

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)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	3.00	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)
1	0.023	3.00	5.670		499176.727	104093.652	0.490
2	0.162	3.00	5.760	1200	499124.683	104127.398	0.855
3	0.125	3.00	5.760	1200	499124.271	104112.363	0.905
4	0.022	3.00	5.560		499122.755	104105.020	0.790
5	0.200	3.00	5.420	1200	499065.471	104138.210	0.795
6	0.179	3.00	5.420	1200	499065.471	104123.882	0.840
7			5.350		499063.933	104117.170	0.890
8	0.110	3.00	5.600		499015.938	104127.769	1.260
9			5.875		498969.837	104137.690	1.655
10	0.074	3.00	6.000	1200	498950.763	104151.135	1.200
11	0.007	3.00	5.875		498951.237	104141.840	1.710
12			5.775		498937.379	104144.900	1.635
13			5.600		498925.091	104159.306	1.500
14		3.00	5.600		498844.603	104156.227	1.500
15			6.300	1500	498836.068	104158.333	2.255
16			6.200		498833.443	104159.756	2.200

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	4	55.156	0.350	5.180	4.770	0.410	134.5	520	11.65	35.8
2.000	2	3	15.041	0.600	4.905	4.855	0.050	300.8	300	3.28	50.0
2.001	3	4	7.498	0.600	4.855	4.830	0.025	299.9	300	3.42	50.0
1.001	4	7	60.064	0.350	4.770	4.460	0.310	193.8	716	21.05	25.3
3.000	5	6	14.328	0.600	4.625	4.580	0.045	318.4	300	3.27	50.0
3.001	6	7	6.886	0.600	4.580	4.560	0.020	344.3	300	3.41	50.0
1.002	7	8	49.151	0.350	4.460	4.340	0.120	409.6	837	30.00	20.2
1.003	8	9	47.156	0.350	4.340	4.220	0.120	393.0	1161	30.00	20.2

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	0.106	85.1	2.2	0.030	0.270	0.023	0.0	85	0.040
2.000	0.901	63.7	22.0	0.555	0.605	0.162	0.0	121	0.819
2.001	0.902	127.6	38.9	0.605	0.430	0.287	0.0	113	0.795
1.001	0.106	147.3	22.7	0.074	0.174	0.332	0.0	308	0.066
3.000	0.876	123.8	27.1	0.495	0.540	0.200	0.0	95	0.706
3.001	0.841	119.0	51.4	0.540	0.490	0.379	0.0	137	0.811
1.002	0.080	146.1	39.0	0.053	0.423	0.711	0.0	470	0.058
1.003	0.100	326.8	45.0	0.029	0.494	0.821	0.0	497	0.061

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)
1.004	9	11	19.057	0.600	4.220	4.170	0.050	381.1	525	30.00	20.2
4.000	10	11	9.307	0.600	4.800	4.165	0.635	14.7	225	3.05	50.0
1.005	11	12	14.192	0.350	4.170	4.140	0.030	473.1	1730	30.00	20.2
1.006	12	13	18.935	0.600	4.140	4.100	0.040	473.4	525	30.00	20.2
5.000	14	15	8.791	0.600	4.100	4.045	0.055	159.8	450	3.09	50.0
5.001	15	16	2.986	0.600	4.045	4.000	0.045	66.4	150	3.13	50.0

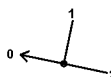
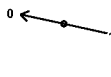
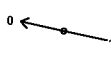
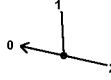
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.004	0.022	9.5	45.0	1.130	1.180	0.821	0.0	525	0.022
4.000	2.435	136.6	10.0	0.975	1.485	0.074	0.0	41	2.022
1.005	0.116	795.9	49.4	-0.025	-0.095	0.902	0.0	540	0.058
1.006	0.020	8.6	49.4	1.110	0.975	0.902	0.0	525	0.020
5.000	1.605	255.3	0.0	1.050	1.805	0.000	0.0	0	0.000
5.001	1.236	21.8	0.0	2.105	2.050	0.000	0.0	0	0.000

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	55.156	134.5	520	Swale	5.670	5.180	-0.090	5.560	4.770	0.270
2.000	15.041	300.8	300	Pipe	5.760	4.905	0.855	5.760	4.855	0.605
2.001	7.498	299.9	300	Twin 300mm	5.760	4.855	0.605	5.560	4.830	0.430
1.001	60.064	193.8	716	Swale	5.560	4.770	0.074	5.350	4.460	0.174
3.000	14.328	318.4	300	Twin 300mm	5.420	4.625	0.495	5.420	4.580	0.540
3.001	6.886	344.3	300	Twin 300mm	5.420	4.580	0.540	5.350	4.560	0.490
1.002	49.151	409.6	837	Swale	5.350	4.460	0.053	5.600	4.340	0.423
1.003	47.156	393.0	1161	Swale	5.600	4.340	0.099	5.875	4.220	0.494
1.004	19.057	381.1	525	Twin Pipes	5.875	4.220	1.130	5.875	4.170	1.180
4.000	9.307	14.7	225	Pipe	6.000	4.800	0.975	5.875	4.165	1.485
1.005	14.192	473.1	1730	Swale	5.875	4.170	-0.025	5.775	4.140	-0.095
1.006	18.935	473.4	525	Twin Pipes	5.775	4.140	1.110	5.600	4.100	0.975
5.000	8.791	159.8	450	Pipe	5.600	4.100	1.050	6.300	4.045	1.805
5.001	2.986	66.4	150	Pipe	6.300	4.045	2.105	6.200	4.000	2.050

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1		Junction		4		Junction	
2.000	2	1200	Manhole	Adoptable	3	1200	Manhole	Adoptable
2.001	3	1200	Manhole	Adoptable	4		Junction	
1.001	4		Junction		7		Junction	
3.000	5	1200	Manhole	Adoptable	6	1200	Manhole	Adoptable
3.001	6	1200	Manhole	Adoptable	7		Junction	
1.002	7		Junction		8		Junction	
1.003	8		Junction		9		Junction	
1.004	9		Junction		11		Junction	
4.000	10	1200	Manhole	Adoptable	11		Junction	
1.005	11		Junction		12		Junction	
1.006	12		Junction		13		Junction	
5.000	14		Junction		15	1500	Manhole	Adoptable
5.001	15	1500	Manhole	Adoptable	16		Junction	

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
1	499176.727	104093.652	5.670	0.490						
						0	1.000	5.180	520	
2	499124.683	104127.398	5.760	0.855	1200					
						0	2.000	4.905	300	
3	499124.271	104112.363	5.760	0.905	1200		1	2.000	4.855	300
						0	2.001	4.855	300	
4	499122.755	104105.020	5.560	0.790			1	2.001	4.830	300
						2	1.000	4.770	520	
						0	1.001	4.770	716	
5	499065.471	104138.210	5.420	0.795	1200					
						0	3.000	4.625	300	
6	499065.471	104123.882	5.420	0.840	1200		1	3.000	4.580	300
						0	3.001	4.580	300	
7	499063.933	104117.170	5.350	0.890			1	3.001	4.560	300
						2	1.001	4.460	716	
						0	1.002	4.460	837	
8	499015.938	104127.769	5.600	1.260			1	1.002	4.340	837
						0	1.003	4.340	1161	
9	498969.837	104137.690	5.875	1.655			1	1.003	4.220	1161
						0	1.004	4.220	525	
10	498950.763	104151.135	6.000	1.200	1200					
						0	4.000	4.800	225	
11	498951.237	104141.840	5.875	1.710			1	4.000	4.165	225
						2	1.004	4.170	525	
						0	1.005	4.170	1730	
12	498937.379	104144.900	5.775	1.635			1	1.005	4.140	1730
						0	1.006	4.140	525	
13	498925.091	104159.306	5.600	1.500			1	1.006	4.100	525

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
14	498844.603	104156.227	5.600	1.500					
						0	5.000	4.100	450
15	498836.068	104158.333	6.300	2.255	1500		1	5.000	4.045
						0	5.001	4.045	150
16	498833.443	104159.756	6.200	2.200			1	5.001	4.000
									150

Simulation Settings

Rainfall Methodology	FSR	Drain Down Time (mins)	240
FSR Region	England and Wales	Additional Storage (m³/ha)	20.0
M5-60 (mm)	20.000	Check Discharge Rate(s)	✓
Ratio-R	0.400	1 year (l/s)	
Summer CV	0.750	30 year (l/s)	
Winter CV	0.840	100 year (l/s)	13.0
Analysis Speed	Detailed	Check Discharge Volume	x
Skip Steady State	x		

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 %)
1	0	0	0
30	0	0	0
100	40	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 years	1.95
Greenfield Method	IH124	Growth Factor 100 years	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		

Node 14 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	4.100	Product Number	CTL-SHE-0163-1300-1100-1300
Design Depth (m)	1.100	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	13.0	Min Node Diameter (mm)	1200

Node 14 Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Main Channel Length (m)	80.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	4.100	Main Channel Slope (1:X)	99999.0
Safety Factor	2.0	Time to half empty (mins)	0	Main Channel n	0.350

Inlets

13

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)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	287.0	0.0	0.400	572.0	0.0	0.800	869.0	0.0	1.200	1140.0	0.0
0.100	357.0	0.0	0.500	644.0	0.0	0.900	945.0	0.0	1.300	1177.0	0.0
0.200	428.0	0.0	0.600	718.0	0.0	1.000	1022.0	0.0	1.400	1247.0	0.0
0.300	499.0	0.0	0.700	793.0	0.0	1.100	1101.0	0.0	1.500	1317.0	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 98.81%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	1	22	5.237	0.057	2.6	0.0533	0.0000	OK
15 minute summer	2	9	5.049	0.144	28.2	0.7098	0.0000	OK
30 minute winter	3	23	5.020	0.165	32.5	0.6420	0.0000	OK
30 minute winter	4	23	5.020	0.250	33.9	0.1392	0.0000	OK
60 minute winter	5	44	4.830	0.205	14.9	1.2650	0.0000	OK
60 minute winter	6	44	4.830	0.250	25.9	1.3498	0.0000	OK
60 minute winter	7	44	4.830	0.370	34.4	0.0000	0.0000	OK
120 minute winter	8	100	4.721	0.381	24.6	0.6659	0.0000	OK
120 minute winter	9	104	4.698	0.478	19.5	0.0000	0.0000	OK
15 minute summer	10	9	4.846	0.046	12.9	0.1094	0.0000	OK
120 minute winter	11	106	4.594	0.429	14.9	0.0352	0.0000	OK
120 minute winter	12	106	4.587	0.447	14.9	0.0000	0.0000	OK
240 minute winter	13	236	4.287	0.187	14.7	0.0000	0.0000	OK
360 minute winter	14	320	4.265	0.165	11.8	0.0000	0.0000	OK
360 minute winter	15	320	4.121	0.076	9.8	0.1351	0.0000	OK
360 minute winter	16	320	4.070	0.070	9.8	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	1	1.000	4	1.1	0.009	0.013	7.8482	
15 minute summer	2	2.000	3	26.7	0.867	0.420	0.4659	
15 minute summer	3	2.001	4	46.6	0.868	0.365	0.5195	
30 minute winter	4	1.001	7	14.8	0.046	0.100	20.3059	
15 minute summer	5	3.000	6	32.3	0.526	0.261	1.0989	
15 minute summer	6	3.001	7	60.8	0.938	0.511	0.6583	
60 minute winter	7	1.002	8	23.7	0.057	0.162	21.5178	
60 minute winter	8	1.003	9	21.8	0.060	0.067	25.3388	
180 minute winter	9	1.004	11	14.2	0.036	1.488	7.4501	
15 minute summer	10	4.000	11	12.7	1.099	0.093	0.1881	
180 minute winter	11	1.005	12	15.0	0.026	0.019	8.3553	
120 minute winter	12	1.006	13	15.1	0.062	1.765	4.7294	
180 minute winter	13	Flow through pond	14	13.0	0.022	0.157	59.4320	
360 minute winter	14	Hydro-Brake®	15	9.8				
360 minute winter	15	5.001	16	9.8	1.148	0.451	0.0256	146.6

Results for 30 year Critical Storm Duration. Lowest mass balance: 98.81%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	1	21	5.283	0.103	6.4	0.0968	0.0000	OK
30 minute winter	2	20	5.201	0.296	45.1	1.4581	0.0000	OK
30 minute winter	3	21	5.192	0.337	76.9	1.3104	0.0000	SURCHARGED
30 minute winter	4	22	5.189	0.419	82.1	0.2336	0.0000	OK
60 minute winter	5	41	5.056	0.431	35.8	2.6563	0.0000	SURCHARGED
60 minute winter	6	41	5.055	0.475	65.6	2.5617	0.0000	SURCHARGED
30 minute winter	7	24	5.054	0.594	127.1	0.0000	0.0000	OK
120 minute winter	8	98	5.027	0.687	63.6	1.1996	0.0000	OK
120 minute winter	9	98	5.022	0.802	38.4	0.0000	0.0000	SURCHARGED
15 minute summer	10	9	4.873	0.073	31.6	0.1726	0.0000	OK
120 minute winter	11	88	4.727	0.562	25.2	0.0460	0.0000	OK
120 minute winter	12	90	4.721	0.581	24.7	0.0000	0.0000	SURCHARGED
360 minute winter	13	392	4.451	0.351	22.8	0.0000	0.0000	OK
360 minute winter	14	392	4.448	0.348	18.5	0.0000	0.0000	OK
360 minute winter	15	392	4.136	0.091	13.0	0.1606	0.0000	OK
360 minute winter	16	392	4.083	0.083	13.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	1	1.000	4	3.2	0.012	0.038	17.4899	
15 minute summer	2	2.000	3	64.8	1.049	1.017	0.9972	
15 minute summer	3	2.001	4	110.9	1.045	0.870	1.0546	
30 minute winter	4	1.001	7	44.0	0.059	0.299	46.6798	
15 minute summer	5	3.000	6	77.7	0.613	0.628	2.0179	
15 minute summer	6	3.001	7	141.5	1.130	1.189	0.9698	
30 minute winter	7	1.002	8	72.5	0.086	0.497	45.4931	
30 minute winter	8	1.003	9	60.0	0.086	0.184	55.7409	
120 minute winter	9	1.004	11	22.7	0.052	2.373	8.2339	
15 minute summer	10	4.000	11	31.3	1.520	0.229	0.2369	
180 minute winter	11	1.005	12	24.7	0.029	0.031	12.9817	
120 minute winter	12	1.006	13	24.8	0.075	2.896	6.2483	
120 minute winter	13	Flow through pond	14	21.7	0.029	0.261	118.4673	
360 minute winter	14	Hydro-Brake®	15	13.0				
360 minute winter	15	5.001	16	13.0	1.225	0.593	0.0316	306.6

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 98.81%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	1	22	5.364	0.184	13.2	0.1727	0.0000	OK
15 minute winter	2	10	5.543	0.638	117.4	3.1388	0.0000	FLOOD RISK
30 minute winter	3	20	5.372	0.517	143.1	2.0144	0.0000	SURCHARGED
30 minute winter	4	22	5.360	0.590	156.7	0.3289	0.0000	OK
120 minute winter	5	112	5.328	0.703	40.2	4.3301	0.0000	FLOOD RISK
120 minute winter	6	112	5.328	0.748	74.9	4.0314	0.0000	FLOOD RISK
120 minute winter	7	112	5.327	0.867	120.5	0.0000	0.0000	FLOOD RISK
120 minute winter	8	114	5.325	0.985	110.1	1.7204	0.0000	OK
120 minute winter	9	114	5.324	1.104	54.1	0.0000	0.0000	SURCHARGED
120 minute winter	10	88	4.922	0.122	14.9	0.2890	0.0000	OK
120 minute winter	11	88	4.922	0.757	36.2	0.0621	0.0000	OK
120 minute winter	12	88	4.920	0.780	32.5	0.0000	0.0000	SURCHARGED
600 minute winter	13	660	4.662	0.562	26.6	0.0000	0.0000	OK
600 minute winter	14	660	4.662	0.562	19.9	0.0000	0.0000	SURCHARGED
240 minute summer	15	240	4.136	0.091	13.0	0.1607	0.0000	OK
60 minute summer	16	299	4.083	0.083	13.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	1	1.000	4	7.9	0.018	0.093	31.7777	
15 minute summer	2	2.000	3	110.2	1.564	1.730	1.0592	
15 minute summer	3	2.001	4	199.5	1.417	1.564	1.0560	
15 minute winter	4	1.001	7	80.5	0.070	0.547	74.4106	
15 minute summer	5	3.000	6	135.9	0.965	1.098	2.0179	
15 minute summer	6	3.001	7	260.2	1.848	2.187	0.9698	
30 minute winter	7	1.002	8	153.8	0.107	1.053	85.3723	
30 minute winter	8	1.003	9	119.0	0.106	0.364	103.7518	
120 minute winter	9	1.004	11	27.1	0.063	2.843	8.2339	
15 minute summer	10	4.000	11	56.4	1.684	0.413	0.2760	
15 minute summer	11	1.005	12	40.9	0.107	0.051	12.5762	
120 minute winter	12	1.006	13	30.8	0.087	3.595	8.0128	
120 minute winter	13	Flow through pond	14	26.8	0.031	0.323	219.7560	
240 minute summer	14	Hydro-Brake®	15	13.0				
60 minute summer	15	5.001	16	13.0	1.225	0.594	0.0316	173.7