4.000	PERM1	SIC3	10.900	0.600	29.700	29.035	0.665	16.4	100	4.09	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	2.306	40.7	2.4	0.600	1.390	0.018	0.0	25	1.273
1.001	1.286	51.1	9.1	1.315	1.265	0.067	0.0	64	0.974
1.002	1.317	52.4	15.4	1.265	1.345	0.114	0.0	84	1.152
1.003	4.759	84.1	15.4	1.420	1.640	0.114	0.0	44	3.653
2.000	1.336	53.1	0.0	1.375	1.315	0.000	0.0	0	0.000
3.000	2.758	21.7	1.2	0.900	1.315	0.009	0.0	16	1.476
4.000	1.917	15.1	1.6	0.900	1.265	0.012	0.0	22	1.254

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	16.174	19.3	150	Circular	30.600	29.850	0.600	30.550	29.010	1.390
1.001	10.324	103.2	225	Circular	30.550	29.010	1.315	30.400	28.910	1.265
1.002	17.736	98.5	225	Circular	30.400	28.910	1.265	30.300	28.730	1.345
1.003	1.000	4.5	150	Circular	30.300	28.730	1.420	30.300	28.510	1.640
2.000	8.617	95.7	225	Circular	30.700	29.100	1.375	30.550	29.010	1.315
3.000	3.300	8.0	100	Circular	30.550	29.550	0.900	30.550	29.135	1.315
4.000	10.900	16.4	100	Circular	30.700	29.700	0.900	30.400	29.035	1.265

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	SIC1	450	Manhole	Adoptable	SIC2	450	Manhole	Adoptable
1.001	SIC2	450	Manhole	Adoptable	SIC3	450	Manhole	Adoptable
1.002	SIC3	450	Manhole	Adoptable	SMH1	1200	Manhole	Adoptable
1.003	SMH1	1200	Manhole	Adoptable	EX MH	1200	Manhole	Adoptable
2.000	S1		Junction		SIC2	450	Manhole	Adoptable
3.000	PERM2		Junction		SIC2	450	Manhole	Adoptable
4.000	PERM1		Junction		SIC3	450	Manhole	Adoptable

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
SIC1	30.600	0.750	450				
				0	1.000	29.850	150
SIC2	30.550	1.540	450		1	3.000	29.135
				2	2.000	29.010	225
				3	1.000	29.010	150
				0	1.001	29.010	225
SIC3	30.400	1.490	450		1	4.000	29.035
				2	1.001	28.910	225
				0	1.002	28.910	225
SMH1	30.300	1.570	1200		1	1.002	28.730
				0	1.003	28.730	150
S1	30.700	1.600					
				0	2.000	29.100	225
PERM1	30.700	1.000					
				0	4.000	29.700	100
PERM2	30.550	1.000					
				0	3.000	29.550	100

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
EX MH	30.300	1.790	1200	1	1.003	28.510	150

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 SMH1 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	28.730	Product Number	CTL-SHE-0100-5000-1370-5000
Design Depth (m)	1.370	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node S1 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	29.100	Depth (m)	1.000
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	66	Inf Depth (m)	
Safety Factor	2.0	Pit Width (m)	4.800	Number Required	1
Porosity	0.95	Pit Length (m)	7.500		

Node PERM1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	30.550	Slope (1:X)	100.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.150
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.30	Length (m)	21.800		

Node PERM2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	30.400	Slope (1:X)	100.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.150
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.30	Length (m)	17.245		

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 summer	SIC1	10	29.880	0.030	3.5	0.0190	0.0000	OK
15 minute winter	SIC2	11	29.203	0.193	17.3	0.1312	0.0000	OK
15 minute winter	SIC3	11	29.208	0.298	17.4	0.1877	0.0000	SURCHARGED
15 minute winter	SMH1	11	29.208	0.478	10.3	0.5410	0.0000	SURCHARGED
15 minute winter	S1	15	29.197	0.097	18.3	3.3300	0.0000	OK
15 minute summer	PERM1	10	29.727	0.027	2.3	0.0064	0.0000	OK
15 minute summer	PERM2	9	29.569	0.019	1.7	0.0035	0.0000	OK
15 minute summer	EX MH	1	28.510	0.000	5.0	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 summer	SIC1	1.000	SIC2	3.5	0.560	0.086	0.1624	
15 minute winter	SIC2	1.001	SIC3	9.7	0.720	0.190	0.3927	
15 minute winter	SIC3	1.002	SMH1	10.3	0.643	0.197	0.7054	
15 minute winter	SMH1	Hydro-Brake®	EX MH	5.0				9.5
15 minute winter	S1	2.000	SIC2	-18.3	-0.990	-0.344	0.2224	
15 minute summer	PERM1	4.000	SIC3	2.3	1.266	0.153	0.0517	
15 minute summer	PERM2	3.000	SIC2	1.7	1.592	0.078	0.0106	

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 summer	SIC1	10	29.891	0.041	6.6	0.0261	0.0000	OK
30 minute winter	SIC2	30	29.455	0.445	25.4	0.3020	0.0000	SURCHARGED
30 minute winter	SIC3	30	29.454	0.544	12.9	0.3423	0.0000	SURCHARGED
30 minute winter	SMH1	30	29.452	0.722	8.2	0.8170	0.0000	SURCHARGED
30 minute winter	S1	30	29.455	0.355	24.6	12.1450	0.0000	SURCHARGED
15 minute summer	PERM1	10	29.737	0.037	4.4	0.0089	0.0000	OK
15 minute summer	PERM2	10	29.576	0.026	3.3	0.0048	0.0000	OK
15 minute summer	EX MH	1	28.510	0.000	5.0	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 summer	SIC1	1.000	SIC2	6.6	0.617	0.162	0.1738	
30 minute winter	SIC2	1.001	SIC3	-7.0	0.634	-0.138	0.4106	
30 minute winter	SIC3	1.002	SMH1	8.2	0.650	0.156	0.7054	
30 minute winter	SMH1	Hydro-Brake®	EX MH	5.0				23.7
30 minute winter	S1	2.000	SIC2	-24.6	-0.907	-0.463	0.3427	
15 minute summer	PERM1	4.000	SIC3	4.4	1.142	0.292	0.0571	
15 minute summer	PERM2	3.000	SIC2	3.3	1.559	0.152	0.0156	

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
60 minute winter	SIC1	59	30.016	0.166	5.9	0.1062	0.0000	SURCHARGED
60 minute winter	SIC2	59	30.016	1.006	31.2	0.6830	0.0000	SURCHARGED
60 minute winter	SIC3	59	30.015	1.105	15.4	0.6953	0.0000	SURCHARGED
60 minute winter	SMH1	59	30.013	1.283	6.5	1.4515	0.0000	FLOOD RISK
60 minute winter	S1	59	30.016	0.916	29.7	31.3360	0.0000	SURCHARGED
60 minute winter	PERM1	59	30.016	0.316	3.9	0.0758	0.0000	SURCHARGED
60 minute winter	PERM2	59	30.016	0.466	3.0	0.0839	0.0000	SURCHARGED
15 minute summer	EX MH	1	28.510	0.000	5.0	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)
60 minute winter	SIC1	1.000	SIC2	5.9	0.463	0.145	0.2847	
60 minute winter	SIC2	1.001	SIC3	-9.2	0.624	-0.180	0.4106	
60 minute winter	SIC3	1.002	SMH1	6.5	0.620	0.125	0.7054	
60 minute winter	SMH1	Hydro-Brake®	EX MH	5.0				54.3
60 minute winter	S1	2.000	SIC2	-29.7	-0.748	-0.560	0.3427	
60 minute winter	PERM1	4.000	SIC3	3.9	0.973	0.259	0.0853	
60 minute winter	PERM2	3.000	SIC2	3.0	1.336	0.138	0.0258	