

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	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)	17.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	0.600
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	0.072	5.00	39.050	1200	470415.059	174500.876	0.900
2	0.079	5.00	39.000	1200	470439.052	174501.836	0.949
3	0.079	5.00	39.000	1200	470440.544	174473.460	1.044
4	0.404	5.00	39.400	1200	470482.120	174475.324	1.614
5	0.079	5.00	38.900	1350	470484.156	174439.184	1.337
6	0.044	5.00	38.900	1350	470439.053	174437.186	1.477
7	0.163	5.00	38.800	1350	470349.364	174491.609	0.975
8	0.202	5.00	38.800	1350	470352.614	174426.206	1.193
9	0.225	5.00	38.800	1200	470408.722	174471.091	0.825
10	0.000	5.00	38.800	1350	470418.008	174422.983	1.800
OUT			38.800	1350	470418.355	174416.693	1.816

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	24.012	0.600	38.150	38.051	0.099	242.5	300	5.40	45.1
1.001	2	3	28.415	0.600	38.051	37.956	0.095	300.0	300	5.92	43.2
1.002	3	4	41.618	0.600	37.956	37.786	0.170	244.8	300	6.62	41.0
1.003	4	5	36.197	0.600	37.786	37.638	0.148	244.6	300	7.22	39.3
1.004	5	6	45.147	0.600	37.563	37.423	0.140	322.5	375	7.97	37.4
1.005	6	10	25.389	0.600	37.423	37.344	0.079	321.4	375	8.39	36.4
2.000	7	8	65.484	0.600	37.825	37.607	0.218	300.0	375	6.05	42.8
2.001	8	10	65.473	0.600	37.607	37.405	0.202	324.1	375	7.14	39.5
3.000	9	10	48.996	0.600	37.975	37.686	0.289	169.5	225	5.82	43.6
1.006	10	OUT	6.300	0.600	37.000	36.984	0.016	393.7	450	8.49	36.1

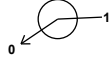
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.005	71.0	8.8	0.600	0.649	0.072	0.0	71	0.691
1.001	0.902	63.8	17.7	0.649	0.744	0.151	0.0	108	0.774
1.002	1.000	70.7	25.6	0.744	1.314	0.230	0.0	125	0.922
1.003	1.001	70.7	67.5	1.314	0.962	0.634	0.0	236	1.133
1.004	1.003	110.8	72.2	0.962	1.102	0.713	0.0	221	1.066
1.005	1.005	111.0	74.6	1.102	1.081	0.757	0.0	225	1.075
2.000	1.041	114.9	18.9	0.600	0.818	0.163	0.0	102	0.774
2.001	1.001	110.5	39.1	0.818	1.020	0.365	0.0	153	0.916
3.000	1.001	39.8	26.6	0.600	0.889	0.225	0.0	135	1.071
1.006	1.018	161.9	131.9	1.350	1.366	1.347	0.0	310	1.130

Pipeline Schedule

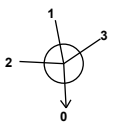
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	24.012	242.5	300	Circular	39.050	38.150	0.600	39.000	38.051	0.649
1.001	28.415	300.0	300	Circular	39.000	38.051	0.649	39.000	37.956	0.744
1.002	41.618	244.8	300	Circular	39.000	37.956	0.744	39.400	37.786	1.314
1.003	36.197	244.6	300	Circular	39.400	37.786	1.314	38.900	37.638	0.962
1.004	45.147	322.5	375	Circular	38.900	37.563	0.962	38.900	37.423	1.102
1.005	25.389	321.4	375	Circular	38.900	37.423	1.102	38.800	37.344	1.081
2.000	65.484	300.0	375	Circular	38.800	37.825	0.600	38.800	37.607	0.818
2.001	65.473	324.1	375	Circular	38.800	37.607	0.818	38.800	37.405	1.020
3.000	48.996	169.5	225	Circular	38.800	37.975	0.600	38.800	37.686	0.889
1.006	6.300	393.7	450	Circular	38.800	37.000	1.350	38.800	36.984	1.366

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	1200	Manhole	Adoptable	2	1200	Manhole	Adoptable
1.001	2	1200	Manhole	Adoptable	3	1200	Manhole	Adoptable
1.002	3	1200	Manhole	Adoptable	4	1200	Manhole	Adoptable
1.003	4	1200	Manhole	Adoptable	5	1350	Manhole	Adoptable
1.004	5	1350	Manhole	Adoptable	6	1350	Manhole	Adoptable
1.005	6	1350	Manhole	Adoptable	10	1350	Manhole	Adoptable
2.000	7	1350	Manhole	Adoptable	8	1350	Manhole	Adoptable
2.001	8	1350	Manhole	Adoptable	10	1350	Manhole	Adoptable
3.000	9	1200	Manhole	Adoptable	10	1350	Manhole	Adoptable
1.006	10	1350	Manhole	Adoptable	OUT	1350	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
1	470415.059	174500.876	39.050	0.900	1200				
						0	1.000	38.150	300
2	470439.052	174501.836	39.000	0.949	1200		1	1.000	38.051
						0	1.001	38.051	300
3	470440.544	174473.460	39.000	1.044	1200		1	1.001	37.956
						0	1.002	37.956	300
4	470482.120	174475.324	39.400	1.614	1200		1	1.002	37.786
						0	1.003	37.786	300
5	470484.156	174439.184	38.900	1.337	1350		1	1.003	37.638
						0	1.004	37.563	375
6	470439.053	174437.186	38.900	1.477	1350		1	1.004	37.423
						0	1.005	37.423	375

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
7	470349.364	174491.609	38.800	0.975	1350		0	2.000	37.825	375
8	470352.614	174426.206	38.800	1.193	1350		1	2.000	37.607	375
							0	2.001	37.607	375
9	470408.722	174471.091	38.800	0.825	1200		0	3.000	37.975	225
10	470418.008	174422.983	38.800	1.800	1350		1	3.000	37.686	225
							2	2.001	37.405	375
							3	1.005	37.344	375
							0	1.006	37.000	450
OUT	470418.355	174416.693	38.800	1.816	1350		1	1.006	36.984	450

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	17.000	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 %)
1	0	0	0
30	0	0	0
100	40	0	0

Node 10 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	37.000	Product Number	CTL-SHE-0085-4000-1700-4000
Design Depth (m)	1.700	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	4.0	Min Node Diameter (mm)	1200

Node 4 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	38.300
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	1750.0	0.0	0.400	1750.0	0.0	0.401	0.0	0.0

Node 7 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	37.825
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	250.0	0.0	0.400	250.0	0.0	0.401	0.0	0.0

Node 9 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	37.975
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	300.0	0.0	0.400	300.0	0.0	0.401	0.0	0.0

Node 4 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	38.800	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	0.350
Safety Factor	2.0	Width (m)	36.000	Inf Depth (m)	
Porosity	0.30	Length (m)	72.000		

Results for 1 year Critical Storm Duration. Lowest mass balance: 91.81%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	38.219	0.069	8.6	0.1882	0.0000	OK
30 minute winter	2	21	38.196	0.145	13.8	0.4061	0.0000	OK
30 minute winter	3	21	38.193	0.237	24.5	0.6259	0.0000	OK
30 minute winter	4	22	38.180	0.394	57.2	2.4208	0.0000	SURCHARGED
15 minute winter	5	13	38.125	0.562	72.8	1.4690	0.0000	SURCHARGED
15 minute winter	6	13	38.102	0.679	67.9	1.3756	0.0000	SURCHARGED
360 minute winter	7	344	38.099	0.274	17.0	66.4706	0.0000	OK
360 minute winter	8	344	38.099	0.492	14.9	2.3722	0.0000	SURCHARGED
360 minute winter	9	344	38.099	0.124	7.9	36.2937	0.0000	OK
360 minute winter	10	344	38.099	1.099	14.7	1.5732	0.0000	SURCHARGED
15 minute summer	OUT	1	36.984	0.000	3.4	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	8.4	0.483	0.118	0.4537	
30 minute winter	2	1.001	3	13.9	0.648	0.217	1.3273	
30 minute winter	3	1.002	4	20.4	0.527	0.289	2.7061	
30 minute winter	4	1.003	5	53.0	1.010	0.749	2.5490	
15 minute winter	5	1.004	6	63.0	0.880	0.569	4.9796	
15 minute winter	6	1.005	10	68.3	0.619	0.615	2.8003	
360 minute winter	7	2.000	8	-14.2	-0.222	-0.124	6.4405	
360 minute winter	8	2.001	10	-11.3	0.330	-0.103	7.2215	
360 minute winter	9	3.000	10	-4.8	0.389	-0.121	1.5261	
360 minute winter	10	Hydro-Brake®	OUT	3.4				109.8

Results for 30 year Critical Storm Duration. Lowest mass balance: 91.81%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	11	38.548	0.398	19.9	1.0880	0.0000	SURCHARGED
15 minute winter	2	11	38.540	0.489	41.7	1.3684	0.0000	SURCHARGED
15 minute winter	3	10	38.503	0.547	65.2	1.4476	0.0000	SURCHARGED
600 minute winter	4	585	38.386	0.600	23.5	148.1292	0.0000	SURCHARGED
600 minute winter	5	585	38.386	0.823	17.3	2.1511	0.0000	SURCHARGED
120 minute winter	6	70	38.404	0.981	55.5	1.9889	0.0000	SURCHARGED
60 minute winter	7	45	38.419	0.594	93.2	97.9537	0.0000	SURCHARGED
120 minute winter	8	70	38.417	0.810	52.2	3.9002	0.0000	SURCHARGED
600 minute winter	9	585	38.386	0.411	23.4	116.8504	0.0000	SURCHARGED
120 minute winter	10	70	38.406	1.406	55.3	2.0119	0.0000	SURCHARGED
15 minute summer	OUT	1	36.984	0.000	3.5	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	1	1.000	2	23.1	0.563	0.325	1.6909	
15 minute winter	2	1.001	3	43.5	0.726	0.683	2.0010	
15 minute winter	3	1.002	4	66.2	0.941	0.937	2.9307	
600 minute winter	4	1.003	5	15.2	0.525	0.215	2.5490	
600 minute winter	5	1.004	6	17.2	0.449	0.155	4.9796	
120 minute winter	6	1.005	10	55.3	0.513	0.499	2.8003	
60 minute winter	7	2.000	8	-69.0	-0.778	-0.600	7.2227	
120 minute winter	8	2.001	10	-34.2	0.413	-0.310	7.2215	
600 minute winter	9	3.000	10	-17.3	-0.434	-0.434	1.9486	
120 minute winter	10	Hydro-Brake®	OUT	3.7				74.1

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 91.81%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	11	39.023	0.873	37.9	2.3833	0.0000	FLOOD RISK
15 minute winter	2	11	38.992	0.941	73.8	2.6301	0.0000	FLOOD RISK
15 minute winter	3	11	38.837	0.881	111.7	2.3287	0.0000	FLOOD RISK
960 minute winter	4	945	38.650	0.864	41.7	588.7081	0.0000	SURCHARGED
960 minute winter	5	945	38.650	1.087	20.9	2.8408	0.0000	FLOOD RISK
120 minute winter	6	76	38.681	1.258	66.1	2.5502	0.0000	FLOOD RISK
60 minute summer	7	36	38.800	0.975	144.0	99.7744	0.7633	FLOOD
60 minute summer	8	36	38.779	1.172	92.6	5.6480	0.0000	FLOOD RISK
120 minute winter	9	76	38.800	0.825	70.6	119.5760	1.0196	FLOOD
120 minute winter	10	76	38.713	1.713	64.9	2.4507	0.0000	FLOOD RISK
15 minute summer	OUT	1	36.984	0.000	3.7	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	1	1.000	2	34.6	0.589	0.486	1.6909	
15 minute winter	2	1.001	3	72.6	1.031	1.139	2.0010	
15 minute winter	3	1.002	4	110.8	1.574	1.568	2.9307	
960 minute winter	4	1.003	5	-20.8	0.547	-0.294	2.5490	
960 minute winter	5	1.004	6	-18.3	0.453	-0.165	4.9796	
120 minute winter	6	1.005	10	-60.9	-0.552	-0.549	2.8003	
60 minute summer	7	2.000	8	-89.0	-0.833	-0.774	7.2227	
60 minute summer	8	2.001	10	88.5	0.803	0.801	7.2215	
120 minute winter	9	3.000	10	-34.9	-0.877	-0.877	1.9486	
120 minute winter	10	Hydro-Brake®	OUT	4.0				78.5