

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	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S1	0.126	5.00	55.700	600	380813.984	387446.295	1.100
S6	0.037	5.00	55.570	600	380849.314	387464.080	0.889
S7	0.022	5.00	55.700	600	380869.352	387495.328	1.019
S8			55.690	600	380859.694	387480.264	1.122
S9	0.099	5.00	55.400	600	380843.196	387490.845	1.097
S10	0.100	5.00	55.600	1500	380869.361	387531.773	1.436
Tank			55.600		380878.483	387525.937	1.467
FCC			55.600	1500	380887.604	387520.101	1.498
S11			55.550	1200	380877.302	387504.013	1.639
SD2			55.720	1200	380875.298	387500.890	1.846

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	S1	S9	53.273	0.600	54.600	54.378	0.222	240.0	300	5.88	43.4
2.000	S6	S8	19.227	0.600	54.681	54.568	0.113	170.0	225	5.32	45.4
3.000	S7	S8	17.894	0.600	54.681	54.568	0.113	158.4	225	5.29	45.5
2.001	S8	S9	19.600	0.600	54.568	54.453	0.115	170.0	225	5.65	44.2
1.001	S9	S10	48.577	0.600	54.303	54.164	0.139	350.0	375	6.72	40.7
1.002	S10	Tank	10.829	0.600	54.164	54.133	0.031	350.0	375	6.91	40.2
1.003	Tank	FCC	10.828	0.600	54.133	54.102	0.031	350.0	375	7.10	39.6
1.004	FCC	S11	19.104	0.600	54.102	53.911	0.191	100.0	150	7.41	38.8
1.005	S11	SD2	3.711	0.600	53.911	53.874	0.037	100.0	150	7.47	38.6

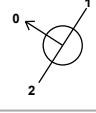
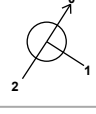
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.010	71.4	14.8	0.800	0.722	0.126	0.0	92	0.801
2.000	1.000	39.7	4.6	0.664	0.897	0.037	0.0	51	0.670
3.000	1.036	41.2	2.7	0.794	0.897	0.022	0.0	39	0.591
2.001	1.000	39.7	7.1	0.897	0.722	0.059	0.0	64	0.756
1.001	0.963	106.3	31.3	0.722	1.061	0.284	0.0	139	0.840
1.002	0.963	106.3	41.8	1.061	1.092	0.384	0.0	163	0.906
1.003	0.963	106.3	41.3	1.092	1.123	0.384	0.0	162	0.904
1.004	1.005	17.8	40.4	1.348	1.489	0.384	0.0	150	1.023
1.005	1.005	17.8	40.2	1.489	1.696	0.384	0.0	150	1.023

Pipeline Schedule

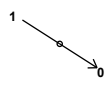
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	53.273	240.0	300	Circular	55.700	54.600	0.800	55.400	54.378	0.722
2.000	19.227	170.0	225	Circular	55.570	54.681	0.664	55.690	54.568	0.897
3.000	17.894	158.4	225	Circular	55.700	54.681	0.794	55.690	54.568	0.897
2.001	19.600	170.0	225	Circular	55.690	54.568	0.897	55.400	54.453	0.722
1.001	48.577	350.0	375	Circular	55.400	54.303	0.722	55.600	54.164	1.061
1.002	10.829	350.0	375	Circular	55.600	54.164	1.061	55.600	54.133	1.092
1.003	10.828	350.0	375	Circular	55.600	54.133	1.092	55.600	54.102	1.123
1.004	19.104	100.0	150	Circular	55.600	54.102	1.348	55.550	53.911	1.489
1.005	3.711	100.0	150	Circular	55.550	53.911	1.489	55.720	53.874	1.696

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S1	600	Manhole	Adoptable	S9	600	Manhole	Adoptable
2.000	S6	600	Manhole	Adoptable	S8	600	Manhole	Adoptable
3.000	S7	600	Manhole	Adoptable	S8	600	Manhole	Adoptable
2.001	S8	600	Manhole	Adoptable	S9	600	Manhole	Adoptable
1.001	S9	600	Manhole	Adoptable	S10	1500	Manhole	Adoptable
1.002	S10	1500	Manhole	Adoptable	Tank		Junction	
1.003	Tank		Junction		FCC	1500	Manhole	Adoptable
1.004	FCC	1500	Manhole	Adoptable	S11	1200	Manhole	Adoptable
1.005	S11	1200	Manhole	Adoptable	SD2	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1	380813.984	387446.295	55.700	1.100	600				
						0	1.000	54.600	300
S6	380849.314	387464.080	55.570	0.889	600				
						0	2.000	54.681	225
S7	380869.352	387495.328	55.700	1.019	600				
						0	3.000	54.681	225
S8	380859.694	387480.264	55.690	1.122	600		1	3.000	54.568
						2	2.000	54.568	225
						0	2.001	54.568	225
S9	380843.196	387490.845	55.400	1.097	600		1	2.001	54.453
						2	1.000	54.378	300
						0	1.001	54.303	375
S10	380869.361	387531.773	55.600	1.436	1500		1	1.001	54.164
						0	1.002	54.164	375

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
Tank	380878.483	387525.937	55.600	1.467			1	1.002	54.133	375
							0	1.003	54.133	375
FCC	380887.604	387520.101	55.600	1.498	1500		1	1.003	54.102	375
							0	1.004	54.102	150
S11	380877.302	387504.013	55.550	1.639	1200		1	1.004	53.911	150
							0	1.005	53.911	150
SD2	380875.298	387500.890	55.720	1.846	1200		1	1.005	53.874	150

Simulation Settings

Rainfall Methodology	FSR	Drain Down Time (mins)	240
FSR Region	England and Wales	Additional Storage (m³/ha)	0.0
M5-60 (mm)	17.000	Check Discharge Rate(s)	✓
Ratio-R	0.400	1 year (l/s)	99.5
Summer CV	0.750	30 year (l/s)	232.2
Winter CV	0.840	100 year (l/s)	292.6
Analysis Speed	Normal	Check Discharge Volume	✓
Skip Steady State	x	100 year 360 minute (m³)	321

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 %)
1	0	0	0
30	0	0	0
100	45	10	0

Pre-development Discharge Rate

Site Makeup	Brownfield	Time of Concentration (mins)	5.00
Brownfield Method	MRM	Betterment (%)	0
Contributing Area (ha)	0.590	Q 1 year (l/s)	99.5
PIMP (%)	100	Q 30 year (l/s)	232.2
CV	1.000	Q 100 year (l/s)	292.6

Pre-development Discharge Volume

Site Makeup	Brownfield	CV	1.000	Betterment (%)	0
Brownfield Method	MRM	Return Period (years)	100	PR	1.000
Contributing Area (ha)	0.590	Climate Change (%)	0	Runoff Volume (m³)	321
PIMP (%)	100	Storm Duration (mins)	360		

Node FCC Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	54.102	Product Number	CTL-SHE-0109-5000-0750-5000
Design Depth (m)	0.750	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node S11 Online Orifice Control

Flap Valve	✓	Invert Level (m)	53.911	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Diameter (m)	0.150		

Node Tank Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	54.133
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	235.0	0.0	0.800	235.0	0.0	0.801	0.0	0.0

Results for 1 year 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
15 minute winter	S1	11	54.692	0.092	15.0	0.0261	0.0000	OK
15 minute winter	S6	10	54.731	0.050	4.4	0.0141	0.0000	OK
15 minute winter	S7	10	54.719	0.038	2.6	0.0107	0.0000	OK
15 minute winter	S8	11	54.632	0.064	6.9	0.0182	0.0000	OK
15 minute winter	S9	11	54.445	0.142	32.3	0.0402	0.0000	OK
15 minute winter	S10	11	54.327	0.163	43.7	0.2885	0.0000	OK
120 minute winter	Tank	90	54.244	0.111	14.4	24.8109	0.0000	OK
120 minute winter	FCC	90	54.244	0.142	4.9	0.2503	0.0000	OK
120 minute winter	S11	90	53.993	0.082	4.8	0.0929	0.0000	OK
15 minute summer	SD2	1	53.874	0.000	3.8	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	S1	1.000	S9	14.4	0.797	0.202	0.9642	
15 minute winter	S6	2.000	S8	4.3	0.560	0.109	0.1510	
15 minute winter	S7	3.000	S8	2.6	0.394	0.062	0.1227	
15 minute winter	S8	2.001	S9	6.8	0.739	0.170	0.1795	
15 minute winter	S9	1.001	S10	32.5	0.772	0.306	2.0467	
15 minute winter	S10	1.002	Tank	43.2	1.910	0.406	0.2882	
120 minute winter	Tank	1.003	FCC	4.9	0.244	0.046	0.3539	
120 minute winter	FCC	Hydro-Brake®	S11	4.8				
120 minute winter	S11	Orifice	SD2	4.8				40.2

Results for 30 year 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
15 minute winter	S1	10	54.753	0.153	36.7	0.0433	0.0000	OK
15 minute winter	S6	10	54.761	0.080	10.8	0.0227	0.0000	OK
15 minute winter	S7	10	54.740	0.059	6.4	0.0167	0.0000	OK
15 minute winter	S8	11	54.674	0.106	17.0	0.0301	0.0000	OK
15 minute winter	S9	11	54.559	0.256	81.3	0.0724	0.0000	OK
120 minute winter	S10	118	54.448	0.284	35.3	0.5015	0.0000	OK
120 minute winter	Tank	118	54.448	0.315	34.4	70.2846	0.0000	OK
120 minute winter	FCC	118	54.448	0.346	5.5	0.6110	0.0000	SURCHARGED
30 minute summer	S11	56	53.995	0.084	5.0	0.0952	0.0000	OK
15 minute summer	SD2	1	53.874	0.000	5.0	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 winter	S1	1.000	S9	36.4	0.947	0.510	2.0981	
15 minute winter	S6	2.000	S8	10.7	0.696	0.269	0.2959	
15 minute winter	S7	3.000	S8	6.3	0.487	0.153	0.2376	
15 minute winter	S8	2.001	S9	16.7	0.924	0.421	0.3609	
15 minute winter	S9	1.001	S10	80.1	0.982	0.754	3.9963	
120 minute winter	S10	1.002	Tank	34.4	1.251	0.324	1.0196	
120 minute winter	Tank	1.003	FCC	5.5	0.241	0.052	1.1104	
120 minute winter	FCC	Hydro-Brake®	S11	5.0				
30 minute summer	S11	Orifice	SD2	5.0				55.5

Results for 100 year +45% CC +10% A 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
15 minute winter	S1	11	55.144	0.544	75.4	0.1540	0.0000	SURCHARGED
15 minute winter	S6	11	55.046	0.365	22.2	0.1033	0.0000	SURCHARGED
15 minute winter	S7	11	55.015	0.334	13.2	0.0945	0.0000	SURCHARGED
15 minute winter	S8	11	55.003	0.435	34.0	0.1232	0.0000	SURCHARGED
240 minute winter	S9	232	54.932	0.629	32.9	0.1781	0.0000	SURCHARGED
240 minute winter	S10	236	54.932	0.768	41.5	1.3575	0.0000	SURCHARGED
240 minute winter	Tank	236	54.932	0.799	40.7	178.4268	0.0000	SURCHARGED
240 minute winter	FCC	236	54.932	0.830	5.4	1.4668	0.0000	SURCHARGED
240 minute winter	S11	236	53.998	0.087	5.2	0.0981	0.0000	OK
15 minute summer	SD2	1	53.874	0.000	5.0	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 winter	S1	1.000	S9	71.9	1.021	1.007	3.7514	
15 minute winter	S6	2.000	S8	21.6	0.771	0.544	0.7647	
15 minute winter	S7	3.000	S8	12.6	0.551	0.307	0.7117	
15 minute winter	S8	2.001	S9	35.1	0.897	0.884	0.7795	
240 minute winter	S9	1.001	S10	29.9	0.584	0.281	5.3579	
240 minute winter	S10	1.002	Tank	40.7	1.228	0.383	1.1944	
240 minute winter	Tank	1.003	FCC	5.4	0.240	0.051	1.1943	
240 minute winter	FCC	Hydro-Brake®	S11	5.2				
240 minute winter	S11	Orifice	SD2	5.2				127.1