

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)	19.300	Minimum Backdrop Height (m)	0.200
Ratio-R	0.389	Preferred Cover Depth (m)	1.200
CV	1.000	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)
8	0.150	5.00	27.309	2700	341791.472	397626.544	2.211
9	0.041	5.00	28.098	2700	341796.228	397635.982	3.026
10	0.051	5.00	28.237	2700	341807.210	397630.448	3.196
11	0.121	5.00	27.972	2700	341831.782	397618.063	3.000
12	0.015	5.00	27.404	2700	341825.403	397605.169	2.468
13	0.080	5.00	26.925	2700	341819.388	397593.010	2.023
14	0.000		26.211	1800	341807.278	397568.531	1.446
15	0.000		26.231	1800	341798.000	397561.500	1.524

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	8	9	10.569	0.600	25.098	25.072	0.026	400.0	900	5.11	50.0
1.001	9	10	12.298	0.600	25.072	25.041	0.031	400.0	900	5.24	50.0
1.002	10	11	27.517	0.600	25.041	24.972	0.069	400.0	900	5.54	49.8
1.003	11	12	14.386	0.600	24.972	24.936	0.036	400.0	900	5.69	49.2
1.004	12	13	13.565	0.600	24.936	24.902	0.034	400.0	900	5.84	0.0
1.005	13	14	27.311	0.600	24.902	24.765	0.137	200.0	225	6.33	0.0
1.006	14	15	11.641	0.600	24.765	24.707	0.058	200.0	255	6.53	0.0

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	1.560	992.5	27.1	1.311	2.126	0.150	0.0	101	0.701
1.001	1.560	992.5	34.5	2.126	2.296	0.191	0.0	113	0.752
1.002	1.560	992.5	43.6	2.296	2.100	0.242	0.0	126	0.803
1.003	1.560	992.5	64.5	2.100	1.568	0.363	0.0	153	0.901
1.004	1.560	992.5	0.0	1.568	1.123	0.378	0.0	0	0.000
1.005	0.921	36.6	0.0	1.798	1.221	0.458	0.0	0	0.000
1.006	0.998	51.0	0.0	1.191	1.269	0.458	0.0	0	0.000

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	10.569	400.0	900	Circular_Default Sewer Type	27.309	25.098	1.311	28.098	25.072	2.126
1.001	12.298	400.0	900	Circular_Default Sewer Type	28.098	25.072	2.126	28.237	25.041	2.296
1.002	27.517	400.0	900	Circular_Default Sewer Type	28.237	25.041	2.296	27.972	24.972	2.100
1.003	14.386	400.0	900	Circular_Default Sewer Type	27.972	24.972	2.100	27.404	24.936	1.568
1.004	13.565	400.0	900	Circular_Default Sewer Type	27.404	24.936	1.568	26.925	24.902	1.123
1.005	27.311	200.0	225	Circular_Default Sewer Type	26.925	24.902	1.798	26.211	24.765	1.221
1.006	11.641	200.0	255	Circular_Default Sewer Type	26.211	24.765	1.191	26.231	24.707	1.269

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	8	2700	Manhole	Adoptable	9	2700	Manhole	Adoptable
1.001	9	2700	Manhole	Adoptable	10	2700	Manhole	Adoptable
1.002	10	2700	Manhole	Adoptable	11	2700	Manhole	Adoptable
1.003	11	2700	Manhole	Adoptable	12	2700	Manhole	Adoptable
1.004	12	2700	Manhole	Adoptable	13	2700	Manhole	Adoptable
1.005	13	2700	Manhole	Adoptable	14	1800	Manhole	Adoptable
1.006	14	1800	Manhole	Adoptable	15	1800	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
8	341791.472	397626.544	27.309	2.211	2700				
						0	1.000	25.098	900
9	341796.228	397635.982	28.098	3.026	2700		1	1.000	25.072
						0	1.001	25.072	900
10	341807.210	397630.448	28.237	3.196	2700		1	1.001	25.041
						0	1.002	25.041	900
11	341831.782	397618.063	27.972	3.000	2700		1	1.002	24.972
						0	1.003	24.972	900
12	341825.403	397605.169	27.404	2.468	2700		1	1.003	24.936
						0	1.004	24.936	900
13	341819.388	397593.010	26.925	2.023	2700		1	1.004	24.902
						0	1.005	24.902	225
14	341807.278	397568.531	26.211	1.446	1800		1	1.005	24.765
						0	1.006	24.765	255

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
15	341798.000	397561.500	26.231	1.524	1800		1	1.006	24.707 255

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	✓
Rainfall Events	Singular	Drain Down Time (mins)	240
FSR Region	England and Wales	Additional Storage (m³/ha)	20.0
M5-60 (mm)	19.300	Starting Level (m)	
Ratio-R	0.389	Check Discharge Rate(s)	✓
Summer CV	1.000	Check Discharge Volume	✓
Winter CV	1.000	100 year 360 minute (m³)	
Analysis Speed	Normal		

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	10	0
2	0	10	0
30	0	10	0
100	45	10	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	1.95
Greenfield Method	IH124	Growth Factor 100 year	2.48
Positively Drained Area (ha)		Betterment (%)	0
SAAR (mm)		QBar	
Soil Index	1	Q 1 year (l/s)	
SPR	0.10	Q 30 year (l/s)	
Region	1	Q 100 year (l/s)	
Growth Factor 1 year	0.85		

Pre-development Discharge Volume

Site Makeup	Greenfield	Return Period (years)	100
Greenfield Method	FSR/FEH	Climate Change (%)	0
Positively Drained Area (ha)		Storm Duration (mins)	360
Soil Index	1	Betterment (%)	0
SPR	0.10	PR	
CWI		Runoff Volume (m³)	

Node 13 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	24.856	Product Number	CTL-SHE-0184-2180-2500-2180
Design Depth (m)	2.500	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	21.8	Min Node Diameter (mm)	2100

Node 12 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	26.136
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.98	Time to half empty (mins)	38

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	30.0	30.0	0.400	30.0	37.8	0.401	0.0	37.8

Node 13 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	26.136
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.98	Time to half empty (mins)	38

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	22.0	22.0	0.400	22.0	28.7	0.401	0.0	28.7

Node 9 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	26.136
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	58

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	110.0	110.0	0.800	110.0	139.7	0.801	0.0	139.7

Results for 1 year +10% A Critical Storm Duration. Lowest mass balance: 99.20%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	8	24	25.345	0.247	25.3	1.7821	0.0000	OK
30 minute summer	9	24	25.344	0.272	27.1	1.6405	0.0000	OK
60 minute summer	10	41	25.344	0.303	20.9	1.8418	0.0000	OK
60 minute summer	11	41	25.344	0.372	28.1	2.4619	0.0000	OK
60 minute summer	12	41	25.344	0.408	20.3	2.3919	0.0000	OK
60 minute summer	13	41	25.344	0.442	23.0	2.9199	0.0000	SURCHARGED
60 minute summer	14	42	24.882	0.117	19.5	0.2973	0.0000	OK
60 minute summer	15	42	24.815	0.108	19.5	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)
30 minute summer	8	1.000	9	20.8	0.507	0.021	1.5994	
30 minute summer	9	1.001	10	20.6	0.515	0.021	2.1454	
60 minute summer	10	1.002	11	12.7	0.331	0.013	5.9845	
60 minute summer	11	1.003	12	18.4	0.398	0.019	3.7911	
60 minute summer	12	1.004	13	16.6	0.203	0.017	3.9976	
60 minute summer	13	1.005	14	19.5	0.916	0.532	0.5811	
60 minute summer	14	1.006	15	19.5	0.900	0.382	0.2523	61.8

Results for 2 year +10% A Critical Storm Duration. Lowest mass balance: 99.20%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	8	42	25.445	0.347	24.3	2.5068	0.0000	OK
60 minute summer	9	42	25.445	0.373	25.1	2.2488	0.0000	OK
60 minute summer	10	42	25.445	0.404	25.5	2.4565	0.0000	OK
60 minute summer	11	42	25.445	0.473	33.2	3.1276	0.0000	OK
60 minute summer	12	42	25.445	0.509	22.6	2.9816	0.0000	OK
60 minute summer	13	42	25.445	0.543	25.9	3.5838	0.0000	SURCHARGED
60 minute summer	14	43	24.886	0.121	20.6	0.3076	0.0000	OK
60 minute summer	15	43	24.819	0.112	20.6	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)
60 minute summer	8	1.000	9	18.5	0.427	0.019	2.5048	
60 minute summer	9	1.001	10	17.2	0.410	0.017	3.2243	
60 minute summer	10	1.002	11	13.8	0.352	0.014	8.4403	
60 minute summer	11	1.003	12	20.2	0.416	0.020	5.0865	
60 minute summer	12	1.004	13	17.5	0.215	0.018	5.2175	
60 minute summer	13	1.005	14	20.6	0.928	0.564	0.6074	
60 minute summer	14	1.006	15	20.6	0.912	0.405	0.2634	78.5

Results for 30 year +10% A Critical Storm Duration. Lowest mass balance: 99.20%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	8	48	26.148	1.050	46.2	7.5768	0.0000	SURCHARGED
60 minute summer	9	48	26.148	1.076	45.6	7.8220	0.0000	SURCHARGED
60 minute summer	10	48	26.147	1.106	42.9	6.7241	0.0000	SURCHARGED
60 minute summer	11	50	26.147	1.175	53.4	7.7722	0.0000	SURCHARGED
60 minute summer	12	47	26.147	1.211	30.1	7.4420	0.0000	SURCHARGED
60 minute summer	13	47	26.147	1.245	34.9	8.4734	0.0000	SURCHARGED
15 minute summer	14	21	24.890	0.125	21.8	0.3177	0.0000	OK
15 minute summer	15	21	24.822	0.115	21.8	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)
60 minute summer	8	1.000	9	33.0	0.398	0.033	6.6984	
60 minute summer	9	1.001	10	27.3	0.431	0.027	7.7942	
60 minute summer	10	1.002	11	16.3	0.414	0.016	17.4396	
60 minute summer	11	1.003	12	25.5	0.466	0.026	9.1175	
60 minute summer	12	1.004	13	21.9	0.228	0.022	8.5971	
60 minute summer	13	1.005	14	21.8	0.940	0.595	0.6329	
15 minute summer	14	1.006	15	21.8	0.924	0.427	0.2743	91.1

Results for 100 year +45% CC +10% A Critical Storm Duration. Lowest mass balance: 99.20%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	8	114	26.915	1.817	39.3	13.1181	0.0000	SURCHARGED
120 minute winter	9	114	26.915	1.843	64.2	96.8972	0.0000	SURCHARGED
120 minute winter	10	116	26.916	1.875	30.2	11.3917	0.0000	SURCHARGED
120 minute winter	11	114	26.915	1.943	39.1	12.8493	0.0000	SURCHARGED
120 minute winter	12	116	26.916	1.980	34.3	23.3915	0.0000	SURCHARGED
120 minute winter	13	116	26.915	2.013	45.2	21.9268	0.0000	FLOOD RISK
960 minute summer	14	600	24.890	0.125	21.8	0.3177	0.0000	OK
960 minute summer	15	600	24.822	0.115	21.8	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)
120 minute winter	8	1.000	9	35.6	0.404	0.036	6.6984	
120 minute winter	9	1.001	10	-25.8	0.446	-0.026	7.7942	
120 minute winter	10	1.002	11	-20.7	0.409	-0.021	17.4396	
120 minute winter	11	1.003	12	30.5	0.451	0.031	9.1175	
120 minute winter	12	1.004	13	24.7	0.217	0.025	8.5971	
120 minute winter	13	1.005	14	21.8	0.940	0.595	0.6329	
960 minute summer	14	1.006	15	21.8	0.924	0.427	0.2743	551.3