

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)	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	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
PS2	0.014	5.00	71.650	180	473467.431	171435.870	0.750
SW4a			71.650	450	473468.862	171437.396	1.400
SW4			71.547	1350	473475.256	171456.629	1.477
SW5	0.007	5.00	71.138	1050	473488.324	171455.286	1.038
SW6			71.361	1350	473487.371	171452.417	1.421
SW7	0.010	5.00	70.950	450	473500.302	171454.980	0.950
SW8	0.010	5.00	70.210	1350	473500.958	171447.908	1.670
SW9		5.00	69.450	1350	473510.797	171449.945	0.940
S2			69.516	1350	473509.218	171445.166	1.039
PS1	0.110	5.00	72.250	450	473454.454	171413.995	1.050
SW1	0.030	5.00	71.640	1350	473462.686	171419.210	1.140
SW2	0.045	5.00	71.068	1350	473489.719	171410.045	1.668
SW3	0.031	5.00	70.350	1350	473495.588	171427.438	1.900
Tank			69.660	600	473503.427	171427.389	1.305
SW10			69.700	1350	473502.597	171425.129	1.360
SW11			69.910	1350	473508.658	171416.844	1.640

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	PS2	SW4a	2.091	0.600	70.900	70.250	0.650	3.2	150	5.01	46.6
1.001	SW4a	SW4	20.269	0.600	70.250	70.070	0.180	112.6	150	5.36	45.3
1.002	SW4	SW6	12.826	0.600	70.070	69.940	0.130	98.7	150	5.57	44.5
2.000	SW5	SW6	3.022	0.600	70.100	69.940	0.160	18.9	150	5.02	46.6
1.003	SW6	SW8	14.316	0.600	69.940	68.690	1.250	11.5	150	5.65	44.2
3.000	SW7	SW8	7.103	0.600	70.000	68.690	1.310	5.4	150	5.03	46.6
1.004	SW8	S2	8.703	0.600	68.540	68.477	0.063	138.1	300	5.76	43.8
4.000	SW9	S2	5.032	0.600	68.510	68.477	0.033	152.5	300	5.07	46.4
1.005	S2	Tank	18.696	0.600	68.477	68.355	0.122	153.2	300	6.04	42.8
1.006	Tank	SW10	2.408	0.600	68.355	68.340	0.015	160.5	300	6.06	42.8
5.000	PS1	SW1	9.744	0.600	71.200	70.500	0.700	13.9	150	5.06	46.4
5.001	SW1	SW2	28.545	0.600	70.500	69.475	1.025	27.8	150	5.31	45.5
5.002	SW2	SW3	18.357	0.600	69.400	68.525	0.875	21.0	225	5.41	45.1
5.003	SW3	SW10	7.379	0.600	68.450	68.340	0.110	67.1	300	5.48	44.8

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.000	5.660	100.0	1.8	0.600	1.250	0.014	0.0
1.001	0.946	16.7	1.7	1.250	1.327	0.014	0.0
1.002	1.011	17.9	1.7	1.327	1.271	0.014	0.0
2.000	2.328	41.1	0.9	0.888	1.271	0.007	0.0
1.003	2.993	52.9	2.5	1.271	1.370	0.021	0.0
3.000	4.356	77.0	1.3	0.800	1.370	0.010	0.0
1.004	1.336	94.4	4.9	1.370	0.739	0.041	0.0
4.000	1.271	89.8	0.0	0.640	0.739	0.000	0.0
1.005	1.267	89.6	4.8	0.739	1.005	0.041	0.0
1.006	1.238	87.5	4.8	1.005	1.060	0.041	0.0
5.000	2.714	48.0	13.8	0.900	0.990	0.110	0.0
5.001	1.915	33.8	17.3	0.990	1.443	0.140	0.0
5.002	2.869	114.1	22.6	1.443	1.600	0.185	0.0
5.003	1.922	135.9	26.2	1.600	1.060	0.216	0.0

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)
1.007	SW10	SW11	10.266	0.600	68.340	68.270	0.070	146.7	225	6.20	42.3

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.007	1.077	42.8	29.5	1.135	1.415	0.257	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)
1.000	2.091	3.2	150	1 STANDARD	71.650	70.900	0.600	71.650	70.250	1.250
1.001	20.269	112.6	150	1 STANDARD	71.650	70.250	1.250	71.547	70.070	1.327
1.002	12.826	98.7	150	1 STANDARD	71.547	70.070	1.327	71.361	69.940	1.271
2.000	3.022	18.9	150	1 STANDARD	71.138	70.100	0.888	71.361	69.940	1.271
1.003	14.316	11.5	150	1 STANDARD	71.361	69.940	1.271	70.210	68.690	1.370
3.000	7.103	5.4	150	1 STANDARD	70.950	70.000	0.800	70.210	68.690	1.370
1.004	8.703	138.1	300	1 STANDARD	70.210	68.540	1.370	69.516	68.477	0.739
4.000	5.032	152.5	300	1 STANDARD	69.450	68.510	0.640	69.516	68.477	0.739
1.005	18.696	153.2	300	1 STANDARD	69.516	68.477	0.739	69.660	68.355	1.005

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	PS2	180	Manhole	1 STANDARD	SW4a	450	Manhole	1 STANDARD
1.001	SW4a	450	Manhole	1 STANDARD	SW4	1350	Manhole	1 STANDARD
1.002	SW4	1350	Manhole	1 STANDARD	SW6	1350	Manhole	1 STANDARD
2.000	SW5	1050	Manhole	1 STANDARD	SW6	1350	Manhole	1 STANDARD
1.003	SW6	1350	Manhole	1 STANDARD	SW8	1350	Manhole	1 STANDARD
3.000	SW7	450	Manhole	1 STANDARD	SW8	1350	Manhole	1 STANDARD
1.004	SW8	1350	Manhole	1 STANDARD	S2	1350	Manhole	1 STANDARD
4.000	SW9	1350	Manhole	1 STANDARD	S2	1350	Manhole	1 STANDARD
1.005	S2	1350	Manhole	1 STANDARD	Tank	600	Junction	

Pipeline Schedule

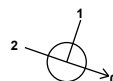
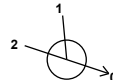
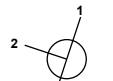
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.006	2.408	160.5	300	1 STANDARD	69.660	68.355	1.005	69.700	68.340	1.060
5.000	9.744	13.9	150	1 STANDARD	72.250	71.200	0.900	71.640	70.500	0.990
5.001	28.545	27.8	150	1 STANDARD	71.640	70.500	0.990	71.068	69.475	1.443
5.002	18.357	21.0	225	1 STANDARD	71.068	69.400	1.443	70.350	68.525	1.600
5.003	7.379	67.1	300	1 STANDARD	70.350	68.450	1.600	69.700	68.340	1.060
1.007	10.266	146.7	225	1 STANDARD	69.700	68.340	1.135	69.910	68.270	1.415

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.006	Tank	600	Junction		SW10	1350	Manhole	1 STANDARD
5.000	PS1	450	Manhole	1 STANDARD	SW1	1350	Manhole	1 STANDARD
5.001	SW1	1350	Manhole	1 STANDARD	SW2	1350	Manhole	1 STANDARD
5.002	SW2	1350	Manhole	1 STANDARD	SW3	1350	Manhole	1 STANDARD
5.003	SW3	1350	Manhole	1 STANDARD	SW10	1350	Manhole	1 STANDARD
1.007	SW10	1350	Manhole	1 STANDARD	SW11	1350	Manhole	1 STANDARD

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
PS2	473467.431	171435.870	71.650	0.750	180					
						0	1.000	70.900	150	
SW4a	473468.862	171437.396	71.650	1.400	450		1	1.000	70.250	150
						0	1.001	70.250	150	
SW4	473475.256	171456.629	71.547	1.477	1350		1	1.001	70.070	150
						0	1.002	70.070	150	

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
SW5	473488.324	171455.286	71.138	1.038	1050		0	2.000	70.100	150
SW6	473487.371	171452.417	71.361	1.421	1350		1	2.000	69.940	150
							2	1.002	69.940	150
							0	1.003	69.940	150
SW7	473500.302	171454.980	70.950	0.950	450		0	3.000	70.000	150
SW8	473500.958	171447.908	70.210	1.670	1350		1	3.000	68.690	150
							2	1.003	68.690	150
							0	1.004	68.540	300
SW9	473510.797	171449.945	69.450	0.940	1350		0	4.000	68.510	300
S2	473509.218	171445.166	69.516	1.039	1350		1	4.000	68.477	300
							2	1.004	68.477	300
							0	1.005	68.477	300
PS1	473454.454	171413.995	72.250	1.050	450		0	5.000	71.200	150
SW1	473462.686	171419.210	71.640	1.140	1350		1	5.000	70.500	150
							0	5.001	70.500	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
SW2	473489.719	171410.045	71.068	1.668	1350		1	5.001	69.475	150
							0	5.002	69.400	225
SW3	473495.588	171427.438	70.350	1.900	1350		1	5.002	68.525	225
							0	5.003	68.450	300
Tank	473503.427	171427.389	69.660	1.305	600		1	1.005	68.355	300
							0	1.006	68.355	300
SW10	473502.597	171425.129	69.700	1.360	1350		1	5.003	68.340	300
							2	1.006	68.340	300
							0	1.007	68.340	225
SW11	473508.658	171416.844	69.910	1.640	1350		1	1.007	68.270	225

Simulation Settings

Rainfall Methodology	FSR	Summer CV	0.750	Drain Down Time (mins)	240
FSR Region	England and Wales	Winter CV	0.840	Additional Storage (m³/ha)	20.0
M5-60 (mm)	17.000	Analysis Speed	Normal	Check Discharge Rate(s)	x
Ratio-R	0.400	Skip Steady State	x	Check Discharge Volume	x

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440 | 2160 | 2880 | 4320 | 5760 | 7200

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	40	0	0

Node SW10 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	68.340	Product Number	CTL-SHE-0106-5000-1000-5000
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node Tank Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	68.355
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	152

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	230.0	0.0	0.500	230.0	0.0	0.501	0.0	0.0

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.83%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	PS2	10	70.927	0.027	7.4	0.0109	0.0000	OK
15 minute winter	SW4a	10	70.319	0.069	7.4	0.0110	0.0000	OK
15 minute winter	SW4	11	70.137	0.067	7.3	0.0962	0.0000	OK
15 minute winter	SW5	10	70.130	0.030	3.7	0.0304	0.0000	OK
15 minute winter	SW6	11	69.986	0.046	10.8	0.0659	0.0000	OK
15 minute winter	SW7	10	70.027	0.027	5.3	0.0099	0.0000	OK
180 minute winter	SW8	172	68.784	0.244	7.8	0.3786	0.0000	OK
180 minute winter	SW9	172	68.784	0.274	1.9	0.3923	0.0000	OK
180 minute winter	S2	172	68.784	0.307	5.2	0.4395	0.0000	SURCHARGED
15 minute winter	PS1	11	72.250	1.050	57.8	2.3667	0.8399	FLOOD
15 minute winter	SW1	11	71.640	1.140	57.8	2.2321	1.2811	FLOOD
15 minute winter	SW2	10	69.526	0.126	69.8	0.2485	0.0000	OK
180 minute winter	SW3	176	68.785	0.335	27.2	0.5887	0.0000	SURCHARGED
180 minute winter	Tank	172	68.784	0.429	32.7	93.7499	0.0000	SURCHARGED
180 minute winter	SW10	176	68.785	0.445	30.4	0.6362	0.0000	SURCHARGED

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	PS2	1.000	SW4a	7.4	1.507	0.074	0.0106	
15 minute winter	SW4a	1.001	SW4	7.3	0.933	0.435	0.1579	
15 minute winter	SW4	1.002	SW6	7.2	1.180	0.402	0.0784	
15 minute winter	SW5	2.000	SW6	3.7	1.059	0.090	0.0107	
15 minute winter	SW6	1.003	SW8	10.8	2.357	0.204	0.0655	
15 minute winter	SW7	3.000	SW8	5.3	2.499	0.069	0.0150	
15 minute winter	SW8	1.004	S2	21.0	1.076	0.223	0.1718	
120 minute summer	SW9	4.000	S2	-5.2	-0.117	-0.058	0.2892	
15 minute winter	S2	1.005	Tank	21.0	1.196	0.234	0.8089	
15 minute summer	PS1	5.000	SW1	42.9	2.435	0.894	0.1715	
15 minute summer	SW1	5.001	SW2	46.9	2.664	1.386	0.5020	
15 minute winter	SW2	5.002	SW3	69.3	3.038	0.608	0.4192	
15 minute winter	SW3	5.003	SW10	85.1	1.992	0.626	0.3558	
15 minute winter	Tank	1.006	SW10	-79.9	-2.775	-0.914	0.1489	
30 minute summer	SW10	Hydro-Brake®	SW11	5.0				64.1

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.83%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW11	1	68.270	0.000	4.9	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)
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