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)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	0.350
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
S1	0.001	4.00	28.850	450	0.450
S2	0.004	4.00	28.850	225	0.680
S3	0.003	4.00	28.850	225	0.450
S4	0.005	4.00	28.850	450	0.810
S5	0.016	4.00	28.400	225	0.800
S6	0.009	4.00	28.500	225	0.450
S7	0.003	4.00	28.500	225	0.610
S8	0.006	4.00	28.100	225	0.700
S9			27.900	1200	0.900
S10			27.800	1200	1.100

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	S2	13.800	0.600	28.400	28.170	0.230	60.0	100	4.23	50.0
1.001	S2	S4	7.900	0.600	28.170	28.040	0.130	60.8	100	4.36	50.0
2.000	S3	S4	17.200	0.600	28.400	28.040	0.360	47.8	100	4.26	50.0
1.002	S4	S5	22.400	0.600	28.040	27.650	0.390	57.4	100	4.73	50.0
1.003	S5	S8	15.400	0.600	27.600	27.400	0.200	77.0	150	4.95	50.0
3.000	S6	S7	9.200	0.600	28.050	27.890	0.160	57.5	100	4.15	50.0
3.001	S7	S8	16.500	0.600	27.890	27.450	0.440	37.5	100	4.37	50.0
1.004	S8	S9	9.200	0.600	27.400	27.000	0.400	23.0	150	5.03	50.0
1.005	S9	S10	17.800	0.600	27.000	26.700	0.300	59.3	150	5.25	50.0

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)
1.000	0.996	7.8	0.1	0.350	0.580	0.001	0.0	9	0.360
1.001	0.990	7.8	0.7	0.580	0.710	0.005	0.0	20	0.603
2.000	1.118	8.8	0.4	0.350	0.710	0.003	0.0	14	0.557
1.002	1.018	8.0	1.8	0.710	0.650	0.013	0.0	32	0.813
1.003	1.147	20.3	3.9	0.650	0.550	0.029	0.0	45	0.891
3.000	1.018	8.0	1.2	0.350	0.510	0.009	0.0	26	0.730
3.001	1.263	9.9	1.6	0.510	0.550	0.012	0.0	28	0.938
1.004	2.108	37.3	6.4	0.550	0.750	0.047	0.0	42	1.580
1.005	1.308	23.1	6.4	0.750	0.950	0.047	0.0	54	1.118

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	13.800	60.0	100	Circular	28.850	28.400	0.350	28.850	28.170	0.580
1.001	7.900	60.8	100	Circular	28.850	28.170	0.580	28.850	28.040	0.710
2.000	17.200	47.8	100	Circular	28.850	28.400	0.350	28.850	28.040	0.710
1.002	22.400	57.4	100	Circular	28.850	28.040	0.710	28.400	27.650	0.650
1.003	15.400	77.0	150	Circular	28.400	27.600	0.650	28.100	27.400	0.550
3.000	9.200	57.5	100	Circular	28.500	28.050	0.350	28.500	27.890	0.510
3.001	16.500	37.5	100	Circular	28.500	27.890	0.510	28.100	27.450	0.550
1.004	9.200	23.0	150	Circular	28.100	27.400	0.550	27.900	27.000	0.750
1.005	17.800	59.3	150	Circular	27.900	27.000	0.750	27.800	26.700	0.950

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S1	450	Manhole	Private	S2	225	Manhole	Private
1.001	S2	225	Manhole	Private	S4	450	Manhole	Private
2.000	S3	225	Manhole	Private	S4	450	Manhole	Private
1.002	S4	450	Manhole	Private	S5	225	Manhole	Private
1.003	S5	225	Manhole	Private	S8	225	Manhole	Private
3.000	S6	225	Manhole	Private	S7	225	Manhole	Private
3.001	S7	225	Manhole	Private	S8	225	Manhole	Private
1.004	S8	225	Manhole	Private	S9	1200	Manhole	Private
1.005	S9	1200	Manhole	Private	S10	1200	Manhole	Private

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1	28.850	0.450	450	0	1.000	28.400	100
S2	28.850	0.680	225	1	1.000	28.170	100
				0	1.001	28.170	100
S3	28.850	0.450	225	0	2.000	28.400	100
S4	28.850	0.810	450	1	2.000	28.040	100
				2	1.001	28.040	100
				0	1.002	28.040	100
S5	28.400	0.800	225	1	1.002	27.650	100
				0	1.003	27.600	150
S6	28.500	0.450	225	0	3.000	28.050	100

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S7	28.500	0.610	225	1	3.000	27.890	100
				0	3.001	27.890	100
S8	28.100	0.700	225	1	3.001	27.450	100
				2	1.003	27.400	150
				0	1.004	27.400	150
S9	27.900	0.900	1200	1	1.004	27.000	150
				0	1.005	27.000	150
S10	27.800	1.100	1200	1	1.005	26.700	150

Simulation Settings

Rainfall Methodology	FSR	Drain Down Time (mins)	240
FSR Region	England and Wales	Additional Storage (m³/ha)	20.0
M5-60 (mm)	17.000	Check Discharge Rate(s)	✓
Ratio-R	0.400	30 year (l/s)	4.2
Summer CV	0.750	100 year (l/s)	5.4
Winter CV	0.840	Check Discharge Volume	✓
Analysis Speed	Normal	100 year 360 minute (m³)	108
Skip Steady State	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 %)
30	0	0	0
100	40	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	1.99
Greenfield Method	IH124	Growth Factor 100 year	2.57
Positively Drained Area (ha)	0.450	Betterment (%)	0
SAAR (mm)	679	QBar	2.1
Soil Index	4	Q 30 year (l/s)	4.2
SPR	0.47	Q 100 year (l/s)	5.4
Region	4		

Pre-development Discharge Volume

Site Makeup	Greenfield	CWI	102.074
Greenfield Method	FSR/FEH	Return Period (years)	100
Positively Drained Area (ha)	0.450	Climate Change (%)	0
Soil Index	4	Storm Duration (mins)	360
SPR	0.47	Betterment (%)	0

Pre-development Discharge Volume

PR 0.442 | Runoff Volume (m^3) 108

Node S9 Online Head/Flow Control

Flap Valve x | Replaces Downstream Link ✓ | Invert Level (m) 27.000

Head (m)	Flow (l/s)
0.500	3.200

Node S9 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	27.100
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	29

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	10.0	0.0	0.400	45.0	0.0	0.800	100.0	0.0

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year 15 minute summer	226.195	64.005	100 year +40% CC 15 minute summer	408.473	115.584
30 year 15 minute winter	158.733	64.005	100 year +40% CC 15 minute winter	286.647	115.584
30 year 30 minute summer	147.452	41.724	100 year +40% CC 30 minute summer	268.775	76.054
30 year 30 minute winter	103.475	41.724	100 year +40% CC 30 minute winter	188.614	76.054
30 year 60 minute summer	98.615	26.061	100 year +40% CC 60 minute summer	180.954	47.821
30 year 60 minute winter	65.517	26.061	100 year +40% CC 60 minute winter	120.222	47.821
30 year 120 minute summer	59.946	15.842	100 year +40% CC 120 minute summer	110.370	29.168
30 year 120 minute winter	39.827	15.842	100 year +40% CC 120 minute winter	73.327	29.168
30 year 180 minute summer	45.598	11.734	100 year +40% CC 180 minute summer	83.953	21.604
30 year 180 minute winter	29.640	11.734	100 year +40% CC 180 minute winter	54.572	21.604
30 year 240 minute summer	35.759	9.450	100 year +40% CC 240 minute summer	65.765	17.380
30 year 240 minute winter	23.758	9.450	100 year +40% CC 240 minute winter	43.693	17.380
30 year 360 minute summer	26.939	6.932	100 year +40% CC 360 minute summer	49.370	12.705
30 year 360 minute winter	17.511	6.932	100 year +40% CC 360 minute winter	32.092	12.705
30 year 480 minute summer	20.981	5.545	100 year +40% CC 480 minute summer	38.291	10.119
30 year 480 minute winter	13.940	5.545	100 year +40% CC 480 minute winter	25.439	10.119
30 year 600 minute summer	17.039	4.661	100 year +40% CC 600 minute summer	30.992	8.477
30 year 600 minute winter	11.642	4.661	100 year +40% CC 600 minute winter	21.176	8.477
30 year 720 minute summer	15.093	4.045	100 year +40% CC 720 minute summer	27.387	7.340
30 year 720 minute winter	10.143	4.045	100 year +40% CC 720 minute winter	18.406	7.340
30 year 960 minute summer	12.278	3.233	100 year +40% CC 960 minute summer	22.191	5.844
30 year 960 minute winter	8.133	3.233	100 year +40% CC 960 minute winter	14.700	5.844
30 year 1440 minute summer	8.788	2.355	100 year +40% CC 1440 minute summer	15.789	4.232
30 year 1440 minute winter	5.906	2.355	100 year +40% CC 1440 minute winter	10.611	4.232

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.60%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	11	28.413	0.013	0.3	0.0027	0.0000	OK
15 minute winter	S2	10	28.200	0.030	1.5	0.0047	0.0000	OK
15 minute winter	S3	10	28.422	0.022	0.9	0.0037	0.0000	OK
15 minute winter	S4	10	28.090	0.050	3.9	0.0141	0.0000	OK
15 minute winter	S5	10	27.672	0.072	8.7	0.0318	0.0000	OK
15 minute summer	S6	10	28.092	0.042	2.8	0.0186	0.0000	OK
15 minute winter	S7	10	27.933	0.043	3.7	0.0060	0.0000	OK
15 minute winter	S8	10	27.464	0.064	14.2	0.0135	0.0000	OK
60 minute winter	S9	46	27.346	0.346	7.0	5.5024	0.0000	SURCHARGED
15 minute summer	S10	1	26.700	0.000	1.9	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	S2	0.3	0.247	0.038	0.0177	
15 minute winter	S2	1.001	S4	1.5	0.525	0.192	0.0231	
15 minute winter	S3	2.000	S4	0.9	0.365	0.102	0.0442	
15 minute winter	S4	1.002	S5	3.8	0.994	0.477	0.0859	
15 minute winter	S5	1.003	S8	8.7	1.114	0.428	0.1200	
15 minute summer	S6	3.000	S7	2.8	0.875	0.351	0.0295	
15 minute winter	S7	3.001	S8	3.7	1.152	0.372	0.0529	
15 minute winter	S8	1.004	S9	14.1	0.980	0.379	0.1140	
60 minute winter	S9	Head/Flow	S10	2.2				10.2

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.60%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	28.419	0.019	0.6	0.0038	0.0000	OK
15 minute winter	S2	10	28.211	0.041	2.8	0.0065	0.0000	OK
15 minute winter	S3	10	28.430	0.030	1.7	0.0052	0.0000	OK
15 minute winter	S4	10	28.117	0.077	7.3	0.0216	0.0000	OK
15 minute winter	S5	10	27.708	0.108	16.0	0.0475	0.0000	OK
15 minute winter	S6	10	28.111	0.061	5.0	0.0267	0.0000	OK
15 minute summer	S7	10	27.952	0.062	6.7	0.0085	0.0000	OK
15 minute winter	S8	11	27.563	0.163	26.0	0.0343	0.0000	SURCHARGED
60 minute winter	S9	48	27.500	0.500	12.8	11.5514	0.0000	SURCHARGED
15 minute summer	S10	1	26.700	0.000	2.7	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)
15 minute winter	S1	1.000	S2	0.6	0.301	0.076	0.0281	
15 minute winter	S2	1.001	S4	2.8	0.595	0.359	0.0375	
15 minute winter	S3	2.000	S4	1.7	0.417	0.193	0.0721	
15 minute winter	S4	1.002	S5	7.1	1.128	0.885	0.1407	
15 minute winter	S5	1.003	S8	15.9	1.141	0.783	0.2271	
15 minute winter	S6	3.000	S7	5.0	1.003	0.625	0.0458	
15 minute summer	S7	3.001	S8	6.8	1.295	0.684	0.0908	
15 minute winter	S8	1.004	S9	25.2	1.443	0.676	0.1620	
60 minute winter	S9	Head/Flow	S10	3.2				18.8