



Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	10	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)	20.000	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	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.071	4.00	9.000	1350	493782.406	104143.299	1.300
2	0.071	4.00	8.370	1350	493778.821	104214.168	0.970
3			8.250	1200	493786.449	104212.110	0.900

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	70.960	0.600	7.700	7.400	0.300	236.5	450	4.90	50.0
1.001	2	3	7.901	0.600	7.400	7.350	0.050	158.0	150	5.06	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)
1.000	1.317	209.5	9.6	0.850	0.520	0.071	0.0
1.001	0.797	14.1	19.2	0.820	0.750	0.142	0.0

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	70.960	236.5	450	Circular_Default Sewer Type	9.000	7.700	0.850	8.370	7.400	0.520
1.001	7.901	158.0	150	Circular_Default Sewer Type	8.370	7.400	0.820	8.250	7.350	0.750

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	1350	Manhole	Adoptable	2	1350	Manhole	Adoptable
1.001	2	1350	Manhole	Adoptable	3	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
1	493782.406	104143.299	9.000	1.300	1350					
						0	1.000	7.700	450	
2	493778.821	104214.168	8.370	0.970	1350		1	1.000	7.400	450
						0	1.001	7.400	150	



Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
3	493786.449	104212.110	8.250	0.900	1200	1	1.001	7.350	150



Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	✓
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	19.400	Additional Storage (m³/ha)	20.0
Ratio-R	0.333	Check Discharge Rate(s)	✓
Winter CV	1.000	Check Discharge Volume	x
Analysis Speed	Detailed		

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 %)
2	40	0	0
10	40	0	0
30	40	0	0
100	20	0	0
100	40	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		

Node 2 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	7.400	Product Number	CTL-SHE-0060-1500-0850-1500
Design Depth (m)	0.850	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.5	Min Node Diameter (mm)	1200

Node 2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	7.400
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	124.0	0.0	0.400	124.0	0.0	0.410	124.0	0.0



Node 2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	7.700	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.450
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.32	Length (m)	66.250		



Results for 2 year +40% CC Critical Storm Duration. Lowest mass balance: 99.36%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute winter	1	10	7.801	0.101	20.8	0.2538	0.0000	OK
360 minute winter	2	280	7.667	0.267	6.6	32.1803	0.0000	SURCHARGED
15 minute winter	3	1	7.350	0.000	1.4	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute winter	1	1.000	2	21.3	1.098	0.102	1.6643	
360 minute winter	2	Hydro-Brake®	3	1.5				43.1



Results for 10 year +40% CC Critical Storm Duration. Lowest mass balance: 99.36%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	7.821	0.121	31.2	0.3046	0.0000	OK
360 minute winter	2	344	7.780	0.380	9.4	50.5513	0.0000	SURCHARGED
15 minute winter	3	1	7.350	0.000	1.5	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)
15 minute winter	1	1.000	2	32.0	1.160	0.153	2.6606	
360 minute winter	2	Hydro-Brake®	3	1.5				45.2



Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 99.36%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	1	456	7.859	0.159	4.7	0.4024	0.0000	OK
480 minute winter	2	456	7.859	0.459	9.4	68.2961	0.0000	SURCHARGED
15 minute winter	3	1	7.350	0.000	1.5	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)
480 minute winter	1	1.000	2	4.7	0.474	0.022	7.4036	
480 minute winter	2	Hydro-Brake®	3	1.5				53.2



Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 99.36%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	1	464	7.904	0.204	5.2	0.5159	0.0000	OK
480 minute winter	2	464	7.905	0.505	10.4	78.3420	0.0000	SURCHARGED
15 minute winter	3	1	7.350	0.000	1.5	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)
480 minute winter	1	1.000	2	5.2	0.474	0.025	8.1053	
480 minute winter	2	Hydro-Brake®	3	1.5				52.2



Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.36%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute winter	1	585	7.986	0.286	5.1	0.7218	0.0000	OK
600 minute winter	2	585	7.986	0.586	9.8	96.4738	0.0000	SURCHARGED
15 minute winter	3	1	7.350	0.000	1.5	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)
600 minute winter	1	1.000	2	4.9	0.472	0.023	9.3916	
600 minute winter	2	Hydro-Brake®	3	1.5				58.1