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)	18.400	Minimum Backdrop Height (m)	0.200
Ratio-R	0.338	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	0.013	5.00	88.750	450	385524.290	403552.851	1.050
2	0.013	5.00	88.650	450	385511.036	403547.815	1.050
3	0.013	5.00	88.650	450	385512.178	403542.428	1.090
4	0.013	5.00	88.650	450	385520.156	403518.209	1.260
5	0.006	5.00	88.400	450	385533.211	403507.686	1.222
6	0.009	5.00	88.400	450	385550.523	403507.691	1.355
7	0.012	5.00	88.160	450	385552.349	403504.806	1.225
8	0.012	5.00	88.150	600	385566.519	403509.727	1.352
9	0.015	5.00	88.580	600	385562.723	403543.659	1.812
10	0.012	5.00	88.800	600	385560.204	403528.898	2.137
11	0.012	5.00	89.100	600	385558.240	403537.002	2.600
12	0.013	5.00	88.600	450	385532.392	403527.050	1.379
13	0.013	5.00	88.600	600	385538.522	403523.641	1.430
14			88.973	1200	385564.281	403539.060	2.523
14_OUT			88.700	1200	385566.547	403532.407	2.297

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	14.178	0.600	87.700	87.605	0.095	149.2	150	5.29	45.3
1.001	2	3	5.507	0.600	87.600	87.563	0.037	148.8	150	5.40	44.9
1.002	3	4	25.499	0.600	87.560	87.390	0.170	150.0	150	5.92	43.1
1.003	4	5	16.768	0.600	87.390	87.268	0.122	137.4	150	6.25	42.1
1.004	5	6	16.951	0.600	87.178	87.065	0.113	150.0	225	6.51	41.3
1.005	6	7	16.556	0.600	87.045	86.935	0.110	150.0	225	6.77	40.6
1.006	7	8	9.244	0.600	86.935	86.873	0.062	149.1	225	6.91	40.2
1.007	8	10	20.184	0.600	86.798	86.663	0.135	149.5	300	7.18	39.5

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	0.820	14.5	1.6	0.900	0.895	0.013	0.0	34	0.541
1.001	0.821	14.5	3.2	0.900	0.937	0.026	0.0	48	0.660
1.002	0.818	14.5	4.6	0.940	1.110	0.039	0.0	58	0.725
1.003	0.855	15.1	5.9	1.110	0.982	0.052	0.0	65	0.804
1.004	1.065	42.3	6.5	0.997	1.110	0.058	0.0	59	0.775
1.005	1.065	42.3	7.4	1.130	1.000	0.067	0.0	64	0.806
1.006	1.068	42.5	8.6	1.000	1.052	0.079	0.0	68	0.838
1.007	1.283	90.7	9.7	1.052	1.837	0.091	0.0	66	0.845

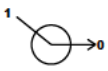
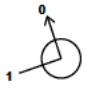
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Links

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)
1.009	11	14	6.382	0.600	86.500	86.450	0.050	127.6	300	7.51	38.5
1.008	10	11	21.276	0.600	86.663	86.500	0.163	130.5	300	7.43	38.7
3.000	9	14	4.856	0.600	86.768	86.525	0.243	20.0	225	5.03	46.2
2.000	12	13	5.073	0.600	87.221	87.187	0.034	149.2	150	5.10	46.0
2.001	13	10	22.310	0.600	87.170	86.813	0.357	62.5	150	5.39	45.3
1.010	14	14_OUT	7.023	0.600	86.450	86.403	0.047	149.4	225	7.62	38.2

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)
1.009	1.390	98.2	14.7	2.300	2.223	0.141	0.0	78	1.009
1.008	1.374	97.1	13.5	1.837	2.300	0.129	0.0	75	0.976
3.000	2.940	116.9	1.9	1.587	2.223	0.015	0.0	20	1.098
2.000	0.820	14.5	1.6	1.229	1.263	0.013	0.0	34	0.541
2.001	1.274	22.5	3.2	1.280	1.837	0.026	0.0	38	0.908
1.010	1.067	42.4	16.2	2.298	2.072	0.156	0.0	96	0.997

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
1	385524.290	403552.851	88.750	1.050	450				
						0	1.000	87.700	150
2	385511.036	403547.815	88.650	1.050	450	1	1.000	87.605	150
									
						0	1.001	87.600	150
3	385512.178	403542.428	88.650	1.090	450	1	1.001	87.563	150
									
						0	1.002	87.560	150
4	385520.156	403518.209	88.650	1.260	450	1	1.002	87.390	150
									
						0	1.003	87.390	150
5	385533.211	403507.686	88.400	1.222	450	1	1.003	87.268	150
									
						0	1.004	87.178	225
6	385550.523	403507.691	88.400	1.355	450	1	1.004	87.065	225
									
						0	1.005	87.045	225
7	385552.349	403504.806	88.160	1.225	450	1	1.005	86.935	225
									
						0	1.006	86.935	225
8	385566.519	403509.727	88.150	1.352	600	1	1.006	86.873	225
									
						0	1.007	86.798	300

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
9	385562.723	403543.659	88.580	1.812	600	0	3.000	86.768	225
10	385560.204	403528.898	88.800	2.137	600	1	2.001	86.813	150
						2	1.007	86.663	300
						0	1.008	86.663	300
11	385558.240	403537.002	89.100	2.600	600	1	1.008	86.500	300
						0	1.009	86.500	300
12	385532.392	403527.050	88.600	1.379	450	0	2.000	87.221	150
13	385538.522	403523.641	88.600	1.430	600	1	2.000	87.187	150
						0	2.001	87.170	150
14	385564.281	403539.060	88.973	2.523	1200	1	3.000	86.525	225
						2	1.009	86.450	300
						0	1.010	86.450	225
14_OUT	385566.547	403532.407	88.700	2.297	1200	1	1.010	86.403	225

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
Rainfall Events	Singular	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	18.400	Additional Storage (m³/ha)	20.0
Ratio-R	0.338	Starting Level (m)	
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

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Node 14 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	86.450	Product Number	CTL-SHE-0099-5000-1450-5000
Design Depth (m)	1.450	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node 9 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	87.090
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	72

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	70.0	70.0	0.800	70.0	97.2	0.801	0.0	97.2

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Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	87.733	0.033	1.6	0.0136	0.0000	OK
15 minute winter	2	10	87.651	0.051	3.2	0.0208	0.0000	OK
15 minute winter	3	10	87.619	0.059	4.7	0.0233	0.0000	OK
15 minute winter	4	11	87.459	0.069	6.2	0.0254	0.0000	OK
15 minute winter	5	11	87.241	0.063	6.9	0.0163	0.0000	OK
15 minute winter	6	11	87.113	0.068	7.9	0.0198	0.0000	OK
30 minute winter	7	26	87.049	0.114	7.7	0.0403	0.0000	OK
30 minute winter	8	25	87.051	0.253	8.8	0.1164	0.0000	OK
30 minute winter	9	26	87.051	0.283	1.8	0.1269	0.0000	SURCHARGED
30 minute winter	10	25	87.052	0.389	12.4	0.1536	0.0000	SURCHARGED
30 minute winter	11	26	87.051	0.551	11.3	0.2067	0.0000	SURCHARGED
15 minute winter	12	10	87.256	0.035	1.6	0.0122	0.0000	OK
15 minute winter	13	10	87.208	0.038	3.2	0.0178	0.0000	OK
30 minute winter	14	26	87.050	0.600	7.6	0.6790	0.0000	SURCHARGED
15 minute winter	14_OUT	13	86.455	0.052	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 winter	1	1.000	2	1.6	0.423	0.109	0.0531	
15 minute winter	2	1.001	3	3.1	0.555	0.214	0.0309	
15 minute winter	3	1.002	4	4.7	0.658	0.323	0.1824	
15 minute winter	4	1.003	5	6.2	0.800	0.412	0.1304	
15 minute winter	5	1.004	6	6.9	0.773	0.162	0.1507	
15 minute winter	6	1.005	7	7.8	0.723	0.185	0.1798	
30 minute winter	7	1.006	8	7.7	0.788	0.181	0.2467	
30 minute winter	8	1.007	10	8.7	0.666	0.095	1.3505	
30 minute winter	9	3.000	14	1.4	0.628	0.012	0.1931	
30 minute winter	10	1.008	11	10.1	0.502	0.104	1.4982	
30 minute winter	11	1.009	14	7.6	0.214	0.078	0.4494	
15 minute winter	12	2.000	13	1.6	0.523	0.109	0.0153	
15 minute winter	13	2.001	10	3.1	0.889	0.137	0.2188	
30 minute winter	14	1.010	14_OUT	5.0	0.694	0.118	0.0505	11.7

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Results for 30 year Critical Storm Duration. Lowest mass balance: 96.08%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	87.753	0.053	3.9	0.0214	0.0000	OK
15 minute winter	2	10	87.690	0.090	7.7	0.0368	0.0000	OK
15 minute winter	3	10	87.661	0.101	11.5	0.0401	0.0000	OK
15 minute winter	4	11	87.525	0.135	15.3	0.0493	0.0000	OK
60 minute winter	5	56	87.309	0.131	9.4	0.0336	0.0000	OK
60 minute winter	6	56	87.309	0.264	10.9	0.0770	0.0000	SURCHARGED
60 minute winter	7	57	87.308	0.373	11.9	0.1326	0.0000	SURCHARGED
60 minute winter	8	57	87.308	0.510	13.5	0.2347	0.0000	SURCHARGED
60 minute winter	9	58	87.308	0.540	17.9	14.7491	0.0000	SURCHARGED
60 minute winter	10	57	87.308	0.645	19.3	0.2548	0.0000	SURCHARGED
60 minute winter	11	57	87.308	0.808	20.9	0.3029	0.0000	SURCHARGED
60 minute winter	12	57	87.309	0.088	2.1	0.0305	0.0000	OK
60 minute winter	13	57	87.309	0.139	4.2	0.0645	0.0000	OK
60 minute winter	14	57	87.308	0.858	20.6	0.9700	0.0000	SURCHARGED
30 minute summer	14_OUT	82	86.455	0.052	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 winter	1	1.000	2	3.9	0.489	0.266	0.1124	
15 minute winter	2	1.001	3	7.6	0.659	0.526	0.0639	
15 minute winter	3	1.002	4	11.4	0.792	0.790	0.3713	
15 minute winter	4	1.003	5	15.1	0.969	1.002	0.2606	
60 minute winter	5	1.004	6	9.4	0.780	0.222	0.5401	
60 minute winter	6	1.005	7	10.1	0.727	0.238	0.6584	
60 minute winter	7	1.006	8	11.7	0.791	0.275	0.3676	
60 minute winter	8	1.007	10	13.3	0.600	0.146	1.4213	
60 minute winter	9	3.000	14	-15.5	0.669	-0.133	0.1931	
60 minute winter	10	1.008	11	19.0	0.513	0.195	1.4982	
60 minute winter	11	1.009	14	20.6	0.292	0.209	0.4494	
60 minute winter	12	2.000	13	2.1	0.567	0.145	0.0660	
60 minute winter	13	2.001	10	4.2	0.814	0.187	0.3862	
60 minute winter	14	1.010	14_OUT	5.0	0.694	0.118	0.0505	37.6

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Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.16%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	12	88.156	0.456	7.0	0.1855	0.0000	SURCHARGED
15 minute winter	2	12	88.141	0.541	11.5	0.2204	0.0000	SURCHARGED
15 minute winter	3	12	88.114	0.554	16.3	0.2206	0.0000	SURCHARGED
15 minute winter	4	12	87.899	0.509	21.2	0.1856	0.0000	SURCHARGED
120 minute winter	5	114	87.711	0.533	11.2	0.1370	0.0000	SURCHARGED
120 minute winter	6	114	87.711	0.666	12.2	0.1944	0.0000	SURCHARGED
120 minute winter	7	114	87.710	0.775	14.3	0.2752	0.0000	SURCHARGED
120 minute winter	8	114	87.710	0.912	16.3	0.4195	0.0000	SURCHARGED
120 minute winter	9	116	87.709	0.941	22.7	41.6474	0.0000	SURCHARGED
120 minute winter	10	114	87.710	1.047	22.6	0.4135	0.0000	SURCHARGED
120 minute winter	11	116	87.710	1.210	24.6	0.4536	0.0000	SURCHARGED
120 minute winter	12	116	87.710	0.489	2.5	0.1703	0.0000	SURCHARGED
120 minute winter	13	116	87.710	0.540	4.7	0.2513	0.0000	SURCHARGED
120 minute winter	14	116	87.709	1.259	24.3	1.4244	0.0000	SURCHARGED
60 minute winter	14_OUT	20	86.455	0.052	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 winter	1	1.000	2	5.2	0.511	0.359	0.2496	
15 minute winter	2	1.001	3	10.1	0.666	0.693	0.0969	
15 minute winter	3	1.002	4	15.1	0.855	1.042	0.4489	
15 minute winter	4	1.003	5	20.2	1.146	1.335	0.2952	
120 minute winter	5	1.004	6	10.5	0.733	0.249	0.6742	
120 minute winter	6	1.005	7	12.0	0.661	0.283	0.6584	
120 minute winter	7	1.006	8	14.0	0.717	0.330	0.3676	
120 minute winter	8	1.007	10	16.0	0.557	0.177	1.4213	
120 minute winter	9	3.000	14	-19.9	0.620	-0.170	0.1931	
120 minute winter	10	1.008	11	22.3	0.490	0.230	1.4982	
120 minute winter	11	1.009	14	24.3	0.345	0.247	0.4494	
120 minute winter	12	2.000	13	2.2	0.558	0.150	0.0893	
120 minute winter	13	2.001	10	4.3	0.707	0.192	0.3928	
120 minute winter	14	1.010	14_OUT	5.0	0.694	0.118	0.0505	85.1

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