

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	0.840	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)
SW09			41.700	1350	385197.017	397299.706	1.644
SW10			42.000	1200	385199.882	397305.703	1.008
CW02			41.210	1200	385177.875	397267.666	2.267
CW01			41.250	1200	385190.854	397292.906	1.256
SW01			41.300	1350	385192.458	397294.410	1.291
SW12	0.115	5.00	41.670	600	385215.997	397289.462	1.470
SW11	0.008	5.00	42.000	450	385205.134	397317.930	0.800
SW02			41.250	450	385193.491	397293.468	1.105
SW03			41.250	450	385192.000	397291.478	1.088
SW04			41.250	450	385183.308	397275.400	0.966
SW05	0.004	5.00	41.250	450	385184.820	397274.597	0.955
SW06	0.010	5.00	41.250	450	385191.287	397270.991	0.906
SW07			41.250	450	385195.279	397268.798	0.876
SW08	0.012	5.00	41.250	450	385200.631	397265.865	0.835

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)
1.008	CW01	CW02	28.383	0.600	39.994	38.943	1.051	27.0	225	6.08	42.7
1.007	SW01	CW01	2.200	0.600	40.009	39.994	0.015	150.0	225	5.89	43.4
2.001	SW09	SW01	6.988	0.600	40.056	40.009	0.047	150.0	375	5.34	45.4
1.006	SW02	SW01	1.398	0.600	40.145	40.136	0.009	150.0	150	5.85	43.5
1.005	SW03	SW02	2.487	0.600	40.162	40.145	0.017	150.0	150	5.83	43.6
1.004	SW04	SW03	18.277	0.600	40.284	40.162	0.122	150.0	150	5.78	43.8
1.003	SW05	SW04	1.712	0.600	40.295	40.284	0.011	150.0	150	5.40	45.1
1.002	SW06	SW05	7.404	0.600	40.344	40.295	0.049	150.0	150	5.37	45.2

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)
1.008	2.527	100.5	19.2	1.031	2.042	0.148	0.0	66	1.959
1.007	1.065	42.3	19.5	1.066	1.031	0.148	0.0	107	1.042
2.001	1.477	163.1	16.8	1.269	0.916	0.122	0.0	81	0.966
1.006	0.818	14.5	3.4	0.955	1.014	0.026	0.0	50	0.670
1.005	0.818	14.5	3.4	0.938	0.955	0.026	0.0	50	0.670
1.004	0.818	14.5	3.4	0.816	0.938	0.026	0.0	50	0.670
1.003	0.818	14.5	3.5	0.805	0.816	0.026	0.0	50	0.674
1.002	0.818	14.5	3.0	0.756	0.805	0.022	0.0	46	0.644

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)
1.001	SW07	SW06	4.555	0.600	40.374	40.344	0.030	150.0	150	5.22	45.8
1.000	SW08	SW07	6.103	0.600	40.415	40.374	0.041	150.0	150	5.12	46.2
2.000	SW12	SW09	21.578	0.600	40.200	40.056	0.144	150.0	375	5.24	45.7
3.001	SW10	SW09	6.655	0.600	40.992	40.948	0.044	150.0	300	5.26	45.7
3.000	SW11	SW10	13.307	0.600	41.200	41.067	0.133	100.0	225	5.17	46.0

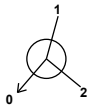
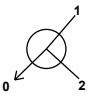
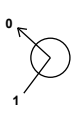
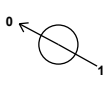
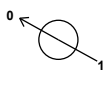
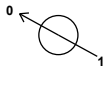
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.001	0.818	14.5	1.6	0.726	0.756	0.012	0.0	34	0.545
1.000	0.818	14.5	1.6	0.685	0.726	0.012	0.0	34	0.545
2.000	1.477	163.1	15.9	1.095	1.269	0.115	0.0	79	0.951
3.001	1.281	90.6	1.0	0.708	0.452	0.008	0.0	23	0.432
3.000	1.307	52.0	1.1	0.575	0.708	0.008	0.0	22	0.526

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)
1.008	28.383	27.0	225	Circular	41.250	39.994	1.031	41.210	38.943	2.042
1.007	2.200	150.0	225	Circular	41.300	40.009	1.066	41.250	39.994	1.031
2.001	6.988	150.0	375	Circular	41.700	40.056	1.269	41.300	40.009	0.916
1.006	1.398	150.0	150	Circular	41.250	40.145	0.955	41.300	40.136	1.014
1.005	2.487	150.0	150	Circular	41.250	40.162	0.938	41.250	40.145	0.955
1.004	18.277	150.0	150	Circular	41.250	40.284	0.816	41.250	40.162	0.938
1.003	1.712	150.0	150	Circular	41.250	40.295	0.805	41.250	40.284	0.816
1.002	7.404	150.0	150	Circular	41.250	40.344	0.756	41.250	40.295	0.805
1.001	4.555	150.0	150	Circular	41.250	40.374	0.726	41.250	40.344	0.756
1.000	6.103	150.0	150	Circular	41.250	40.415	0.685	41.250	40.374	0.726
2.000	21.578	150.0	375	Circular	41.670	40.200	1.095	41.700	40.056	1.269
3.001	6.655	150.0	300	Circular	42.000	40.992	0.708	41.700	40.948	0.452
3.000	13.307	100.0	225	Circular	42.000	41.200	0.575	42.000	41.067	0.708

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.008	CW01	1200	Manhole	Adoptable	CW02	1200	Manhole	Adoptable
1.007	SW01	1350	Manhole	Adoptable	CW01	1200	Manhole	Adoptable
2.001	SW09	1350	Manhole	Adoptable	SW01	1350	Manhole	Adoptable
1.006	SW02	450	Manhole	Adoptable	SW01	1350	Manhole	Adoptable
1.005	SW03	450	Manhole	Adoptable	SW02	450	Manhole	Adoptable
1.004	SW04	450	Manhole	Adoptable	SW03	450	Manhole	Adoptable
1.003	SW05	450	Manhole	Adoptable	SW04	450	Manhole	Adoptable
1.002	SW06	450	Manhole	Adoptable	SW05	450	Manhole	Adoptable
1.001	SW07	450	Manhole	Adoptable	SW06	450	Manhole	Adoptable
1.000	SW08	450	Manhole	Adoptable	SW07	450	Manhole	Adoptable
2.000	SW12	600	Manhole	Adoptable	SW09	1350	Manhole	Adoptable
3.001	SW10	1200	Manhole	Adoptable	SW09	1350	Manhole	Adoptable
3.000	SW11	450	Manhole	Adoptable	SW10	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
SW09	385197.017	397299.706	41.700	1.644	1350		1	3.001	40.948	300
						2	2.000	40.056	375	
						0	2.001	40.056	375	
SW10	385199.882	397305.703	42.000	1.008	1200		1	3.000	41.067	225
						0	3.001	40.992	300	
CW02	385177.875	397267.666	41.210	2.267	1200		1	1.008	38.943	225
CW01	385190.854	397292.906	41.250	1.256	1200		1	1.007	39.994	225
						0	1.008	39.994	225	
SW01	385192.458	397294.410	41.300	1.291	1350		1	2.001	40.009	375
						2	1.006	40.136	150	
						0	1.007	40.009	225	
SW12	385215.997	397289.462	41.670	1.470	600					
						0	2.000	40.200	375	
SW11	385205.134	397317.930	42.000	0.800	450		0	3.000	41.200	225
						0	1.005	40.145	150	
SW02	385193.491	397293.468	41.250	1.105	450		1	1.006	40.145	150
SW03	385192.000	397291.478	41.250	1.088	450		1	1.004	40.162	150
						0	1.005	40.162	150	
SW04	385183.308	397275.400	41.250	0.966	450		1	1.003	40.284	150
						0	1.004	40.284	150	
SW05	385184.820	397274.597	41.250	0.955	450		1	1.002	40.295	150
						0	1.003	40.295	150	
SW06	385191.287	397270.991	41.250	0.906	450		1	1.001	40.344	150
						0	1.002	40.344	150	
SW07	385195.279	397268.798	41.250	0.876	450		1	1.000	40.374	150
						0	1.001	40.374	150	

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
SW08	385200.631	397265.865	41.250	0.835	450		0	1.000	40.415	150

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	17.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m³/ha)	20.0
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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	45	0	0

Node SW01 Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	40.009	Product Number	CTL-SHE-0092-3500-0799-3500
Design Depth (m)	0.799	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	3.5	Min Node Diameter (mm)	1200

Node SW09 Online Orifice Control

Flap Valve	x	Design Depth (m)	1.800	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	0.5		
Invert Level (m)	40.056	Diameter (m)	0.025		

Node SW09 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	41.075
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	310.0	0.0	0.500	310.0	0.0	0.501	0.0	0.0

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.80%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	SW09	232	41.658	1.602	12.2	48.8848	0.0000	FLOOD RISK
240 minute winter	SW10	232	41.657	0.665	0.8	0.7526	0.0000	SURCHARGED
120 minute summer	CW02	58	38.972	0.029	3.5	0.0000	0.0000	OK
30 minute winter	CW01	69	40.023	0.029	3.5	0.0328	0.0000	OK
30 minute winter	SW01	27	40.781	0.772	5.3	1.1041	0.0000	SURCHARGED
240 minute winter	SW12	232	41.657	1.457	12.1	2.6871	0.0000	FLOOD RISK
240 minute winter	SW11	232	41.658	0.458	0.8	0.1592	0.0000	SURCHARGED
30 minute winter	SW02	27	40.781	0.636	5.4	0.1011	0.0000	SURCHARGED
30 minute winter	SW03	27	40.782	0.620	7.2	0.0985	0.0000	SURCHARGED
30 minute winter	SW04	27	40.786	0.502	8.1	0.0798	0.0000	SURCHARGED
30 minute winter	SW05	27	40.787	0.492	9.1	0.1200	0.0000	SURCHARGED
30 minute winter	SW06	27	40.788	0.444	8.2	0.1674	0.0000	SURCHARGED
30 minute winter	SW07	27	40.788	0.414	4.6	0.0659	0.0000	SURCHARGED
30 minute winter	SW08	27	40.789	0.374	5.0	0.1644	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
240 minute winter	SW09	Orifice	SW01	1.6				
240 minute winter	SW10	3.001	SW09	0.7	0.298	0.008	0.4686	
30 minute winter	CW01	1.008	CW02	3.5	1.183	0.035	0.0839	30.1
30 minute winter	SW01	Hydro-Brake®	CW01	3.5				
240 minute winter	SW12	2.000	SW09	11.9	0.309	0.073	2.3800	
240 minute winter	SW11	3.000	SW10	0.8	0.319	0.015	0.5292	
30 minute winter	SW02	1.006	SW01	4.2	0.607	0.288	0.0246	
30 minute winter	SW03	1.005	SW02	5.4	0.583	0.376	0.0438	
30 minute winter	SW04	1.004	SW03	7.2	0.658	0.501	0.3218	
30 minute winter	SW05	1.003	SW04	8.1	0.774	0.563	0.0301	
30 minute winter	SW06	1.002	SW05	7.5	0.660	0.518	0.1303	
30 minute winter	SW07	1.001	SW06	4.3	0.454	0.300	0.0802	
30 minute winter	SW08	1.000	SW07	4.6	0.606	0.318	0.1074	