Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	5	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)	18.000	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	✓

Adoptable Manhole Type

Max Width (mm)	Diameter (mm)	Max Width (mm)	Diameter (mm)
374	1200	749	1500
499	1350	900	1800

>900 Link+900 mm

Max Depth (m)	Diameter (mm)	Max Depth (m)	Diameter (mm)
1.500	1050	99.999	1200

Circular Link Type

Shape	Circular	Auto Increment (mm)	75
Barrels	1	Follow Ground	x

Available Diameters (mm)

100	150

Nodes

	Name	Area (ha)	T of E (mins)	Cover Level (m)	Manhole Type	Diameter (mm)	Depth (m)
✓	1	0.016	4.00	80.000	Adoptable	1200	1.400
✓	2	0.045	4.00	80.000	Adoptable	1200	1.677
✓	3	0.028	4.00	79.500	Adoptable	1200	1.700
✓	4	0.055	4.00	79.000	Adoptable	1200	2.400
✓	5			78.000	Adoptable	1200	1.464

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)	T of C (mins)	Rain (mm/hr)
?	1	1	2	16.437	0.600	Colebrook-White	78.600	78.323	0.277	59.3	225	4.16	50.0
✓	2	2	3	15.687	0.600	Colebrook-White	78.323	77.800	0.523	30.0	225	4.27	50.0
?	3	3	4	19.326	0.600	Colebrook-White	77.800	77.686	0.114	169.5	225	4.59	50.0
✓	4	4	5	6.401	0.600	Colebrook-White	76.600	76.536	0.064	100.0	225	4.67	50.0

	Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Minimum Depth (m)	Maximum Depth (m)	Σ Area (ha)	Pro Depth (mm)	Pro Velocity (m/s)
?	1	1	2	1.701	67.6	2.2	1.175	1.452	1.175	1.452	0.016	28	0.785
✓	2	2	3	2.397	95.3	8.2	1.452	1.475	1.452	1.475	0.061	44	1.480
?	3	3	4	1.001	39.8	12.1	1.475	1.089	1.089	1.475	0.089	85	0.880
✓	4	4	5	1.307	52.0	19.5	2.175	1.239	1.239	2.175	0.144	95	1.216

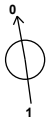
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Pipeline Schedule

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	16.437	59.3	225	Circular	80.000	78.600	1.175	80.000	78.323	1.452
2	15.687	30.0	225	Circular	80.000	78.323	1.452	79.500	77.800	1.475
3	19.326	169.5	225	Circular	79.500	77.800	1.475	79.000	77.686	1.089
4	6.401	100.0	225	Circular	79.000	76.600	2.175	78.000	76.536	1.239

Link	US Node	Dia (mm)	MH Type	DS Node	Dia (mm)	MH Type
1	1	1200	Adoptable	2	1200	Adoptable
2	2	1200	Adoptable	3	1200	Adoptable
3	3	1200	Adoptable	4	1200	Adoptable
4	4	1200	Adoptable	5	1200	Adoptable

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Node Type	MH Type	Connections	Link	IL (m)	Dia (mm)	Link Type
1	80.000	1.400	1200	Manhole	Adoptable					
						0	1	78.600	225	Circular
2	80.000	1.677	1200	Manhole	Adoptable					
						1	1	78.323	225	Circular
						0	2	78.323	225	Circular
3	79.500	1.700	1200	Manhole	Adoptable					
						1	2	77.800	225	Circular
						0	3	77.800	225	Circular
4	79.000	2.400	1200	Manhole	Adoptable					
						1	3	77.686	225	Circular
						0	4	76.600	225	Circular
5	78.000	1.464	1200	Manhole	Adoptable					
						1	4	76.536	225	Circular

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	18.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.350	Check Discharge Rate(s)	x
Summer CV	0.750	Check Discharge Volume	x
Analysis Speed	Normal		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

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

Node 4 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	76.600	Product Number	CTL-SHE-0082-3000-1000-3000
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	3.0	Min Node Diameter (mm)	1200

Node 2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	79.300	Slope (1:X)	100.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	
Safety Factor	2.0	Width (m)	21.000	Inf Depth (m)	
Porosity	0.30	Length (m)	21.000		

Node 3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	78.800	Slope (1:X)	80.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	
Safety Factor	2.0	Width (m)	8.500	Inf Depth (m)	
Porosity	0.30	Length (m)	8.500		

Node 4 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	78.200	Slope (1:X)	40.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	132	Depth (m)	
Safety Factor	2.0	Width (m)	13.500	Inf Depth (m)	
Porosity	0.30	Length (m)	13.500		

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 15 minute summer	121.566	34.399
2 year 30 minute summer	80.376	22.744
2 year 60 minute summer	54.898	14.508
2 year 120 minute summer	34.334	9.073
2 year 180 minute summer	26.663	6.861
2 year 240 minute summer	21.267	5.620
2 year 360 minute summer	16.459	4.235
2 year 480 minute summer	13.074	3.455
2 year 600 minute summer	10.784	2.950
2 year 720 minute summer	9.671	2.592
2 year 960 minute summer	8.026	2.113
2 year 1440 minute summer	5.915	1.585
2 year 2160 minute summer	4.304	1.189
2 year 2880 minute summer	3.617	0.969
2 year 4320 minute summer	2.781	0.727
2 year 5760 minute summer	2.316	0.593
2 year 7200 minute summer	1.984	0.506

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Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 8640 minute summer	1.744	0.445
2 year 10080 minute summer	1.563	0.399
30 year +30% CC 15 minute summer	298.632	84.502
30 year +30% CC 30 minute summer	198.894	56.280
30 year +30% CC 60 minute summer	136.032	35.949
30 year +30% CC 120 minute summer	84.471	22.323
30 year +30% CC 180 minute summer	64.962	16.717
30 year +30% CC 240 minute summer	51.289	13.554
30 year +30% CC 360 minute summer	38.971	10.029
30 year +30% CC 480 minute summer	30.646	8.099
30 year +30% CC 600 minute summer	25.070	6.857
30 year +30% CC 720 minute summer	22.324	5.983
30 year +30% CC 960 minute summer	18.311	4.822
30 year +30% CC 1440 minute summer	13.255	3.552
30 year +30% CC 2160 minute summer	9.457	2.614
30 year +30% CC 2880 minute summer	7.837	2.100
30 year +30% CC 4320 minute summer	5.896	1.542
30 year +30% CC 5760 minute summer	4.832	1.237
30 year +30% CC 7200 minute summer	4.085	1.042
30 year +30% CC 8640 minute summer	3.551	0.906
30 year +30% CC 10080 minute summer	3.155	0.805
100 year +45% CC 15 minute summer	429.887	121.643
100 year +45% CC 30 minute summer	289.193	81.832
100 year +45% CC 60 minute summer	199.139	52.627
100 year +45% CC 120 minute summer	123.927	32.750
100 year +45% CC 180 minute summer	95.134	24.481
100 year +45% CC 240 minute summer	74.874	19.787
100 year +45% CC 360 minute summer	56.497	14.539
100 year +45% CC 480 minute summer	44.233	11.690
100 year +45% CC 600 minute summer	36.054	9.862
100 year +45% CC 720 minute summer	32.006	8.578
100 year +45% CC 960 minute summer	26.118	6.877
100 year +45% CC 1440 minute summer	18.759	5.028
100 year +45% CC 2160 minute summer	13.271	3.668
100 year +45% CC 2880 minute summer	10.927	2.929
100 year +45% CC 4320 minute summer	8.142	2.129
100 year +45% CC 5760 minute summer	6.623	1.695
100 year +45% CC 7200 minute summer	5.566	1.420
100 year +45% CC 8640 minute summer	4.814	1.228
100 year +45% CC 10080 minute summer	4.260	1.087

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Results for 2 year Critical Storm Duration. Lowest mass balance: 99.80%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	78.631	0.031	2.7	0.0417	0.0000	OK
15 minute summer	2	10	78.372	0.049	10.1	0.0820	0.0000	OK
30 minute summer	3	25	78.357	0.557	12.8	0.8143	0.0000	SURCHARGED
30 minute summer	4	24	78.356	1.756	18.9	4.7800	0.0000	SURCHARGED
15 minute summer	5	1	76.536	0.000	3.9	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	2	2.7	0.569	0.040	0.0792	
15 minute summer	2	2	3	10.1	0.912	0.106	0.3622	
30 minute summer	3	3	4	11.3	0.759	0.284	0.7686	
30 minute summer	4	Hydro-Brake®	5	3.9				12.2

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Results for 30 year +30% CC Critical Storm Duration. Lowest mass balance: 99.80%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	1	53	78.702	0.102	4.3	0.1386	0.0000	OK
60 minute summer	2	53	78.702	0.379	16.1	0.6307	0.0000	SURCHARGED
60 minute summer	3	53	78.702	0.902	21.7	1.3189	0.0000	SURCHARGED
60 minute summer	4	54	78.701	2.101	35.1	21.5009	0.0000	FLOOD RISK
15 minute summer	5	1	76.536	0.000	4.1	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)
60 minute summer	1	1	2	4.3	0.556	0.063	0.4702	
60 minute summer	2	2	3	14.5	0.685	0.152	0.6239	
60 minute summer	3	3	4	21.0	0.629	0.528	0.7686	
60 minute summer	4	Hydro-Brake®	5	4.2				38.8

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.80%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute summer	1	98	78.962	0.362	4.2	0.4923	0.0000	SURCHARGED
120 minute summer	2	98	78.962	0.639	13.8	1.0634	0.0000	SURCHARGED
120 minute summer	3	98	78.961	1.161	19.9	4.0498	0.0000	SURCHARGED
120 minute summer	4	98	78.961	2.361	33.4	36.1211	0.0000	FLOOD RISK
15 minute summer	5	1	76.536	0.000	4.3	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)
120 minute summer	1	1	2	3.3	0.472	0.049	0.6537	
120 minute summer	2	2	3	12.6	0.645	0.133	0.6239	
120 minute summer	3	3	4	19.2	0.587	0.482	0.7686	
120 minute summer	4	Hydro-Brake®	5	4.5				70.7

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