

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)	0.000
Ratio-R	0.300	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)	Depth (m)
✓ HW6	0.026	5.00	101.448	1500	2.188
✓ HW7	0.054	5.00	100.866	1500	1.825
✓ HW8	0.060	5.00	99.288	1500	2.107
✓ HW9	0.020	5.00	98.725	1500	1.902
✓ HW5	0.339	5.00	99.489	1500	1.761
✓ HW11			98.960	2100	2.375
✓ HW12			97.780	3000	2.100
✓ BASIN		5.00	97.500		1.650
✓ HW13			96.570	3000	2.203
✓ HW13a			96.050	1350	1.700

Links

Name	US Node	DS Node	Length (m)	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)
✓ 2.000	HW6	HW7	21.882	99.260	99.041	0.219	100.0	150	5.36
✓ 2.001	HW7	HW8	46.247	99.041	97.931	1.110	41.7	150	5.86
? 2.002	HW8	HW9	43.832	97.181	96.823	0.358	122.4	900	6.11
? 2.003	HW9	HW11	25.017	96.823	96.585	0.238	105.1	900	6.25
✓ 1.004	HW5	HW11	37.046	97.728	97.185	0.543	68.2	300	5.32
? 1.006	HW11	HW12	24.794	96.585	95.680	0.905	27.4	900	6.32
? 1.007	HW12	HW13	72.781	95.680	94.367	1.313	55.4	900	6.61
? 3.000	BASIN	HW13	29.378	95.850	94.367	1.483	19.8	450	5.11
? 1.008	HW13	HW13a	8.384	94.367	94.350	0.017	493.2	450	6.76

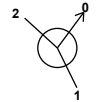
Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Minimum Depth (m)	Maximum Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
✓ 2.000	HW6	HW7	1.005	17.8	3.5	2.038	1.675	1.675	2.038	0.026	0.0
✓ 2.001	HW7	HW8	1.563	27.6	10.5	1.675	1.207	1.207	1.675	0.080	0.0
? 2.002	HW8	HW9	2.830	1800.5	18.0	1.207	1.002	1.002	1.207	0.140	0.0
? 2.003	HW9	HW11	3.056	1943.9	20.4	1.002	1.475	1.002	1.475	0.160	0.0
✓ 1.004	HW5	HW11	1.906	134.7	45.9	1.461	1.475	1.461	1.475	0.339	0.0
? 1.006	HW11	HW12	5.998	3815.5	63.4	1.475	1.200	1.200	1.475	0.499	0.0
? 1.007	HW12	HW13	4.213	2679.9	62.2	1.200	1.303	1.200	1.303	0.499	0.0
? 3.000	BASIN	HW13	4.583	728.9	0.0	1.200	1.753	1.200	1.753	0.000	0.0
? 1.008	HW13	HW13a	0.908	144.5	61.6	1.753	1.250	1.250	1.753	0.499	0.0

Pipeline Schedule

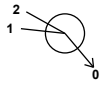
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
2.000	21.882	100.0	150	Circular	101.448	99.260	2.038	100.866	99.041	1.675
2.001	46.247	41.7	150	Circular	100.866	99.041	1.675	99.288	97.931	1.207
2.002	43.832	122.4	900	Circular	99.288	97.181	1.207	98.725	96.823	1.002
2.003	25.017	105.1	900	Circular	98.725	96.823	1.002	98.960	96.585	1.475
1.004	37.046	68.2	300	Circular	99.489	97.728	1.461	98.960	97.185	1.475
1.006	24.794	27.4	900	Circular	98.960	96.585	1.475	97.780	95.680	1.200
1.007	72.781	55.4	900	Circular	97.780	95.680	1.200	96.570	94.367	1.303
3.000	29.378	19.8	450	Circular	97.500	95.850	1.200	96.570	94.367	1.753
1.008	8.384	493.2	450	Circular	96.570	94.367	1.753	96.050	94.350	1.250

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
2.000	HW6	1500	Manhole	Adoptable	HW7	1500	Manhole	Adoptable
2.001	HW7	1500	Manhole	Adoptable	HW8	1500	Manhole	Adoptable
2.002	HW8	1500	Manhole	Adoptable	HW9	1500	Manhole	Adoptable
2.003	HW9	1500	Manhole	Adoptable	HW11	2100	Manhole	Adoptable
1.004	HW5	1500	Manhole	Adoptable	HW11	2100	Manhole	Adoptable
1.006	HW11	2100	Manhole	Adoptable	HW12	3000	Manhole	Adoptable
1.007	HW12	3000	Manhole	Adoptable	HW13	3000	Manhole	Adoptable
3.000	BASIN		Junction		HW13	3000	Manhole	Adoptable
1.008	HW13	3000	Manhole	Adoptable	HW13a	1350	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
HW6	417708.419	427809.184	101.448	2.188	1500				
						0	2.000	99.260	150
HW7	417727.552	427798.709	100.866	1.825	1500		1	2.000	99.041
						0	2.001	99.041	150
HW8	417768.119	427776.503	99.288	2.107	1500		1	2.001	97.931
						0	2.002	97.181	900
HW9	417806.384	427755.123	98.725	1.902	1500		1	2.002	96.823
						0	2.003	96.823	900
HW5	417848.845	427689.561	99.489	1.761	1500		0	1.004	97.728
						0	1.004	97.185	300
HW11	417824.871	427738.268	98.960	2.375	2100		1	2.003	96.585
						2	2.003	96.585	900
						0	1.006	96.585	900

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
HW12	417835.296	427752.328	97.780	2.100	3000		1 1.006	95.680	900
BASIN	417859.900	427725.471	97.500	1.650			0 1.007	95.680	900
HW13	417889.110	427722.332	96.570	2.203	3000		1 3.000 2 1.007	94.367 94.367	450 900
HW13a	417894.514	427715.922	96.050	1.700	1350		0 1.008 1 1.008	94.367 94.350	450 450

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Detailed
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	17.000	Drain Down Time (mins)	240
Ratio-R	0.300	Additional Storage (m³/ha)	0.0
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
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	0	0	0
100	30	0	0

Node HW13 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	94.367	Product Number	CTL-SHE-0140-1150-2000-1150
Design Depth (m)	2.000	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	11.5	Min Node Diameter (mm)	1500

Node HW11 Online Orifice Control

Flap Valve	x	Invert Level (m)	96.585	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Diameter (m)	0.095		

Node HW11 Online Weir Control

Flap Valve	x	Invert Level (m)	98.200	Discharge Coefficient	0.590
Replaces Downstream Link	✓	Width (m)	2.100		

Node BASIN Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	95.850
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	72

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	50.0	0.0	1.650	397.0	0.0

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 15 minute summer	109.066	30.862	30 year 360 minute summer	30.343	7.808
2 year 15 minute winter	76.538	30.862	30 year 360 minute winter	19.724	7.808
2 year 30 minute summer	73.782	20.878	30 year 480 minute summer	24.111	6.372
2 year 30 minute winter	51.777	20.878	30 year 480 minute winter	16.019	6.372
2 year 60 minute summer	51.720	13.668	30 year 600 minute summer	19.882	5.438
2 year 60 minute winter	34.361	13.668	30 year 600 minute winter	13.585	5.438
2 year 120 minute summer	33.252	8.787	30 year 720 minute summer	17.819	4.776
2 year 120 minute winter	22.092	8.787	30 year 720 minute winter	11.975	4.776
2 year 180 minute summer	26.258	6.757	30 year 960 minute summer	14.763	3.887
2 year 180 minute winter	17.069	6.757	30 year 960 minute winter	9.779	3.887
2 year 240 minute summer	21.199	5.602	30 year 1440 minute summer	10.836	2.904
2 year 240 minute winter	14.084	5.602	30 year 1440 minute winter	7.282	2.904
2 year 360 minute summer	16.686	4.294	100 year +30% CC 15 minute summer	342.507	96.918
2 year 360 minute winter	10.846	4.294	100 year +30% CC 15 minute winter	240.356	96.918
2 year 480 minute summer	13.415	3.545	100 year +30% CC 30 minute summer	236.880	67.029
2 year 480 minute winter	8.912	3.545	100 year +30% CC 30 minute winter	166.231	67.029
2 year 600 minute summer	11.170	3.055	100 year +30% CC 60 minute summer	168.029	44.405
2 year 600 minute winter	7.632	3.055	100 year +30% CC 60 minute winter	111.634	44.405
2 year 720 minute summer	10.095	2.706	100 year +30% CC 120 minute summer	107.796	28.487
2 year 720 minute winter	6.784	2.706	100 year +30% CC 120 minute winter	71.617	28.487
2 year 960 minute summer	8.482	2.233	100 year +30% CC 180 minute summer	84.153	21.655
2 year 960 minute winter	5.619	2.233	100 year +30% CC 180 minute winter	54.702	21.655
2 year 1440 minute summer	6.362	1.705	100 year +30% CC 240 minute summer	66.954	17.694
2 year 1440 minute winter	4.276	1.705	100 year +30% CC 240 minute winter	44.482	17.694
30 year 15 minute summer	205.071	58.028	100 year +30% CC 360 minute summer	51.234	13.184
30 year 15 minute winter	143.910	58.028	100 year +30% CC 360 minute winter	33.303	13.184
30 year 30 minute summer	140.191	39.669	100 year +30% CC 480 minute summer	40.503	10.704
30 year 30 minute winter	98.380	39.669	100 year +30% CC 480 minute winter	26.909	10.704
30 year 60 minute summer	98.615	26.061	100 year +30% CC 600 minute summer	33.258	9.097
30 year 60 minute winter	65.517	26.061	100 year +30% CC 600 minute winter	22.724	9.097
30 year 120 minute summer	63.038	16.659	100 year +30% CC 720 minute summer	29.698	7.960
30 year 120 minute winter	41.881	16.659	100 year +30% CC 720 minute winter	19.959	7.960
30 year 180 minute summer	49.285	12.683	100 year +30% CC 960 minute summer	24.455	6.440
30 year 180 minute winter	32.037	12.683	100 year +30% CC 960 minute winter	16.200	6.440
30 year 240 minute summer	39.344	10.398	100 year +30% CC 1440 minute summer	17.783	4.766
30 year 240 minute winter	26.139	10.398	100 year +30% CC 1440 minute winter	11.951	4.766

Results for 2 year Critical Storm Duration. Lowest mass balance: 98.46%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	HW6	10	99.306	0.046	3.7	0.0806	0.0000	OK
15 minute winter	HW7	11	99.107	0.066	11.2	0.1170	0.0000	OK
30 minute winter	HW8	25	97.341	0.160	15.6	0.2835	0.0000	OK
30 minute winter	HW9	26	97.335	0.512	28.3	0.9049	0.0000	OK
15 minute winter	HW5	10	97.855	0.127	47.6	0.2237	0.0000	OK
30 minute winter	HW11	26	97.334	0.749	38.0	2.5953	0.0000	OK
30 minute winter	HW12	26	95.729	0.049	15.8	0.3445	0.0000	OK
15 minute summer	BASIN	1	95.850	0.000	0.0	0.0000	0.0000	OK
120 minute winter	HW13	114	94.785	0.418	14.9	2.9522	0.0000	OK
15 minute summer	HW13a	1	94.350	0.000	10.3	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	HW6	2.000	HW7	3.6	0.604	0.202	0.1306	
15 minute winter	HW7	2.001	HW8	10.8	1.461	0.392	0.3432	
30 minute winter	HW8	2.002	HW9	16.6	0.657	0.009	9.6896	
30 minute winter	HW9	2.003	HW11	14.6	0.100	0.008	11.7152	
15 minute winter	HW5	1.004	HW11	46.7	1.706	0.347	1.0138	
30 minute winter	HW11	Orifice	HW12	15.8				
30 minute winter	HW11	Weir	HW12	0.0				
30 minute winter	HW12	1.007	HW13	15.8	0.959	0.006	8.7389	
15 minute summer	BASIN	3.000	HW13	0.0	0.000	0.000	1.3760	
120 minute winter	HW13	Hydro-Brake®	HW13a	11.3				73.5

Results for 30 year Critical Storm Duration. Lowest mass balance: 98.46%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	HW6	10	99.324	0.064	6.9	0.1132	0.0000	OK
15 minute winter	HW7	11	99.140	0.099	21.1	0.1741	0.0000	OK
60 minute winter	HW8	43	98.221	1.040	33.7	1.8374	0.0000	SURCHARGED
60 minute winter	HW9	43	98.221	1.398	37.1	2.4703	0.0000	SURCHARGED
60 minute winter	HW5	43	98.235	0.507	50.6	0.8966	0.0000	SURCHARGED
60 minute winter	HW11	43	98.221	1.636	50.6	5.6683	0.0000	SURCHARGED
180 minute winter	HW12	200	95.842	0.162	20.3	1.1450	0.0000	OK
15 minute summer	BASIN	1	95.850	0.000	0.0	0.0000	0.0000	OK
180 minute winter	HW13	200	95.841	1.474	20.4	10.4203	0.0000	SURCHARGED
15 minute summer	HW13a	1	94.350	0.000	11.4	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	HW6	2.000	HW7	6.8	0.699	0.382	0.2117	
15 minute winter	HW7	2.001	HW8	20.5	1.694	0.741	0.5588	
60 minute winter	HW8	2.002	HW9	21.3	0.584	0.012	27.7796	
60 minute winter	HW9	2.003	HW11	-31.2	0.103	-0.016	15.8551	
60 minute winter	HW5	1.004	HW11	50.6	1.668	0.376	2.6088	
60 minute winter	HW11	Orifice	HW12	23.8				
60 minute winter	HW11	Weir	HW12	12.3				
180 minute winter	HW12	1.007	HW13	20.4	0.721	0.008	25.8779	
15 minute summer	BASIN	3.000	HW13	0.0	0.000	0.000	2.3268	
180 minute winter	HW13	Hydro-Brake®	HW13a	11.5				159.5

Results for 100 year +30% CC Critical Storm Duration. Lowest mass balance: 98.46%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	HW6	12	99.493	0.233	11.5	0.4123	0.0000	SURCHARGED
15 minute winter	HW7	12	99.440	0.399	33.6	0.7053	0.0000	SURCHARGED
30 minute winter	HW8	19	98.310	1.129	60.9	1.9942	0.0000	SURCHARGED
30 minute summer	HW9	19	98.312	1.489	100.7	2.6316	0.0000	SURCHARGED
30 minute summer	HW5	19	98.887	1.159	134.8	2.0478	0.0000	SURCHARGED
30 minute summer	HW11	19	98.320	1.735	184.7	6.0112	0.0000	SURCHARGED
180 minute winter	HW12	212	96.379	0.699	62.9	4.9397	0.0000	OK
180 minute winter	BASIN	212	96.379	0.529	23.3	55.8598	0.0000	SURCHARGED
180 minute winter	HW13	212	96.379	2.012	62.9	14.2220	0.0000	FLOOD RISK
15 minute summer	HW13a	1	94.350	0.000	11.5	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	HW6	2.000	HW7	10.7	0.749	0.602	0.3852	
15 minute winter	HW7	2.001	HW8	28.7	1.705	1.040	0.8142	
30 minute winter	HW8	2.002	HW9	54.4	0.751	0.030	27.7796	
30 minute summer	HW9	2.003	HW11	-84.5	-0.133	-0.043	15.8551	
30 minute summer	HW5	1.004	HW11	125.0	1.963	0.928	2.6088	
30 minute summer	HW11	Orifice	HW12	24.5				
30 minute summer	HW11	Weir	HW12	162.5				
180 minute winter	HW12	1.007	HW13	62.9	0.798	0.023	42.2875	
180 minute winter	BASIN	3.000	HW13	-23.3	-0.206	-0.032	4.6548	
180 minute winter	HW13	Hydro-Brake®	HW13a	11.5				256.1