

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)	19.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.350	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
10	0.014	4.00	183.220	1200	407346.066	413387.378	1.620
11	0.009	4.00	182.537	1200	407346.670	413399.363	1.937
18	0.009	4.00	181.348	1200	407350.025	413413.169	1.548
12	0.026	4.00	181.710	1200	407354.939	413408.914	2.163
13	0.059	4.00	180.800	2100	407370.234	413426.579	7.367
14	0.000		179.175	2400	407377.030	413445.389	5.925
15			178.600	1500	407385.570	413459.988	5.519
16			175.038	1200	407378.174	413471.973	2.098
17			173.431	1200	407370.403	413483.338	0.720

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	10	11	12.000	0.600	181.600	180.600	1.000	12.0	150	4.07	50.0
1.001	11	12	12.633	0.600	180.600	179.547	1.053	12.0	150	4.14	50.0
2.000	18	12	6.500	0.600	179.800	179.547	0.253	25.7	150	4.05	50.0
1.002	12	13	23.366	0.600	179.547	177.210	2.337	10.0	150	4.26	50.0
1.003	13	14	20.000	0.600	173.433	173.300	0.133	150.0	1500	4.36	50.0
1.004	14	15	16.913	0.600	173.250	173.081	0.169	100.0	150	4.64	50.0
1.005	15	16	14.083	0.600	173.081	172.940	0.141	100.0	150	4.87	50.0
1.006	16	17	13.768	0.600	172.940	172.711	0.229	60.0	150	5.05	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	2.924	51.7	1.9	1.470	1.787	0.014	0.0	20	1.393
1.001	2.924	51.7	3.1	1.787	2.013	0.023	0.0	25	1.616
2.000	1.994	35.2	1.2	1.398	2.013	0.009	0.0	19	0.930
1.002	3.204	56.6	7.9	2.013	3.440	0.058	0.0	38	2.268
1.003	3.500	6184.5	15.9	5.867	4.375	0.117	0.0	54	0.786
1.004	1.005	17.8	15.9	5.775	5.369	0.117	0.0	111	1.133
1.005	1.005	17.8	15.9	5.369	1.948	0.117	0.0	111	1.133
1.006	1.301	23.0	15.9	1.948	0.570	0.117	0.0	92	1.401

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	12.000	12.0	150	Circular_Default Sewer Type	183.220	181.600	1.470	182.537	180.600	1.787
1.001	12.633	12.0	150	Circular_Default Sewer Type	182.537	180.600	1.787	181.710	179.547	2.013
2.000	6.500	25.7	150	Circular_Default Sewer Type	181.348	179.800	1.398	181.710	179.547	2.013
1.002	23.366	10.0	150	Circular_Default Sewer Type	181.710	179.547	2.013	180.800	177.210	3.440
1.003	20.000	150.0	1500	Circular_Default Sewer Type	180.800	173.433	5.867	179.175	173.300	4.375
1.004	16.913	100.0	150	Circular_Default Sewer Type	179.175	173.250	5.775	178.600	173.081	5.369
1.005	14.083	100.0	150	Circular_Default Sewer Type	178.600	173.081	5.369	175.038	172.940	1.948
1.006	13.768	60.0	150	Circular_Default Sewer Type	175.038	172.940	1.948	173.431	172.711	0.570

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	10	1200	Manhole	Adoptable	11	1200	Manhole	Adoptable
1.001	11	1200	Manhole	Adoptable	12	1200	Manhole	Adoptable
2.000	18	1200	Manhole	Adoptable	12	1200	Manhole	Adoptable
1.002	12	1200	Manhole	Adoptable	13	2100	Manhole	Adoptable
1.003	13	2100	Manhole	Adoptable	14	2400	Manhole	Adoptable
1.004	14	2400	Manhole	Adoptable	15	1500	Manhole	Adoptable
1.005	15	1500	Manhole	Adoptable	16	1200	Manhole	Adoptable
1.006	16	1200	Manhole	Adoptable	17	1200	Manhole	Adoptable

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	✓
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	19.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.350	Check Discharge Rate(s)	✓
Summer CV	0.750	Check Discharge Volume	✓
Winter CV	0.840	100 year 360 minute (m³)	
Analysis Speed	Normal		

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	0	0	0
100	30	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	1.95
Greenfield Method	IH124	Growth Factor 100 year	2.48
Positively Drained Area (ha)		Betterment (%)	0
SAAR (mm)		QBar	
Soil Index	1	Q 1 year (l/s)	
SPR	0.10	Q 30 year (l/s)	
Region	1	Q 100 year (l/s)	
Growth Factor 1 year	0.85		

Pre-development Discharge Volume

Site Makeup	Greenfield	Return Period (years)	100
Greenfield Method	FSR/FEH	Climate Change (%)	0
Positively Drained Area (ha)		Storm Duration (mins)	360
Soil Index	1	Betterment (%)	0
SPR	0.10	PR	
CWI		Runoff Volume (m³)	

Node 14 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	173.250	Product Number	CTL-SHE-0074-3000-1600-3000
Design Depth (m)	1.600	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	3.0	Min Node Diameter (mm)	1200

Results for 1 year Critical Storm Duration. Lowest mass balance: 98.88%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	10	10	181.620	0.020	1.9	0.0257	0.0000	OK
15 minute summer	11	10	180.625	0.025	3.1	0.0306	0.0000	OK
15 minute summer	18	10	179.819	0.019	1.2	0.0237	0.0000	OK
15 minute winter	12	10	179.585	0.038	7.8	0.0526	0.0000	OK
60 minute winter	13	46	173.605	0.172	8.1	0.6249	0.0000	OK
30 minute winter	14	26	173.608	0.358	11.9	1.6200	0.0000	SURCHARGED
60 minute summer	15	47	173.120	0.039	2.5	0.0696	0.0000	OK
60 minute winter	16	61	172.974	0.034	2.5	0.0386	0.0000	OK
60 minute winter	17	61	172.744	0.033	2.5	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	10	1.000	11	1.9	1.161	0.037	0.0197	
15 minute summer	11	1.001	12	3.1	1.147	0.060	0.0345	
15 minute summer	18	2.000	12	1.2	0.512	0.034	0.0157	
15 minute winter	12	1.002	13	7.8	2.227	0.138	0.0818	
60 minute winter	13	1.003	14	8.8	0.564	0.001	3.6317	
30 minute winter	14	Hydro-Brake®	15	2.5				
60 minute summer	15	1.005	16	2.5	0.746	0.140	0.0472	
60 minute winter	16	1.006	17	2.5	0.842	0.109	0.0408	11.9

Results for 30 year Critical Storm Duration. Lowest mass balance: 98.88%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	10	10	181.630	0.030	4.6	0.0395	0.0000	OK
15 minute summer	11	10	180.639	0.039	7.6	0.0477	0.0000	OK
15 minute summer	18	10	179.830	0.030	3.0	0.0370	0.0000	OK
15 minute summer	12	10	179.609	0.062	19.2	0.0852	0.0000	OK
120 minute winter	13	100	174.048	0.615	12.5	2.2287	0.0000	OK
120 minute winter	14	100	174.048	0.798	12.7	3.6101	0.0000	SURCHARGED
15 minute summer	15	74	173.120	0.039	2.5	0.0696	0.0000	OK
15 minute summer	16	75	172.974	0.034	2.5	0.0386	0.0000	OK
15 minute summer	17	75	172.744	0.033	2.5	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	10	1.000	11	4.6	1.499	0.089	0.0370	
15 minute summer	11	1.001	12	7.6	1.458	0.147	0.0664	
15 minute summer	18	2.000	12	3.0	0.661	0.085	0.0304	
15 minute summer	12	1.002	13	19.2	2.844	0.339	0.1577	
120 minute winter	13	1.003	14	12.7	0.589	0.002	15.5684	
120 minute winter	14	Hydro-Brake®	15	2.5				
15 minute summer	15	1.005	16	2.5	0.763	0.140	0.0472	
15 minute summer	16	1.006	17	2.5	0.842	0.109	0.0408	15.1

Results for 100 year Critical Storm Duration. Lowest mass balance: 98.88%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	10	10	181.635	0.035	6.0	0.0451	0.0000	OK
15 minute winter	11	10	180.645	0.045	9.9	0.0545	0.0000	OK
15 minute winter	18	10	179.834	0.034	3.9	0.0421	0.0000	OK
15 minute winter	12	10	179.619	0.072	24.9	0.0991	0.0000	OK
120 minute winter	13	114	174.306	0.873	16.3	3.1649	0.0000	OK
120 minute winter	14	114	174.306	1.056	12.3	4.7787	0.0000	SURCHARGED
60 minute winter	15	245	173.120	0.039	2.5	0.0696	0.0000	OK
15 minute summer	16	110	172.974	0.034	2.5	0.0386	0.0000	OK
60 minute winter	17	246	172.744	0.033	2.5	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 winter	10	1.000	11	6.0	1.619	0.116	0.0446	
15 minute winter	11	1.001	12	9.9	1.560	0.192	0.0807	
15 minute winter	18	2.000	12	3.9	0.703	0.111	0.0369	
15 minute winter	12	1.002	13	24.9	3.036	0.440	0.1916	
120 minute winter	13	1.003	14	12.3	0.597	0.002	23.2010	
120 minute winter	14	Hydro-Brake®	15	2.5				
60 minute winter	15	1.005	16	2.5	0.746	0.140	0.0472	
15 minute summer	16	1.006	17	2.5	0.842	0.109	0.0408	19.5

Results for 100 year +30% CC Critical Storm Duration. Lowest mass balance: 98.88%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	10	10	181.640	0.039	7.8	0.0514	0.0000	OK
15 minute winter	11	10	180.651	0.051	12.8	0.0623	0.0000	OK
15 minute winter	18	10	179.838	0.038	5.0	0.0477	0.0000	OK
15 minute winter	12	10	179.632	0.085	32.3	0.1165	0.0000	OK
120 minute winter	13	116	174.690	1.257	21.1	4.5569	0.0000	OK
120 minute winter	14	116	174.690	1.440	13.0	6.5165	0.0000	SURCHARGED
120 minute winter	15	116	173.123	0.042	2.9	0.0748	0.0000	OK
120 minute winter	16	116	172.977	0.037	2.9	0.0415	0.0000	OK
120 minute winter	17	118	172.747	0.036	2.9	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	10	1.000	11	7.8	1.748	0.151	0.0537	
15 minute winter	11	1.001	12	12.8	1.651	0.248	0.0983	
15 minute winter	18	2.000	12	5.0	0.738	0.142	0.0449	
15 minute winter	12	1.002	13	32.3	3.226	0.570	0.2339	
120 minute winter	13	1.003	14	13.0	0.643	0.002	32.8028	
120 minute winter	14	Hydro-Brake®	15	2.9				
120 minute winter	15	1.005	16	2.9	0.775	0.161	0.0522	
120 minute winter	16	1.006	17	2.9	0.875	0.125	0.0451	51.2