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)	19.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.350	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	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)
1	0.030	4.00	183.614	1200	407349.488	413377.270	1.580
2	0.245	4.00	182.772	1200	407339.764	413374.910	1.572
3	0.091	4.00	180.961	1500	407300.799	413365.454	4.461
4	0.120	4.00	181.501	1500	407267.559	413342.821	5.344
5	0.044	4.00	181.971	1800	407224.961	413335.741	6.102
6	0.112	4.00	181.743	1800	407218.407	413338.899	8.523
7	0.000	4.00	181.342	2400	407217.459	413344.824	8.212
8			179.000	1800	407204.981	413342.590	6.000

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	10.006	0.600	182.034	181.275	0.759	13.2	225	4.05	50.0
1.001	2	3	40.096	0.600	181.200	177.859	3.341	12.0	300	4.19	50.0
1.002	3	4	40.214	0.600	176.500	176.232	0.268	150.0	375	4.65	50.0
1.003	4	5	43.182	0.600	176.157	175.869	0.288	150.0	450	5.08	50.0
1.004	5	6	7.275	0.600	175.869	175.820	0.049	150.0	450	5.15	50.0
1.005	6	7	6.000	0.600	173.220	173.180	0.040	150.0	450	5.21	50.0
1.006	7	8	12.676	0.600	173.130	173.000	0.130	97.5	225	5.37	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	3.623	144.0	4.1	1.355	1.272	0.030	0.0	26	1.612
1.001	4.562	322.5	37.3	1.272	2.802	0.275	0.0	68	3.076
1.002	1.477	163.1	49.6	4.086	4.894	0.366	0.0	142	1.303
1.003	1.657	263.6	65.9	4.894	5.652	0.486	0.0	152	1.386
1.004	1.657	263.6	71.8	5.652	5.473	0.530	0.0	160	1.418
1.005	1.657	263.6	87.0	8.073	7.712	0.642	0.0	177	1.492
1.006	1.324	52.6	87.0	7.987	5.775	0.642	0.0	225	1.348

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	10.006	13.2	225	Circular	183.614	182.034	1.355	182.772	181.275	1.272
1.001	40.096	12.0	300	Circular	182.772	181.200	1.272	180.961	177.859	2.802
1.002	40.214	150.0	375	Circular	180.961	176.500	4.086	181.501	176.232	4.894
1.003	43.182	150.0	450	Circular	181.501	176.157	4.894	181.971	175.869	5.652
1.004	7.275	150.0	450	Circular	181.971	175.869	5.652	181.743	175.820	5.473
1.005	6.000	150.0	450	Circular	181.743	173.220	8.073	181.342	173.180	7.712
1.006	12.676	97.5	225	Circular	181.342	173.130	7.987	179.000	173.000	5.775

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	1200	Manhole	Adoptable	2	1200	Manhole	Adoptable
1.001	2	1200	Manhole	Adoptable	3	1500	Manhole	Adoptable
1.002	3	1500	Manhole	Adoptable	4	1500	Manhole	Adoptable
1.003	4	1500	Manhole	Adoptable	5	1800	Manhole	Adoptable
1.004	5	1800	Manhole	Adoptable	6	1800	Manhole	Adoptable
1.005	6	1800	Manhole	Adoptable	7	2400	Manhole	Adoptable
1.006	7	2400	Manhole	Adoptable	8	1800	Manhole	Adoptable

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	✓
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	19.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.350	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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	0	0	0
100	30	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 (m^3)	

Node 7 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	173.130	Product Number	CTL-SHE-0100-6600-2500-6600
Design Depth (m)	2.500	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	6.6	Min Node Diameter (mm)	1200

Node 6 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	173.300
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

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	150.0	0.0	2.200	150.0	0.0	2.210	0.0	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.37%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	182.061	0.027	4.1	0.0404	0.0000	OK
15 minute winter	2	10	181.270	0.070	37.2	0.2969	0.0000	OK
15 minute summer	3	10	176.646	0.146	49.5	0.3176	0.0000	OK
15 minute summer	4	10	176.314	0.157	65.5	0.3477	0.0000	OK
15 minute winter	5	10	176.047	0.178	71.2	0.4783	0.0000	OK
120 minute winter	6	114	173.609	0.389	28.8	47.4792	0.0000	OK
120 minute winter	7	114	173.609	0.479	7.9	2.1657	0.0000	SURCHARGED
15 minute summer	8	1	173.000	0.000	5.1	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	1	1.000	2	4.1	1.576	0.028	0.0260	
15 minute winter	2	1.001	3	37.2	3.038	0.115	0.4909	
15 minute summer	3	1.002	4	49.3	1.282	0.302	1.5454	
15 minute summer	4	1.003	5	65.1	1.217	0.247	2.3127	
15 minute winter	5	1.004	6	69.9	1.314	0.265	0.3874	
120 minute winter	6	1.005	7	7.9	0.548	0.030	0.9040	
120 minute winter	7	Hydro-Brake®	8	5.1				82.9

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.37%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	182.076	0.042	9.9	0.0628	0.0000	OK
15 minute winter	2	10	181.313	0.113	91.0	0.4779	0.0000	OK
15 minute winter	3	10	176.755	0.255	121.2	0.5546	0.0000	OK
15 minute winter	4	10	176.431	0.274	161.0	0.6073	0.0000	OK
15 minute winter	5	10	176.176	0.307	175.5	0.8265	0.0000	OK
240 minute winter	6	236	174.377	1.157	41.1	164.8809	0.0000	SURCHARGED
240 minute winter	7	232	174.382	1.252	13.3	5.6652	0.0000	SURCHARGED
15 minute summer	8	1	173.000	0.000	5.1	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	1	1.000	2	9.9	2.028	0.069	0.0488	
15 minute winter	2	1.001	3	91.1	3.879	0.282	0.9419	
15 minute winter	3	1.002	4	121.3	1.587	0.744	3.0730	
15 minute winter	4	1.003	5	160.9	1.486	0.610	4.6731	
15 minute winter	5	1.004	6	172.9	1.646	0.656	0.7633	
240 minute winter	6	1.005	7	13.3	0.581	0.051	0.9507	
240 minute winter	7	Hydro-Brake®	8	5.1				128.0

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.37%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	9	182.080	0.046	12.9	0.0695	0.0000	OK
15 minute winter	2	10	181.330	0.130	117.9	0.5536	0.0000	OK
15 minute winter	3	10	176.819	0.319	156.9	0.6936	0.0000	OK
15 minute winter	4	10	176.488	0.331	207.4	0.7331	0.0000	OK
15 minute winter	5	10	176.238	0.369	225.5	0.9924	0.0000	OK
240 minute winter	6	236	174.805	1.585	53.8	230.2534	0.0000	SURCHARGED
240 minute winter	7	236	174.805	1.675	12.8	7.5793	0.0000	SURCHARGED
15 minute summer	8	1	173.000	0.000	5.1	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	1	1.000	2	12.9	2.032	0.090	0.0666	
15 minute winter	2	1.001	3	117.9	4.142	0.366	1.1415	
15 minute winter	3	1.002	4	156.0	1.658	0.956	3.8189	
15 minute winter	4	1.003	5	206.6	1.562	0.784	5.7011	
15 minute winter	5	1.004	6	221.7	1.742	0.841	0.9245	
240 minute winter	6	1.005	7	12.8	0.548	0.049	0.9507	
240 minute winter	7	Hydro-Brake®	8	5.5				142.2

Results for 100 year +30% CC Critical Storm Duration. Lowest mass balance: 99.37%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	182.086	0.052	16.7	0.0779	0.0000	OK
15 minute winter	2	10	181.353	0.152	153.1	0.6477	0.0000	OK
15 minute winter	3	10	177.209	0.709	203.9	1.5430	0.0000	SURCHARGED
15 minute winter	4	10	176.711	0.554	262.8	1.2282	0.0000	SURCHARGED
15 minute winter	5	10	176.356	0.487	283.2	1.3094	0.0000	SURCHARGED
360 minute winter	6	352	175.379	2.159	51.7	317.9992	0.0000	SURCHARGED
360 minute winter	7	352	175.383	2.253	13.1	10.1903	0.0000	SURCHARGED
15 minute summer	8	1	173.000	0.000	5.1	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	1	1.000	2	16.7	2.027	0.116	0.0947	
15 minute winter	2	1.001	3	153.2	4.413	0.475	1.3921	
15 minute winter	3	1.002	4	196.1	1.778	1.202	4.4355	
15 minute winter	4	1.003	5	258.7	1.633	0.981	6.8419	
15 minute winter	5	1.004	6	281.3	1.806	1.067	1.0850	
360 minute winter	6	1.005	7	13.1	0.600	0.050	0.9507	
360 minute winter	7	Hydro-Brake®	8	6.3				196.7