

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	3000	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	3000	Manhole	D AND CG
1.006	HB2	3000	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 (m³/ha)	20.0
M5-60 (mm)	17.000	Check Discharge Rate(s)	✓
Ratio-R	0.400	1 year (l/s)	6.8
Summer CV	0.750	30 year (l/s)	15.2
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 %)
1	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-0126-6800-0700-6800
Design Depth (m)	0.700	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	6.8	Min Node Diameter (mm)	1200

Node HB2 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	43.550	Product Number	CTL-SHE-0125-7800-1360-7800
Design Depth (m)	1.360	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	7.8	Min Node Diameter (mm)	1200

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	92.521	26.180	1 year 60 minute winter	26.839	10.676
1 year 15 minute winter	64.927	26.180	1 year 120 minute summer	24.980	6.602
1 year 30 minute summer	60.022	16.984	1 year 120 minute winter	16.596	6.602
1 year 30 minute winter	42.121	16.984	1 year 180 minute summer	19.271	4.959
1 year 60 minute summer	40.398	10.676	1 year 180 minute winter	12.527	4.959

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 240 minute summer	15.301	4.043	30 year 600 minute winter	11.642	4.661
1 year 240 minute winter	10.165	4.043	30 year 720 minute summer	15.093	4.045
1 year 360 minute summer	11.775	3.030	30 year 720 minute winter	10.143	4.045
1 year 360 minute winter	7.654	3.030	30 year 960 minute summer	12.278	3.233
1 year 480 minute summer	9.342	2.469	30 year 960 minute winter	8.133	3.233
1 year 480 minute winter	6.207	2.469	30 year 1440 minute summer	8.788	2.355
1 year 600 minute summer	7.682	2.101	30 year 1440 minute winter	5.906	2.355
1 year 600 minute winter	5.249	2.101	100 year +45% CC 15 minute summer	423.061	119.712
1 year 720 minute summer	6.859	1.838	100 year +45% CC 15 minute winter	296.885	119.712
1 year 720 minute winter	4.609	1.838	100 year +45% CC 30 minute summer	278.374	78.770
1 year 960 minute summer	5.653	1.489	100 year +45% CC 30 minute winter	195.350	78.770
1 year 960 minute winter	3.745	1.489	100 year +45% CC 60 minute summer	187.417	49.529
1 year 1440 minute summer	4.127	1.106	100 year +45% CC 60 minute winter	124.515	49.529
1 year 1440 minute winter	2.773	1.106	100 year +45% CC 120 minute summer	114.312	30.209
30 year 15 minute summer	226.195	64.005	100 year +45% CC 120 minute winter	75.946	30.209
30 year 15 minute winter	158.733	64.005	100 year +45% CC 180 minute summer	86.951	22.375
30 year 30 minute summer	147.452	41.724	100 year +45% CC 180 minute winter	56.520	22.375
30 year 30 minute winter	103.475	41.724	100 year +45% CC 240 minute summer	68.114	18.001
30 year 60 minute summer	98.615	26.061	100 year +45% CC 240 minute winter	45.253	18.001
30 year 60 minute winter	65.517	26.061	100 year +45% CC 360 minute summer	51.133	13.158
30 year 120 minute summer	59.946	15.842	100 year +45% CC 360 minute winter	33.238	13.158
30 year 120 minute winter	39.827	15.842	100 year +45% CC 480 minute summer	39.658	10.480
30 year 180 minute summer	45.598	11.734	100 year +45% CC 480 minute winter	26.348	10.480
30 year 180 minute winter	29.640	11.734	100 year +45% CC 600 minute summer	32.099	8.780
30 year 240 minute summer	35.759	9.450	100 year +45% CC 600 minute winter	21.932	8.780
30 year 240 minute winter	23.758	9.450	100 year +45% CC 720 minute summer	28.365	7.602
30 year 360 minute summer	26.939	6.932	100 year +45% CC 720 minute winter	19.063	7.602
30 year 360 minute winter	17.511	6.932	100 year +45% CC 960 minute summer	22.984	6.052
30 year 480 minute summer	20.981	5.545	100 year +45% CC 960 minute winter	15.225	6.052
30 year 480 minute winter	13.940	5.545	100 year +45% CC 1440 minute summer	16.353	4.383
30 year 600 minute summer	17.039	4.661	100 year +45% CC 1440 minute winter	10.990	4.383

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.18%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	11	43.983	0.079	11.8	0.3190	0.0000	OK
15 minute winter	2	11	43.887	0.096	15.8	0.2877	0.0000	OK
15 minute winter	3	10	43.716	0.085	14.5	0.3422	0.0000	OK
60 minute winter	4	55	43.352	0.208	18.0	1.0167	0.0000	OK
60 minute winter	5	59	43.352	0.308	17.7	1.3931	0.0000	OK
60 minute winter	6	59	43.351	0.357	15.1	1.8197	0.0000	OK
15 minute winter	7	11	43.537	0.062	9.4	0.2723	0.0000	OK
60 minute winter	8	56	43.352	0.174	10.2	0.7450	0.0000	OK
60 minute winter	9	61	43.351	0.410	19.5	1.9127	0.0000	OK
60 minute winter	HB2	56	43.351	0.458	12.0	3.4543	0.0000	SURCHARGED
15 minute summer	CWC	1	42.839	0.000	6.8	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	11.3	0.537	0.070	0.9687	
15 minute winter	2	1.001	4	15.3	0.685	0.095	0.4186	
15 minute winter	3	2.000	4	14.1	0.647	0.041	0.3205	
60 minute winter	4	1.002	5	17.7	0.528	0.012	6.5618	
60 minute winter	5	1.003	6	10.9	0.396	0.007	4.6746	
60 minute winter	6	1.004	9	10.3	0.338	0.007	5.9296	
15 minute winter	7	3.000	8	8.3	0.552	0.013	0.8761	
60 minute winter	8	3.001	9	10.1	0.512	0.010	4.0783	
60 minute winter	9	1.005	HB2	8.8	0.242	0.006	6.3590	
60 minute winter	HB2	Hydro-Brake®	CWC	6.8				56.6
60 minute winter	HB2	Hydro-Brake®	CWC	0.0				0.0

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.18%

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
120 minute winter	4	92	43.724	0.580	27.4	2.8375	0.0000	OK
120 minute winter	5	92	43.724	0.680	22.2	3.0743	0.0000	OK
120 minute winter	6	92	43.723	0.729	21.0	3.7132	0.0000	OK
120 minute winter	7	90	43.727	0.252	10.4	1.1026	0.0000	OK
120 minute winter	8	94	43.723	0.545	15.8	2.3317	0.0000	OK
120 minute winter	9	92	43.723	0.782	18.1	3.6485	0.0000	OK
120 minute winter	HB2	92	43.723	0.830	16.3	6.2533	0.0000	SURCHARGED
15 minute summer	CWC	1	42.839	0.000	6.8	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	
120 minute winter	4	1.002	5	22.2	0.430	0.015	21.3915	
120 minute winter	5	1.003	6	14.4	0.381	0.010	12.2511	
120 minute winter	6	1.004	9	15.2	0.335	0.010	13.8373	
120 minute winter	7	3.000	8	7.3	0.503	0.012	10.5610	
120 minute winter	8	3.001	9	9.8	0.455	0.010	15.1148	
120 minute winter	9	1.005	HB2	13.5	0.254	0.009	13.4243	
120 minute winter	HB2	Hydro-Brake®	CWC	7.4				137.4
120 minute winter	HB2	Hydro-Brake®	CWC	7.0				27.5

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.18%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	1	140	45.115	1.211	14.3	4.8680	0.0000	FLOOD RISK
180 minute winter	2	140	45.111	1.320	18.0	3.9564	0.0000	SURCHARGED
180 minute winter	3	140	45.108	1.477	15.9	5.9737	0.0000	FLOOD RISK
180 minute winter	4	140	45.109	1.965	36.3	9.6073	0.0000	FLOOD RISK
180 minute winter	5	140	45.110	2.066	28.4	9.3460	0.0000	SURCHARGED
180 minute winter	6	140	45.110	2.116	30.0	10.7782	0.0000	SURCHARGED
120 minute winter	7	100	45.109	1.634	20.8	7.1588	0.0000	FLOOD RISK
180 minute winter	8	140	45.110	1.932	18.5	8.2652	0.0000	SURCHARGED
180 minute winter	9	140	45.111	2.169	25.7	10.1229	0.0000	SURCHARGED
180 minute winter	HB2	140	45.111	2.218	26.4	16.7105	0.0000	SURCHARGED
15 minute summer	CWC	1	42.839	0.000	7.8	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)
180 minute winter	1	1.000	2	12.9	0.537	0.080	7.0675	
180 minute winter	2	1.001	4	17.7	0.714	0.110	2.9600	
180 minute winter	3	2.000	4	13.9	0.630	0.040	4.1181	
180 minute winter	4	1.002	5	28.4	0.453	0.019	34.1708	
180 minute winter	5	1.003	6	20.1	0.408	0.013	17.1785	
180 minute winter	6	1.004	9	23.2	0.358	0.015	17.9644	
120 minute winter	7	3.000	8	9.7	0.490	0.016	25.5675	
180 minute winter	8	3.001	9	11.9	0.453	0.012	21.8449	
180 minute winter	9	1.005	HB2	20.5	0.250	0.014	16.2987	
180 minute winter	HB2	Hydro-Brake®	CWC	11.7				197.2
180 minute winter	HB2	Hydro-Brake®	CWC	8.3				108.6