



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)	0.500
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
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)	Easting (m)	Northing (m)	Depth (m)
1	0.036	5.00	6.700	450	470923.472	106497.418	0.560
2			6.700	450	470922.713	106496.484	1.150
4	0.012	5.00	6.500	450	470937.019	106546.039	0.950
5	0.003	5.00	6.850	450	470935.778	106536.768	1.375
6			7.075	1200	470936.093	106530.451	1.725
7	0.007	5.00	7.325	1200	470955.222	106524.006	2.125
8	0.026	5.00	7.400	1200	470959.402	106532.740	2.300
12	0.012	5.00	7.670	450	470953.408	106555.409	1.000
9	0.012	5.00	7.400	1200	470962.279	106554.220	2.400
10			6.250	1200	470961.952	106559.309	1.350
11			6.250	1200	470964.032	106574.842	1.500
11_OUT			6.250	1200	470929.165	106579.513	1.850

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	1	2	1.204	0.600	6.140	6.100	0.040	30.1	150	5.01	50.0
1.001	2	6	36.507	0.600	5.550	5.350	0.200	182.5	300	5.54	50.0
2.000	4	5	9.354	0.600	5.550	5.475	0.075	124.7	150	5.17	50.0
2.001	5	6	6.325	0.600	5.475	5.425	0.050	126.5	150	5.29	50.0
1.002	6	7	20.186	0.600	5.350	5.200	0.150	134.6	300	5.78	50.0
1.003	7	8	9.683	0.600	5.200	5.100	0.100	96.8	300	5.88	50.0
1.004	8	9	21.672	0.600	5.150	5.000	0.150	144.5	300	6.16	50.0
3.000	12	9	8.950	0.600	6.670	6.000	0.670	13.4	150	5.05	50.0
1.005	9	10	5.099	0.600	5.000	4.900	0.100	51.0	150	6.22	50.0
1.006	10	11	15.672	0.600	4.900	4.750	0.150	104.5	150	6.49	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)
1.000	1.842	32.5	4.9	0.410	0.450	0.036	0.0
1.001	1.160	82.0	4.9	0.850	1.425	0.036	0.0
2.000	0.898	15.9	1.6	0.800	1.225	0.012	0.0
2.001	0.892	15.8	2.0	1.225	1.500	0.015	0.0
1.002	1.353	95.7	6.9	1.425	1.825	0.051	0.0
1.003	1.598	112.9	7.9	1.825	2.000	0.058	0.0
1.004	1.306	92.3	11.4	1.950	2.100	0.084	0.0
3.000	2.771	49.0	1.6	0.850	1.250	0.012	0.0
1.005	1.412	24.9	14.6	2.250	1.200	0.108	0.0
1.006	0.983	17.4	14.6	1.200	1.350	0.108	0.0

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)
1.007	11	11_OUT	35.178	0.600	4.750	4.400	0.350	100.5	150	7.07	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)
1.007	1.002	17.7	14.6	1.350	1.700	0.108	0.0

Pipeline Schedule

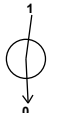
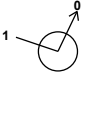
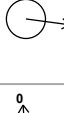
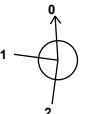
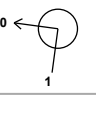
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	1.204	30.1	150	Circular	6.700	6.140	0.410	6.700	6.100	0.450
1.001	36.507	182.5	300	Circular	6.700	5.550	0.850	7.075	5.350	1.425
2.000	9.354	124.7	150	Circular	6.500	5.550	0.800	6.850	5.475	1.225
2.001	6.325	126.5	150	Circular	6.850	5.475	1.225	7.075	5.425	1.500
1.002	20.186	134.6	300	Circular	7.075	5.350	1.425	7.325	5.200	1.825
1.003	9.683	96.8	300	Circular	7.325	5.200	1.825	7.400	5.100	2.000
1.004	21.672	144.5	300	Circular	7.400	5.150	1.950	7.400	5.000	2.100
3.000	8.950	13.4	150	Circular	7.670	6.670	0.850	7.400	6.000	1.250
1.005	5.099	51.0	150	Circular	7.400	5.000	2.250	6.250	4.900	1.200
1.006	15.672	104.5	150	Circular	6.250	4.900	1.200	6.250	4.750	1.350
1.007	35.178	100.5	150	Circular	6.250	4.750	1.350	6.250	4.400	1.700

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	450	Manhole	Adoptable	2	450	Manhole	Adoptable
1.001	2	450	Manhole	Adoptable	6	1200	Manhole	Adoptable
2.000	4	450	Manhole	Adoptable	5	450	Manhole	Adoptable
2.001	5	450	Manhole	Adoptable	6	1200	Manhole	Adoptable
1.002	6	1200	Manhole	Adoptable	7	1200	Manhole	Adoptable
1.003	7	1200	Manhole	Adoptable	8	1200	Manhole	Adoptable
1.004	8	1200	Manhole	Adoptable	9	1200	Manhole	Adoptable
3.000	12	450	Manhole	Adoptable	9	1200	Manhole	Adoptable
1.005	9	1200	Manhole	Adoptable	10	1200	Manhole	Adoptable
1.006	10	1200	Manhole	Adoptable	11	1200	Manhole	Adoptable
1.007	11	1200	Manhole	Adoptable	11_OUT	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
1	470923.472	106497.418	6.700	0.560	450		0	1.000	6.140	150
2	470922.713	106496.484	6.700	1.150	450		1	1.000	6.100	150
							0	1.001	5.550	300
4	470937.019	106546.039	6.500	0.950	450		0	2.000	5.550	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
5	470935.778	106536.768	6.850	1.375	450		1	2.000	5.475	150
6	470936.093	106530.451	7.075	1.725	1200		1	2.001	5.425	150
							2	1.001	5.350	300
							0	1.002	5.350	300
7	470955.222	106524.006	7.325	2.125	1200		1	1.002	5.200	300
							0	1.003	5.200	300
8	470959.402	106532.740	7.400	2.300	1200		1	1.003	5.100	300
							0	1.004	5.150	300
12	470953.408	106555.409	7.670	1.000	450					
							0	3.000	6.670	150
9	470962.279	106554.220	7.400	2.400	1200		1	3.000	6.000	150
							2	1.004	5.000	300
							0	1.005	5.000	150
10	470961.952	106559.309	6.250	1.350	1200		1	1.005	4.900	150
							0	1.006	4.900	150
11	470964.032	106574.842	6.250	1.500	1200		1	1.006	4.750	150
							0	1.007	4.750	150
11_OUT	470929.165	106579.513	6.250	1.850	1200		1	1.007	4.400	150

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	✓
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	19.700	Additional Storage (m³/ha)	20.0
Ratio-R	0.350	Check Discharge Rate(s)	x
Winter CV	1.000	Check Discharge Volume	x
Analysis Speed	Detailed		

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	0	0	0
30	0	0	0
100	0	0	0
100	40	0	0
100	50	0	0

Node 9 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	5.000	Product Number	CTL-SHE-0055-2000-2400-2000
Design Depth (m)	2.400	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node 1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	6.140	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	200	Depth (m)	0.450
Safety Factor	1.0	Width (m)	5.000	Inf Depth (m)	0.450
Porosity	0.32	Length (m)	36.000		

Node 5 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	6.310	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	48	Depth (m)	0.450
Safety Factor	1.0	Width (m)	5.200	Inf Depth (m)	0.450
Porosity	0.32	Length (m)	6.000		

Node 7 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	1.0	Invert Level (m)	5.250
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	40.0	0.0	0.800	40.0	0.0	1.201	0.0	0.0
0.400	40.0	0.0	1.200	40.0	0.0			

Results for 2 year Critical Storm Duration. Lowest mass balance: 95.74%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	11	6.197	0.057	7.4	0.6156	0.0000	OK
15 minute winter	2	12	5.607	0.057	6.5	0.0090	0.0000	OK
15 minute winter	4	10	5.591	0.041	2.5	0.0170	0.0000	OK
15 minute winter	5	11	5.522	0.047	3.1	0.0095	0.0000	OK
180 minute winter	6	144	5.486	0.136	2.7	0.1534	0.0000	OK
180 minute winter	7	152	5.486	0.286	4.2	9.3117	0.0000	OK
180 minute winter	8	148	5.485	0.385	2.1	0.5230	0.0000	SURCHARGED
15 minute winter	12	10	6.694	0.024	2.5	0.0094	0.0000	OK
180 minute winter	9	148	5.486	0.486	2.1	0.5982	0.0000	SURCHARGED
15 minute winter	10	8	4.927	0.027	1.2	0.0309	0.0000	OK
15 minute winter	11	127	4.777	0.027	1.2	0.0300	0.0000	OK
15 minute winter	11_OUT	127	4.426	0.026	1.2	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	1	1.000	2	6.5	1.212	0.199	0.0064	
15 minute winter	2	1.001	6	6.5	0.654	0.079	0.3616	
15 minute winter	4	2.000	5	2.5	0.571	0.154	0.0402	
15 minute winter	5	2.001	6	3.0	0.667	0.191	0.0285	
180 minute winter	6	1.002	7	2.7	0.475	0.028	1.0099	
180 minute winter	7	1.003	8	1.4	0.142	0.012	0.6760	
180 minute winter	8	1.004	9	1.5	0.177	0.016	1.5261	
15 minute winter	12	3.000	9	2.5	1.427	0.050	0.0155	
180 minute winter	9	Hydro-Brake®	10	1.2				
15 minute winter	10	1.006	11	1.2	0.622	0.069	0.0333	
15 minute winter	11	1.007	11_OUT	1.2	0.572	0.067	0.0734	10.1

Results for 30 year Critical Storm Duration. Lowest mass balance: 95.74%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	12	6.224	0.084	13.9	1.2454	0.0000	OK
180 minute winter	2	176	5.836	0.286	3.5	0.0455	0.0000	OK
240 minute winter	4	228	5.836	0.286	0.9	0.1180	0.0000	SURCHARGED
180 minute winter	5	176	5.836	0.361	1.5	0.0734	0.0000	SURCHARGED
180 minute winter	6	176	5.836	0.486	5.0	0.5502	0.0000	SURCHARGED
240 minute winter	7	228	5.836	0.636	6.3	23.0644	0.0000	SURCHARGED
180 minute winter	8	176	5.836	0.736	3.7	0.9994	0.0000	SURCHARGED
15 minute winter	12	10	6.702	0.032	4.6	0.0128	0.0000	OK
180 minute winter	9	176	5.836	0.836	2.4	1.0297	0.0000	SURCHARGED
240 minute winter	10	228	4.928	0.028	1.2	0.0312	0.0000	OK
240 minute winter	11	228	4.777	0.027	1.2	0.0306	0.0000	OK
240 minute winter	11_OUT	228	4.427	0.027	1.2	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	1	1.000	2	11.9	1.394	0.365	0.0103	
180 minute winter	2	1.001	6	3.5	0.511	0.043	2.5502	
240 minute winter	4	2.000	5	0.9	0.451	0.057	0.1647	
180 minute winter	5	2.001	6	1.5	0.528	0.098	0.1114	
180 minute winter	6	1.002	7	3.9	0.440	0.040	1.4215	
240 minute winter	7	1.003	8	-2.5	0.117	-0.022	0.6819	
180 minute winter	8	1.004	9	1.5	0.194	0.016	1.5261	
15 minute winter	12	3.000	9	4.6	1.699	0.093	0.0241	
180 minute winter	9	Hydro-Brake®	10	1.2				
240 minute winter	10	1.006	11	1.2	0.568	0.072	0.0343	
240 minute winter	11	1.007	11_OUT	1.2	0.579	0.070	0.0756	31.7

Results for 100 year Critical Storm Duration. Lowest mass balance: 95.74%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	12	6.238	0.098	18.1	1.6955	0.0000	OK
180 minute winter	2	176	6.125	0.575	4.6	0.0914	0.0000	SURCHARGED
180 minute winter	4	176	6.125	0.575	1.5	0.2369	0.0000	SURCHARGED
180 minute winter	5	176	6.125	0.650	1.9	0.1319	0.0000	SURCHARGED
180 minute winter	6	176	6.125	0.775	5.5	0.8765	0.0000	SURCHARGED
180 minute winter	7	176	6.125	0.925	9.6	34.3754	0.0000	SURCHARGED
180 minute winter	8	176	6.125	1.025	5.0	1.3909	0.0000	SURCHARGED
15 minute winter	12	10	6.707	0.037	6.0	0.0147	0.0000	OK
180 minute winter	9	176	6.125	1.125	3.0	1.3847	0.0000	SURCHARGED
180 minute winter	10	176	4.929	0.029	1.4	0.0333	0.0000	OK
180 minute winter	11	180	4.779	0.029	1.4	0.0327	0.0000	OK
180 minute winter	11_OUT	180	4.429	0.029	1.4	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	1	1.000	2	15.2	1.474	0.468	0.0124	
180 minute winter	2	1.001	6	4.2	0.489	0.052	2.5708	
180 minute winter	4	2.000	5	1.5	0.483	0.094	0.1647	
180 minute winter	5	2.001	6	1.5	0.537	0.096	0.1114	
180 minute winter	6	1.002	7	4.3	0.469	0.045	1.4215	
180 minute winter	7	1.003	8	-4.7	0.158	-0.041	0.6819	
180 minute winter	8	1.004	9	1.8	0.175	0.019	1.5261	
15 minute winter	12	3.000	9	6.0	1.828	0.122	0.0292	
180 minute winter	9	Hydro-Brake®	10	1.4				
180 minute winter	10	1.006	11	1.4	0.591	0.082	0.0377	
180 minute winter	11	1.007	11_OUT	1.4	0.602	0.080	0.0830	31.0

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 95.74%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	1	344	6.410	0.270	4.0	10.7936	0.0000	FLOOD RISK
360 minute winter	2	344	6.410	0.860	3.8	0.1368	0.0000	FLOOD RISK
360 minute winter	4	344	6.410	0.860	1.3	0.3545	0.0000	FLOOD RISK
360 minute winter	5	344	6.410	0.935	1.4	1.0439	0.0000	SURCHARGED
360 minute winter	6	344	6.410	1.060	4.7	1.1993	0.0000	SURCHARGED
360 minute winter	7	344	6.410	1.210	8.7	45.5617	0.0000	SURCHARGED
360 minute winter	8	344	6.410	1.310	3.8	1.7782	0.0000	SURCHARGED
15 minute winter	12	10	6.714	0.044	8.4	0.0176	0.0000	OK
360 minute winter	9	344	6.410	1.410	2.6	1.7361	0.0000	SURCHARGED
360 minute winter	10	344	4.931	0.031	1.6	0.0351	0.0000	OK
360 minute winter	11	344	4.780	0.030	1.6	0.0344	0.0000	OK
360 minute winter	11_OUT	344	4.430	0.030	1.6	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)
360 minute winter	1	1.000	2	3.8	1.071	0.116	0.0212	
360 minute winter	2	1.001	6	3.6	0.436	0.043	2.5708	
360 minute winter	4	2.000	5	1.1	0.432	0.068	0.1647	
360 minute winter	5	2.001	6	1.2	0.474	0.074	0.1114	
360 minute winter	6	1.002	7	4.5	0.446	0.047	1.4215	
360 minute winter	7	1.003	8	-3.5	0.134	-0.031	0.6819	
360 minute winter	8	1.004	9	2.0	0.137	0.022	1.5261	
15 minute winter	12	3.000	9	8.3	2.002	0.170	0.0373	
360 minute winter	9	Hydro-Brake®	10	1.6				
360 minute winter	10	1.006	11	1.6	0.608	0.091	0.0406	
360 minute winter	11	1.007	11_OUT	1.6	0.620	0.089	0.0892	49.2



Results for 100 year +50% CC Critical Storm Duration. Lowest mass balance: 95.74%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	1	344	6.469	0.329	5.5	14.2430	0.0000	FLOOD RISK
360 minute winter	2	344	6.469	0.919	4.1	0.1461	0.0000	FLOOD RISK
360 minute winter	4	344	6.469	0.919	1.4	0.3786	0.0000	FLOOD RISK
360 minute winter	5	344	6.469	0.994	1.5	1.6391	0.0000	SURCHARGED
360 minute winter	6	344	6.469	1.119	5.1	1.2654	0.0000	SURCHARGED
360 minute winter	7	344	6.469	1.269	9.4	47.1567	0.0000	SURCHARGED
360 minute winter	8	344	6.469	1.369	4.2	1.8574	0.0000	SURCHARGED
15 minute winter	12	10	6.716	0.046	9.0	0.0183	0.0000	OK
360 minute winter	9	344	6.469	1.469	2.8	1.8080	0.0000	SURCHARGED
360 minute winter	10	344	4.931	0.031	1.6	0.0354	0.0000	OK
360 minute winter	11	344	4.781	0.031	1.6	0.0347	0.0000	OK
360 minute winter	11_OUT	344	4.430	0.030	1.6	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)
360 minute winter	1	1.000	2	4.1	1.090	0.125	0.0212	
360 minute winter	2	1.001	6	3.8	0.423	0.047	2.5708	
360 minute winter	4	2.000	5	1.2	0.433	0.073	0.1647	
360 minute winter	5	2.001	6	1.3	0.474	0.081	0.1114	
360 minute winter	6	1.002	7	4.8	0.452	0.050	1.4215	
360 minute winter	7	1.003	8	-3.8	0.139	-0.034	0.6819	
360 minute winter	8	1.004	9	1.8	0.130	0.020	1.5261	
15 minute winter	12	3.000	9	8.9	2.038	0.183	0.0393	
360 minute winter	9	Hydro-Brake®	10	1.6				
360 minute winter	10	1.006	11	1.6	0.611	0.092	0.0411	
360 minute winter	11	1.007	11_OUT	1.6	0.624	0.090	0.0904	50.1