

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	10	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	17.000	Minimum Backdrop Height (m)	1.000
Ratio-R	0.350	Preferred Cover Depth (m)	1.200
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Node Type	Manhole Type	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
✓ S1	0.042	5.00	52.488	Manhole	Adoptable	1200	438665.800	562879.337	1.500	50.988
✓ S2	0.032	5.00	52.139	Manhole	Adoptable	1200	438682.212	562852.972	1.725	50.414
✓ S3	0.026	5.00	51.508	Manhole	Adoptable	1500	438667.502	562843.542	1.500	50.008
✓ S5			50.962	Manhole	Adoptable	600	438664.321	562829.358	1.295	49.667
✓ S4			51.131	Manhole	Adoptable	1500	438665.548	562834.829	1.394	49.737

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	Velocity Equation	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	Link Type	T of C (mins)	Rain (mm/hr)
1.000	S1	S2	31.056	0.600	Colebrook-White	50.988	50.414	0.574	54.1	300	Circular	5.24	50.0
1.001	S2	S3	17.473	0.600	Colebrook-White	50.414	50.008	0.406	43.0	300	Circular	5.36	50.0
1.002	S3	S4	8.929	0.600	Colebrook-White	50.008	49.787	0.221	40.4	300	Circular	5.42	50.0
1.003	S4	S5	5.607	0.600	Colebrook-White	49.737	49.667	0.070	80.1	150	Circular	5.51	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	2.142	151.4	8.3	1.200	1.425	0.042	0.0	47	1.160
✓	1.001	2.403	169.9	14.7	1.425	1.200	0.074	0.0	59	1.486
?	1.002	2.480	175.3	19.9	1.200	1.044	0.100	0.0	68	1.662
?	1.003	1.124	19.9	19.9	1.244	1.145	0.100	0.0	123	1.277

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	31.056	54.1	300	Circular	52.488	50.988	1.200	52.139	50.414	1.425
1.001	17.473	43.0	300	Circular	52.139	50.414	1.425	51.508	50.008	1.200
1.002	8.929	40.4	300	Circular	51.508	50.008	1.200	51.131	49.787	1.044
1.003	5.607	80.1	150	Circular	51.131	49.737	1.244	50.962	49.667	1.145

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S1	1200	Manhole	Adoptable	S2	1200	Manhole	Adoptable
1.001	S2	1200	Manhole	Adoptable	S3	1500	Manhole	Adoptable
1.002	S3	1500	Manhole	Adoptable	S4	1500	Manhole	Adoptable
1.003	S4	1500	Manhole	Adoptable	S5	600	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
S1	438665.800	562879.337	52.488	1.500	1200		0	1.000	50.988	300
S2	438682.212	562852.972	52.139	1.725	1200		1	1.000	50.414	300
							0	1.001	50.414	300
S3	438667.502	562843.542	51.508	1.500	1500		1	1.001	50.008	300
							0	1.002	50.008	300
S5	438664.321	562829.358	50.962	1.295	600		1	1.003	49.667	150
							0	1.002	49.787	300
S4	438665.548	562834.829	51.131	1.394	1500		1	1.002	49.787	300
							0	1.003	49.737	150

Simulation Settings

Rainfall Methodology	FSR	Summer CV	1.000	Additional Storage (m ³ /ha)	0.0
Rainfall Events	Singular	Winter CV	1.000	Starting Level (m)	
FSR Region	England and Wales	Analysis Speed	Normal	Check Discharge Rate(s)	x
M5-60 (mm)	17.000	Skip Steady State	x	Check Discharge Volume	x
Ratio-R	0.350	Drain Down Time (mins)	1440		

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 %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0	100	45	10	0
30	40	10	0				

Node S4 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	49.737	Product Number	CTL-SHE-0063-2000-1337-2000
Design Depth (m)	1.337	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node S2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.35	Width (m)	20.000	Depth (m)	0.350
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	51.400	Length (m)	27.000	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)		Slope (1:X)	90.0		

Node S2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	50.500
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	248

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	95.0	95.0	0.550	95.0	114.0	0.551	0.0	114.0

Results for 2 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	S1	10	51.034	0.046	7.8	0.0517	0.0000	OK
60 minute winter	S2	55	50.543	0.129	11.2	4.0787	0.0000	OK
60 minute winter	S3	53	50.546	0.538	8.6	0.9515	0.0000	SURCHARGED
30 minute summer	S5	111	49.696	0.029	1.7	0.0000	0.0000	OK
60 minute winter	S4	53	50.547	0.810	6.5	1.4315	0.0000	SURCHARGED

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	S1	1.000	S2	7.7	0.963	0.051	0.3957	
60 minute winter	S2	1.001	S3	6.3	0.842	0.037	0.8684	
60 minute winter	S3	1.002	S4	6.5	0.701	0.037	0.6288	
60 minute winter	S4	1.003	S5	1.7	0.666	0.084	0.0141	13.7

Results for 30 year +40% CC +10% A Critical Storm Duration. Lowest mass balance: 99.73%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	10	51.066	0.078	22.6	0.0877	0.0000	OK
180 minute winter	S2	176	50.847	0.433	10.9	31.8853	0.0000	SURCHARGED
180 minute winter	S3	176	50.847	0.839	4.2	1.4831	0.0000	SURCHARGED
180 minute winter	S5	176	49.698	0.031	1.8	0.0000	0.0000	OK
180 minute winter	S4	176	50.847	1.110	5.0	1.9619	0.0000	FLOOD RISK

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	S1	1.000	S2	22.5	1.135	0.148	1.0463	
180 minute winter	S2	1.001	S3	3.1	0.707	0.018	1.2304	
180 minute winter	S3	1.002	S4	5.0	0.569	0.028	0.6288	
180 minute winter	S4	1.003	S5	1.8	0.682	0.092	0.0150	56.2

Results for 100 year +45% CC +10% A Critical Storm Duration. Lowest mass balance: 99.85%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	10	51.078	0.090	30.1	0.1015	0.0000	OK
240 minute winter	S2	232	51.048	0.634	12.2	50.2547	0.0000	SURCHARGED
240 minute winter	S3	232	51.048	1.040	3.8	1.8383	0.0000	SURCHARGED
240 minute winter	S5	232	49.699	0.032	2.0	0.0000	0.0000	OK
240 minute winter	S4	232	51.048	1.311	5.2	2.3171	0.0000	FLOOD RISK

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	S1	1.000	S2	29.9	1.182	0.198	1.2592	
240 minute winter	S2	1.001	S3	2.6	0.727	0.015	1.2304	
240 minute winter	S3	1.002	S4	5.2	0.554	0.030	0.6288	
240 minute winter	S4	1.003	S5	2.0	0.697	0.099	0.0158	82.8