

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)	17.000	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)	5.00	Enforce best practice design rules	x

D AND CG Manhole Type

Max Width (mm)	Diameter (mm)	Max Width (mm)	Diameter (mm)	Max Width (mm)	Diameter (mm)
299	1200	599	1500	1199	2100
449	1350	899	1800	1800	2700

>1800 Link+900 mm

SW CIRCULAR Link Type

Shape	Circular	Auto Increment (mm)	75
Barrels	1	Follow Ground	x

Available Diameters (mm)

225	375	525	750	900	1200	1500
300	450	600	825	1050	1350	1800

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.099	5.00	45.245	1800	386307.537	396943.285	1.341
2	0.039	5.00	45.510	1800	386278.229	396976.911	1.719
3	0.122	5.00	45.258	1800	386289.289	396996.921	1.627
4	0.038	5.00	45.226	2400	386274.763	396995.269	2.082
5	0.000		45.645	2400	386235.364	396991.165	2.601
6	0.076	5.00	45.667	2400	386216.409	396985.060	2.673
7	0.079	5.00	45.198	2100	386261.638	396903.204	1.723
8	0.092	5.00	45.438	2100	386222.860	396946.458	2.260
9	0.019	5.00	45.620	2400	386199.992	396972.247	2.679
HB2	0.068	5.00	45.808	2700	386187.851	396986.724	2.915
CWC			45.782	3600	386174.081	397001.708	2.943

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	44.606	0.600	43.904	43.791	0.113	394.7	450	5.73	50.0
1.001	2	4	18.682	0.600	43.791	43.744	0.047	397.5	450	6.04	50.0
2.000	3	4	14.620	0.600	43.631	43.594	0.037	395.1	600	5.20	50.0
1.002	4	5	39.612	0.600	43.144	43.044	0.100	396.1	1050	6.42	50.0
1.003	5	6	19.914	0.600	43.044	42.994	0.050	398.3	1050	6.61	50.0
1.004	6	9	20.825	0.600	42.994	42.941	0.053	392.9	1050	6.81	50.0
3.000	7	8	58.092	0.600	43.475	43.328	0.147	395.2	750	5.69	50.0
3.001	8	9	34.468	0.600	43.178	43.091	0.087	396.2	900	6.06	50.0
1.005	9	HB2	18.894	0.600	42.941	42.893	0.048	393.6	1050	7.00	50.0
1.006	HB2	CWC	20.350	0.600	42.893	42.839	0.054	380.0	450	7.32	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	1.017	161.7	13.4	0.891	1.269	0.099	0.0	87	0.623
1.001	1.013	161.2	18.7	1.269	1.032	0.138	0.0	102	0.683
2.000	1.219	344.6	16.5	1.027	1.032	0.122	0.0	88	0.640
1.002	1.725	1493.7	40.4	1.032	1.551	0.298	0.0	116	0.773
1.003	1.720	1489.5	40.4	1.551	1.623	0.298	0.0	116	0.771
1.004	1.732	1499.8	50.7	1.623	1.629	0.374	0.0	129	0.829
3.000	1.401	619.0	10.7	0.973	1.360	0.079	0.0	67	0.545
3.001	1.568	997.3	23.2	1.360	1.629	0.171	0.0	93	0.670
1.005	1.731	1498.4	76.4	1.629	1.865	0.564	0.0	158	0.932
1.006	1.037	164.9	85.7	2.465	2.493	0.632	0.0	230	1.046

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	44.606	394.7	450	SW CIRCULAR	45.245	43.904	0.891	45.510	43.791	1.269
1.001	18.682	397.5	450	SW CIRCULAR	45.510	43.791	1.269	45.226	43.744	1.032
2.000	14.620	395.1	600	SW CIRCULAR	45.258	43.631	1.027	45.226	43.594	1.032
1.002	39.612	396.1	1050	SW CIRCULAR	45.226	43.144	1.032	45.645	43.044	1.551
1.003	19.914	398.3	1050	SW CIRCULAR	45.645	43.044	1.551	45.667	42.994	1.623
1.004	20.825	392.9	1050	SW CIRCULAR	45.667	42.994	1.623	45.620	42.941	1.629
3.000	58.092	395.2	750	SW CIRCULAR	45.198	43.475	0.973	45.438	43.328	1.360
3.001	34.468	396.2	900	SW CIRCULAR	45.438	43.178	1.360	45.620	43.091	1.629
1.005	18.894	393.6	1050	SW CIRCULAR	45.620	42.941	1.629	45.808	42.893	1.865
1.006	20.350	380.0	450	SW CIRCULAR	45.808	42.893	2.465	45.782	42.839	2.493

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	1800	Manhole	D AND CG	2	1800	Manhole	D AND CG
1.001	2	1800	Manhole	D AND CG	4	2400	Manhole	D AND CG
2.000	3	1800	Manhole	D AND CG	4	2400	Manhole	D AND CG
1.002	4	2400	Manhole	D AND CG	5	2400	Manhole	D AND CG
1.003	5	2400	Manhole	D AND CG	6	2400	Manhole	D AND CG
1.004	6	2400	Manhole	D AND CG	9	2400	Manhole	D AND CG
3.000	7	2100	Manhole	D AND CG	8	2100	Manhole	D AND CG
3.001	8	2100	Manhole	D AND CG	9	2400	Manhole	D AND CG
1.005	9	2400	Manhole	D AND CG	HB2	2700	Manhole	D AND CG
1.006	HB2	2700	Manhole	D AND CG	CWC	3600	Manhole	D AND CG

Simulation Settings

Rainfall Methodology	FSR	Drain Down Time (mins)	240
FSR Region	England and Wales	Additional Storage (m ³ /ha)	20.0
M5-60 (mm)	17.000	Check Discharge Rate(s)	✓
Ratio-R	0.400	2 year (l/s)	20.0
Summer CV	0.750	30 year (l/s)	20.0
Winter CV	0.840	100 year (l/s)	20.0
Analysis Speed	Detailed	Check Discharge Volume	x
Skip Steady State	✓		

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 %)
2	0	0	0
30	0	0	0
100	45	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		

Node HB2 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	42.893	Product Number	CTL-SHE-0177-2000-2500-2000
Design Depth (m)	2.500	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	20.0	Min Node Diameter (mm)	1800

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 15 minute summer	119.760	33.888	2 year 360 minute winter	9.436	3.735
2 year 15 minute winter	84.042	33.888	2 year 480 minute summer	11.436	3.022
2 year 30 minute summer	77.518	21.935	2 year 480 minute winter	7.598	3.022
2 year 30 minute winter	54.399	21.935	2 year 600 minute summer	9.363	2.561
2 year 60 minute summer	51.720	13.668	2 year 600 minute winter	6.398	2.561
2 year 60 minute winter	34.361	13.668	2 year 720 minute summer	8.339	2.235
2 year 120 minute summer	31.549	8.338	2 year 720 minute winter	5.605	2.235
2 year 120 minute winter	20.961	8.338	2 year 960 minute summer	6.846	1.803
2 year 180 minute summer	24.133	6.210	2 year 960 minute winter	4.535	1.803
2 year 180 minute winter	15.687	6.210	2 year 1440 minute summer	4.967	1.331
2 year 240 minute summer	19.039	5.032	2 year 1440 minute winter	3.338	1.331
2 year 240 minute winter	12.649	5.032	30 year 15 minute summer	226.195	64.005
2 year 360 minute summer	14.516	3.735	30 year 15 minute winter	158.733	64.005

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year 30 minute summer	147.452	41.724	100 year +45% CC 15 minute winter	296.885	119.712
30 year 30 minute winter	103.475	41.724	100 year +45% CC 30 minute summer	278.374	78.770
30 year 60 minute summer	98.615	26.061	100 year +45% CC 30 minute winter	195.350	78.770
30 year 60 minute winter	65.517	26.061	100 year +45% CC 60 minute summer	187.417	49.529
30 year 120 minute summer	59.946	15.842	100 year +45% CC 60 minute winter	124.515	49.529
30 year 120 minute winter	39.827	15.842	100 year +45% CC 120 minute summer	114.312	30.209
30 year 180 minute summer	45.598	11.734	100 year +45% CC 120 minute winter	75.946	30.209
30 year 180 minute winter	29.640	11.734	100 year +45% CC 180 minute summer	86.951	22.375
30 year 240 minute summer	35.759	9.450	100 year +45% CC 180 minute winter	56.520	22.375
30 year 240 minute winter	23.758	9.450	100 year +45% CC 240 minute summer	68.114	18.001
30 year 360 minute summer	26.939	6.932	100 year +45% CC 240 minute winter	45.253	18.001
30 year 360 minute winter	17.511	6.932	100 year +45% CC 360 minute summer	51.133	13.158
30 year 480 minute summer	20.981	5.545	100 year +45% CC 360 minute winter	33.238	13.158
30 year 480 minute winter	13.940	5.545	100 year +45% CC 480 minute summer	39.658	10.480
30 year 600 minute summer	17.039	4.661	100 year +45% CC 480 minute winter	26.348	10.480
30 year 600 minute winter	11.642	4.661	100 year +45% CC 600 minute summer	32.099	8.780
30 year 720 minute summer	15.093	4.045	100 year +45% CC 600 minute winter	21.932	8.780
30 year 720 minute winter	10.143	4.045	100 year +45% CC 720 minute summer	28.365	7.602
30 year 960 minute summer	12.278	3.233	100 year +45% CC 720 minute winter	19.063	7.602
30 year 960 minute winter	8.133	3.233	100 year +45% CC 960 minute summer	22.984	6.052
30 year 1440 minute summer	8.788	2.355	100 year +45% CC 960 minute winter	15.225	6.052
30 year 1440 minute winter	5.906	2.355	100 year +45% CC 1440 minute summer	16.353	4.383
100 year +45% CC 15 minute summer	423.061	119.712	100 year +45% CC 1440 minute winter	10.990	4.383

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.03%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	11	43.994	0.090	15.3	0.3623	0.0000	OK
15 minute winter	2	11	43.901	0.110	20.6	0.3302	0.0000	OK
15 minute winter	3	10	43.727	0.096	18.8	0.3899	0.0000	OK
30 minute winter	4	28	43.337	0.193	34.4	0.9421	0.0000	OK
30 minute winter	5	27	43.337	0.293	34.0	1.3262	0.0000	OK
30 minute winter	6	27	43.336	0.342	31.5	1.7425	0.0000	OK
15 minute winter	7	11	43.546	0.071	12.2	0.3095	0.0000	OK
30 minute winter	8	26	43.338	0.160	19.5	0.6848	0.0000	OK
30 minute winter	9	29	43.334	0.393	42.9	1.8354	0.0000	OK
30 minute winter	HB2	26	43.336	0.443	30.2	2.7454	0.0000	OK
15 minute summer	CWC	1	42.839	0.000	18.8	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	14.7	0.577	0.091	1.1719	
15 minute winter	2	1.001	4	20.1	0.737	0.125	0.5103	
15 minute winter	3	2.000	4	18.3	0.692	0.053	0.3890	
30 minute winter	4	1.002	5	34.0	0.663	0.023	5.9834	
30 minute winter	5	1.003	6	22.6	0.478	0.015	4.3860	
30 minute winter	6	1.004	9	21.5	0.397	0.014	5.6013	
15 minute winter	7	3.000	8	11.0	0.590	0.018	1.0923	
30 minute winter	8	3.001	9	19.3	0.626	0.019	3.6903	
30 minute winter	9	1.005	HB2	22.2	0.293	0.015	6.0574	
30 minute winter	HB2	Hydro-Brake®	CWC	19.2				58.1

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.03%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	44.030	0.126	28.8	0.5057	0.0000	OK
15 minute winter	2	11	43.946	0.155	39.4	0.4643	0.0000	OK
15 minute winter	3	10	43.764	0.133	35.5	0.5382	0.0000	OK
60 minute winter	4	49	43.605	0.461	44.2	2.2562	0.0000	OK
60 minute winter	5	50	43.606	0.562	34.8	2.5423	0.0000	OK
60 minute winter	6	48	43.605	0.611	33.6	3.1142	0.0000	OK
60 minute winter	7	52	43.612	0.137	11.8	0.5999	0.0000	OK
60 minute winter	8	49	43.606	0.428	25.8	1.8325	0.0000	OK
60 minute winter	9	51	43.606	0.665	39.1	3.1024	0.0000	OK
60 minute winter	HB2	51	43.606	0.713	28.7	4.4127	0.0000	SURCHARGED
15 minute summer	CWC	1	42.839	0.000	19.8	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	28.0	0.680	0.173	1.8685	
15 minute winter	2	1.001	4	38.9	0.884	0.241	0.8227	
15 minute winter	3	2.000	4	34.8	0.822	0.101	0.6207	
60 minute winter	4	1.002	5	34.8	0.565	0.023	16.5376	
60 minute winter	5	1.003	6	22.5	0.440	0.015	9.8717	
60 minute winter	6	1.004	9	22.5	0.389	0.015	11.4212	
60 minute winter	7	3.000	8	12.1	0.591	0.020	5.9053	
60 minute winter	8	3.001	9	19.5	0.569	0.020	11.5724	
60 minute winter	9	1.005	HB2	20.9	0.295	0.014	11.3340	
60 minute winter	HB2	Hydro-Brake®	CWC	20.0				138.3

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.03%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	1	114	44.596	0.692	17.4	2.7808	0.0000	SURCHARGED
120 minute winter	2	114	44.597	0.806	24.2	2.4173	0.0000	SURCHARGED
120 minute winter	3	114	44.600	0.969	21.4	3.9170	0.0000	SURCHARGED
120 minute winter	4	114	44.597	1.453	51.8	7.1042	0.0000	SURCHARGED
120 minute winter	5	114	44.594	1.550	41.3	7.0105	0.0000	SURCHARGED
120 minute winter	6	116	44.593	1.599	44.0	8.1449	0.0000	SURCHARGED
120 minute winter	7	116	44.603	1.128	20.6	4.9431	0.0000	SURCHARGED
120 minute winter	8	116	44.598	1.420	26.2	6.0758	0.0000	SURCHARGED
120 minute winter	9	116	44.595	1.654	37.7	7.7187	0.0000	SURCHARGED
120 minute winter	HB2	116	44.596	1.703	27.8	10.5428	0.0000	SURCHARGED
15 minute summer	CWC	1	42.839	0.000	20.0	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)
120 minute winter	1	1.000	2	17.4	0.586	0.108	7.0675	
120 minute winter	2	1.001	4	24.2	0.777	0.150	2.9600	
120 minute winter	3	2.000	4	21.3	0.722	0.062	4.1181	
120 minute winter	4	1.002	5	41.3	0.496	0.028	34.1708	
120 minute winter	5	1.003	6	31.0	0.449	0.021	17.1785	
120 minute winter	6	1.004	9	34.4	0.392	0.023	17.9644	
120 minute winter	7	3.000	8	11.9	0.553	0.019	25.5675	
120 minute winter	8	3.001	9	13.2	0.481	0.013	21.8449	
120 minute winter	9	1.005	HB2	18.7	0.277	0.012	16.2987	
120 minute winter	HB2	Hydro-Brake®	CWC	20.0				320.5