Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	5	Maximum Rainfall (mm/hr)	75.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	18.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	0.900
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
RE 1	0.000	5.00	57.000		380742.698	387267.270	1.000
MH SW1	0.024	5.00	56.800	450	380724.340	387290.508	1.000
MH SW2	0.006	5.00	56.550	600	380701.450	387272.558	1.050
MH SW3	0.097	5.00	57.500	600	380722.563	387241.865	2.350
EX. SW MH18	0.090	5.00	57.500	1200	380729.036	387238.423	2.560
EX. TANK			57.500	450	380734.714	387235.453	3.030
NEW TANK		5.00	57.500	450	380726.047	387228.775	3.000
EX. SW MH19			57.440	1200	380736.943	387230.204	3.020
EX. CW MH01			57.640	1200	380754.997	387232.907	3.430

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	RE 1	MH SW1	29.615	0.600	56.000	55.800	0.200	148.1	100	5.78	75.0
1.001	MH SW1	MH SW2	29.089	0.600	55.800	55.500	0.300	97.0	150	6.26	74.3
1.002	MH SW2	MH SW3	37.253	0.600	55.500	55.150	0.350	106.4	225	6.75	71.7
1.003	MH SW3	EX. SW MH18	7.331	0.600	55.150	54.940	0.210	34.9	225	6.80	71.5
1.004	NEW TANK	EX. TANK	10.941	0.600	54.500	54.470	0.030	364.7	225	5.27	75.0
2.000	EX. SW MH18	EX. TANK	6.408	0.600	54.940	54.897	0.043	150.0	225	6.90	71.0
2.001	EX. TANK	EX. SW MH19	5.703	0.600	54.470	54.420	0.050	114.1	225	6.98	70.6
2.002	EX. SW MH19	EX. CW MH01	18.255	0.600	54.420	54.210	0.210	86.9	150	7.26	69.6

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	0.630	4.9	0.0	0.900	0.900	0.000	0.0	0	0.000
1.001	1.020	18.0	4.8	0.850	0.900	0.024	0.0	53	0.867
1.002	1.267	50.4	5.8	0.825	2.125	0.030	0.0	51	0.850
1.003	2.221	88.3	24.6	2.125	2.335	0.127	0.0	81	1.913
1.004	0.679	27.0	0.0	2.775	2.805	0.000	0.0	0	0.000
2.000	1.065	42.3	41.7	2.335	2.378	0.217	0.0	182	1.209
2.001	1.223	48.6	41.5	2.805	2.795	0.217	0.0	160	1.369
2.002	1.078	19.1	40.9	2.870	3.280	0.217	0.0	150	1.099

Flow+ v10.8 Copyright © 1988-2025 Causeway Technologies Ltd

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	29.615	148.1	100	Circular	57.000	56.000	0.900	56.800	55.800	0.900
1.001	29.089	97.0	150	Circular	56.800	55.800	0.850	56.550	55.500	0.900
1.002	37.253	106.4	225	Circular	56.550	55.500	0.825	57.500	55.150	2.125
1.003	7.331	34.9	225	Circular	57.500	55.150	2.125	57.500	54.940	2.335
1.004	10.941	364.7	225	Circular	57.500	54.500	2.775	57.500	54.470	2.805
2.000	6.408	150.0	225	Circular	57.500	54.940	2.335	57.500	54.897	2.378
2.001	5.703	114.1	225	Circular	57.500	54.470	2.805	57.440	54.420	2.795
2.002	18.255	86.9	150	Circular	57.440	54.420	2.870	57.640	54.210	3.280

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	RE 1		Junction		MH SW1	450	Manhole	Adoptable
1.001	MH SW1	450	Manhole	Adoptable	MH SW2	600	Manhole	Adoptable
1.002	MH SW2	600	Manhole	Adoptable	MH SW3	600	Manhole	Adoptable
1.003	MH SW3	600	Manhole	Adoptable	EX. SW MH18	1200	Manhole	Adoptable
1.004	NEW TANK	450	Manhole	Adoptable	EX. TANK	450	Manhole	Adoptable
2.000	EX. SW MH18	1200	Manhole	Adoptable	EX. TANK	450	Manhole	Adoptable
2.001	EX. TANK	450	Manhole	Adoptable	EX. SW MH19	1200	Manhole	Adoptable
2.002	EX. SW MH19	1200	Manhole	Adoptable	EX. CW MH01	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
RE 1	380742.698	387267.270	57.000	1.000					
						0	1.000	56.000	100
MH SW1	380724.340	387290.508	56.800	1.000	450	1	1.000	55.800	100
									
						0	1.001	55.800	150
MH SW2	380701.450	387272.558	56.550	1.050	600	1	1.001	55.500	150
									
						0	1.002	55.500	225
MH SW3	380722.563	387241.865	57.500	2.350	600	1	1.002	55.150	225
									
						0	1.003	55.150	225
EX. SW MH18	380729.036	387238.423	57.500	2.560	1200	1	1.003	54.940	225
									
						0	2.000	54.940	225
EX. TANK	380734.714	387235.453	57.500	3.030	450	1	2.000	54.897	225
						2	1.004	54.470	225
									
						0	2.001	54.470	225
NEW TANK	380726.047	387228.775	57.500	3.000	450				
						0	1.004	54.500	225

Flow+ v10.8 Copyright © 1988-2025 Causeway Technologies Ltd

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
EX. SW MH19	380736.943	387230.204	57.440	3.020	1200	 1	2.001	54.420	225
						0	2.002	54.420	150
EX. CW MH01	380754.997	387232.907	57.640	3.430	1200	1 	2.002	54.210	150

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	18.000	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 %)
5	0	0	0
30	0	0	0
100	45	0	0

Node EX. SW MH19 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	54.420	Product Number	CTL-SHE-0091-5000-2100-5000
Design Depth (m)	2.100	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node NEW TANK Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	54.500
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	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	50.0	0.0	0.800	50.0	0.0	0.801	0.0	0.0

Node EX. TANK Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	54.470
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	248

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	35.0	0.0	1.200	35.0	0.0	1.201	0.0	0.0

Flow+ v10.8 Copyright © 1988-2025 Causeway Technologies Ltd

Results for 5 year Critical Storm Duration. Lowest mass balance: 99.39%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	RE 1	1	56.000	0.000	0.0	0.0000	0.0000	OK
15 minute winter	MH SW1	10	55.855	0.055	5.1	0.0353	0.0000	OK
15 minute winter	MH SW2	11	55.553	0.053	6.3	0.0210	0.0000	OK
15 minute winter	MH SW3	10	55.234	0.084	26.5	0.0926	0.0000	OK
15 minute winter	EX. SW MH18	10	55.164	0.224	45.3	0.4107	0.0000	OK
60 minute winter	EX. TANK	58	54.762	0.292	23.0	9.7470	0.0000	SURCHARGED
60 minute winter	NEW TANK	57	54.762	0.262	15.0	12.4761	0.0000	SURCHARGED
60 minute winter	EX. SW MH19	58	54.761	0.341	4.0	0.3858	0.0000	SURCHARGED
60 minute winter	EX. CW MH01	58	54.256	0.046	4.0	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)
15 minute summer	RE 1	1.000	MH SW1	0.0	0.000	0.000	0.0638	
15 minute winter	MH SW1	1.001	MH SW2	5.0	0.880	0.275	0.1648	
15 minute winter	MH SW2	1.002	MH SW3	6.2	0.619	0.123	0.3790	
15 minute winter	MH SW3	1.003	EX. SW MH18	26.2	0.912	0.297	0.1948	
15 minute winter	EX. SW MH18	2.000	EX. TANK	44.4	1.191	1.049	0.2342	
60 minute winter	EX. TANK	2.001	EX. SW MH19	4.0	0.398	0.083	0.2268	
60 minute winter	NEW TANK	1.004	EX. TANK	-15.0	-0.619	-0.557	0.4351	
60 minute winter	EX. SW MH19	2.002	EX. CW MH01	4.0	0.842	0.208	0.0858	33.4

Flow+ v10.8 Copyright © 1988-2025 Causeway Technologies Ltd

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.39%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	RE 1	1	56.000	0.000	0.0	0.0000	0.0000	OK
15 minute winter	MH SW1	10	55.868	0.068	7.4	0.0436	0.0000	OK
15 minute winter	MH SW2	11	55.564	0.064	9.1	0.0254	0.0000	OK
15 minute winter	MH SW3	11	55.312	0.162	38.7	0.1795	0.0000	OK
15 minute winter	EX. SW MH18	11	55.271	0.331	63.7	0.6074	0.0000	SURCHARGED
120 minute winter	EX. TANK	102	54.956	0.486	21.2	16.2299	0.0000	SURCHARGED
120 minute winter	NEW TANK	102	54.956	0.456	10.0	21.7239	0.0000	SURCHARGED
120 minute winter	EX. SW MH19	102	54.955	0.535	4.2	0.6053	0.0000	SURCHARGED
60 minute summer	EX. CW MH01	44	54.257	0.047	4.0	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)
15 minute summer	RE 1	1.000	MH SW1	0.0	0.000	0.000	0.0820	
15 minute winter	MH SW1	1.001	MH SW2	7.2	0.977	0.401	0.2155	
15 minute winter	MH SW2	1.002	MH SW3	9.0	0.653	0.179	0.7425	
15 minute winter	MH SW3	1.003	EX. SW MH18	37.5	1.005	0.425	0.2579	
15 minute winter	EX. SW MH18	2.000	EX. TANK	63.8	1.606	1.507	0.2487	
120 minute winter	EX. TANK	2.001	EX. SW MH19	4.2	0.343	0.087	0.2268	
120 minute winter	NEW TANK	1.004	EX. TANK	-10.0	-0.369	-0.369	0.4351	
120 minute winter	EX. SW MH19	2.002	EX. CW MH01	4.0	0.845	0.211	0.0868	60.5

Flow+ v10.8 Copyright © 1988-2025 Causeway Technologies Ltd

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.39%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	RE 1	172	56.337	0.337	1.3	0.0000	0.0000	SURCHARGED
180 minute winter	MH SW1	172	56.337	0.537	3.3	0.3429	0.0000	SURCHARGED
180 minute winter	MH SW2	172	56.336	0.836	4.1	0.3319	0.0000	FLOOD RISK
180 minute winter	MH SW3	172	56.336	1.186	17.4	1.3145	0.0000	SURCHARGED
180 minute winter	EX. SW MH18	172	56.336	1.396	29.8	2.5601	0.0000	SURCHARGED
180 minute winter	EX. TANK	172	56.335	1.865	29.7	40.2132	0.0000	SURCHARGED
180 minute winter	NEW TANK	172	56.335	1.835	14.8	38.3155	0.0000	SURCHARGED
180 minute winter	EX. SW MH19	172	56.335	1.915	5.3	2.1654	0.0000	SURCHARGED
180 minute winter	EX. CW MH01	172	54.261	0.051	4.7	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	RE 1	1.000	MH SW1	-1.3	-0.194	-0.263	0.2317	
180 minute winter	MH SW1	1.001	MH SW2	3.3	0.776	0.183	0.5121	
180 minute winter	MH SW2	1.002	MH SW3	4.1	0.544	0.081	1.4816	
180 minute winter	MH SW3	1.003	EX. SW MH18	17.4	0.882	0.197	0.2916	
180 minute winter	EX. SW MH18	2.000	EX. TANK	29.7	1.087	0.701	0.2549	
180 minute winter	EX. TANK	2.001	EX. SW MH19	5.3	0.298	0.110	0.2268	
180 minute winter	NEW TANK	1.004	EX. TANK	-14.8	-0.373	-0.550	0.4351	
180 minute winter	EX. SW MH19	2.002	EX. CW MH01	4.7	0.883	0.248	0.0978	90.4

Flow+ v10.8 Copyright © 1988-2025 Causeway Technologies Ltd