

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	45	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	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)	6.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.025	6.00	162.520	1200	1321.244	1374.296	1.616
6	0.012	6.00	162.597	1200	1339.390	1401.212	1.693
2	0.024	6.00	162.220	450	1317.976	1398.208	1.495
3	0.000		162.240	1200	1318.204	1401.210	1.537
4	0.011	6.00	162.120	450	1315.966	1405.541	1.453
5			162.040	450	1314.694	1408.399	1.685

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	1	2	24.134	0.600	160.904	160.725	0.179	135.0	150	6.47	50.0
2.000	6	2	21.624	0.600	160.904	160.725	0.179	120.8	150	6.39	50.0
1.001	2	3	3.011	0.600	160.725	160.703	0.022	135.0	150	6.52	50.0
1.002	3	4	4.875	0.600	160.703	160.667	0.036	135.0	150	6.62	50.0
1.003	4	5	3.128	0.600	160.667	160.355	0.312	10.0	150	6.63	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	0.863	15.2	4.9	1.466	1.345	0.025	0.0	58	0.769
2.000	0.913	16.1	2.4	1.543	1.345	0.012	0.0	39	0.655
1.001	0.863	15.2	12.0	1.345	1.387	0.061	0.0	100	0.954
1.002	0.863	15.2	12.0	1.387	1.303	0.061	0.0	100	0.954
1.003	3.200	56.6	14.1	1.303	1.535	0.072	0.0	51	2.675

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	24.134	135.0	150	Circular_Default Sewer Type	162.520	160.904	1.466	162.220	160.725	1.345
2.000	21.624	120.8	150	Circular_Default Sewer Type	162.597	160.904	1.543	162.220	160.725	1.345
1.001	3.011	135.0	150	Circular_Default Sewer Type	162.220	160.725	1.345	162.240	160.703	1.387
1.002	4.875	135.0	150	Circular_Default Sewer Type	162.240	160.703	1.387	162.120	160.667	1.303

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	1200	Manhole	Adoptable	2	450	Manhole	Adoptable
2.000	6	1200	Manhole	Adoptable	2	450	Manhole	Adoptable
1.001	2	450	Manhole	Adoptable	3	1200	Manhole	Adoptable
1.002	3	1200	Manhole	Adoptable	4	450	Manhole	Adoptable



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)
1.003	3.128	10.0	150	Circular_Default Sewer Type	162.120	160.667	1.303	162.040	160.355	1.535
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type		
1.003	4	450	Manhole	Adoptable	5	450	Manhole	Adoptable		

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
1	1321.244	1374.296	162.520	1.616	1200				
						0	1.000	160.904	150
6	1339.390	1401.212	162.597	1.693	1200				
						0	2.000	160.904	150
2	1317.976	1398.208	162.220	1.495	450		1	2.000	160.725
						2	1.000	160.725	150
						0	1.001	160.725	150
3	1318.204	1401.210	162.240	1.537	1200		1	1.001	160.703
						0	1.002	160.703	150
4	1315.966	1405.541	162.120	1.453	450		1	1.002	160.667
						0	1.003	160.667	150
5	1314.694	1408.399	162.040	1.685	450		1	1.003	160.355
									150

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	✓
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	20.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.400	Check Discharge Rate(s)	✓
Summer CV	0.750	Check Discharge Volume	✓
Winter CV	0.840	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	0	0
30	0	0	0
100	45	0	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 3 Online Orifice Control

Flap Valve	x	Design Depth (m)	1.000	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	2.0		
Invert Level (m)	160.703	Diameter (m)	0.031		

Node 1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	160.904
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	120

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	30.0	0.0	0.800	30.0	0.0	0.801	0.0	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 98.08%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	1	49	160.988	0.084	3.4	2.6308	0.0000	OK
60 minute winter	6	53	160.988	0.084	0.9	0.1064	0.0000	OK
60 minute winter	2	48	160.987	0.262	2.9	0.1259	0.0000	SURCHARGED
60 minute winter	3	48	160.987	0.284	1.5	0.3214	0.0000	SURCHARGED
15 minute winter	4	11	160.689	0.022	2.3	0.0068	0.0000	OK
15 minute winter	5	11	160.376	0.021	2.3	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 winter	1	1.000	2	-1.6	0.186	-0.107	0.3343	
60 minute winter	6	2.000	2	1.2	0.202	0.074	0.2994	
60 minute winter	2	1.001	3	1.5	0.346	0.097	0.0530	
60 minute winter	3	1.002	4	1.0	0.662	0.067	0.0083	
15 minute winter	4	1.003	5	2.3	1.504	0.040	0.0047	4.6

Results for 30 year Critical Storm Duration. Lowest mass balance: 98.08%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	1	98	161.214	0.310	4.9	9.7547	0.0000	SURCHARGED
120 minute winter	6	96	161.214	0.310	1.3	0.3947	0.0000	SURCHARGED
120 minute winter	2	96	161.214	0.489	3.7	0.2347	0.0000	SURCHARGED
120 minute winter	3	96	161.214	0.511	1.4	0.5775	0.0000	SURCHARGED
15 minute winter	4	11	160.699	0.032	4.7	0.0098	0.0000	OK
15 minute winter	5	11	160.384	0.029	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)
120 minute winter	1	1.000	2	-2.2	0.186	-0.146	0.4249	
120 minute winter	6	2.000	2	1.1	0.202	0.069	0.3807	
120 minute winter	2	1.001	3	1.4	0.341	0.093	0.0530	
120 minute winter	3	1.002	4	1.4	0.724	0.091	0.0102	
15 minute winter	4	1.003	5	4.7	1.821	0.082	0.0080	11.4

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 98.08%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	1	114	161.632	0.728	10.0	22.8787	0.0000	SURCHARGED
120 minute winter	6	114	161.631	0.727	2.5	0.9258	0.0000	SURCHARGED
120 minute winter	2	114	161.631	0.906	7.0	0.4350	0.0000	SURCHARGED
120 minute winter	3	114	161.631	0.928	2.0	1.0490	0.0000	SURCHARGED
15 minute winter	4	11	160.710	0.043	8.0	0.0133	0.0000	OK
15 minute winter	5	11	160.393	0.038	8.0	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)
120 minute winter	1	1.000	2	-4.8	-0.272	-0.314	0.4249	
120 minute winter	6	2.000	2	2.1	0.213	0.130	0.3807	
120 minute winter	2	1.001	3	2.0	0.362	0.129	0.0530	
120 minute winter	3	1.002	4	1.9	0.794	0.124	0.0132	
15 minute winter	4	1.003	5	8.0	2.085	0.141	0.0120	20.9