Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
Rainfall Events	Singular	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	18.600	Additional Storage (m³/ha)	0.0
Ratio-R	0.200	Starting Level (m)	
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

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 %)
2	0	0	0
30	0	0	0
100	45	0	0

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Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	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)	18.600	Minimum Backdrop Height (m)	0.200
Ratio-R	0.328	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	1.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
S1		1.00	30.225	1200	380656.732	390278.711	0.600	29.625
S2	0.035	1.00	30.075	1200	380673.360	390264.415	0.596	29.479
S3			30.075	1200	380663.660	390253.590	0.693	29.382
S4	0.090	1.00	30.075	1200	380659.194	390253.334	0.798	29.277
S5	0.008	1.00	30.528	1800	380651.430	390243.878	2.211	28.317
S6	0.064	1.00	30.407	2100	380618.137	390270.309	2.614	27.793
S7			29.980	1500	380626.246	390281.553	2.249	27.731
Perm Paving 2	0.002	1.00	30.250	1200	380643.760	390241.021	1.250	29.000
Perm Paving 3	0.037	1.00	30.250	1200	380643.184	390255.712	1.250	29.000
Perm Paving 4	0.004	1.00	30.250	1200	380638.155	390246.773	1.250	29.000
Perm Paving 1	0.007	1.00	30.250	1200	380637.005	390239.389	1.300	28.950
Perm Paving 5	0.002	1.00	30.250	1200	380652.542	390251.731	1.300	28.950
Perm Paving 6	0.002	1.00	30.250	1200	380655.279	390237.010	1.300	28.950

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	S1	S2	21.929	0.600	29.625	29.479	0.146	150.0	150	1.45	50.0
1.001	S2	S3	14.535	0.600	29.479	29.382	0.097	150.0	150	1.74	50.0
1.002	S3	S4	4.473	0.600	29.382	29.352	0.030	150.0	150	1.83	50.0
1.003	S4	S5	12.235	0.600	29.277	29.195	0.082	150.0	225	2.03	50.0
1.004	S5	S6	42.509	0.600	28.317	28.211	0.106	400.0	600	3.00	50.0
1.005	S6	S7	13.863	0.600	27.793	27.731	0.062	225.0	600	3.22	50.0
Perm 2	Perm Paving 2	S6	8.185	0.600	29.000	28.898	0.102	80.0	150	1.12	50.0
Perm 3	Perm Paving 3	S6	7.502	0.600	29.000	28.906	0.094	80.0	150	1.11	50.0
Perm 4	Perm Paving 4	S6	13.587	0.600	29.000	28.830	0.170	80.0	150	1.20	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	0.818	14.5	0.0	0.450	0.446	0.000	0.0	0	0.000
1.001	0.818	14.5	4.7	0.446	0.543	0.035	0.0	59	0.732
1.002	0.818	14.5	4.7	0.543	0.573	0.035	0.0	59	0.732
1.003	1.065	42.3	16.9	0.573	1.108	0.125	0.0	99	1.007
1.004	1.211	342.4	18.3	1.611	1.596	0.135	0.0	93	0.656
1.005	1.619	457.8	34.0	2.014	1.649	0.251	0.0	109	0.966
Perm 2	1.125	19.9	0.3	1.100	1.359	0.002	0.0	13	0.396
Perm 3	1.125	19.9	5.0	1.100	1.351	0.037	0.0	51	0.939
Perm 4	1.125	19.9	0.5	1.100	1.427	0.004	0.0	17	0.490

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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)
Perm 1	Perm Paving 1	S6	36.222	0.600	28.950	28.293	0.657	55.1	100	1.58	50.0
Perm 5	Perm Paving 5	S6	39.100	0.600	28.950	28.293	0.657	59.5	100	1.65	50.0
Perm 6	Perm Paving 6	S5	7.873	0.600	28.950	28.817	0.133	59.2	100	1.13	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)
Perm 1	1.040	8.2	0.9	1.200	2.014	0.007	0.0	23	0.692
Perm 5	1.000	7.9	0.3	1.200	2.014	0.002	0.0	13	0.462
Perm 6	1.003	7.9	0.3	1.200	1.611	0.002	0.0	13	0.463

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	21.929	150.0	150	Circular	30.225	29.625	0.450	30.075	29.479	0.446
1.001	14.535	150.0	150	Circular	30.075	29.479	0.446	30.075	29.382	0.543
1.002	4.473	150.0	150	Circular	30.075	29.382	0.543	30.075	29.352	0.573
1.003	12.235	150.0	225	Circular	30.075	29.277	0.573	30.528	29.195	1.108
1.004	42.509	400.0	600	Circular	30.528	28.317	1.611	30.407	28.211	1.596
1.005	13.863	225.0	600	Circular	30.407	27.793	2.014	29.980	27.731	1.649
Perm 2	8.185	80.0	150	Circular	30.250	29.000	1.100	30.407	28.898	1.359
Perm 3	7.502	80.0	150	Circular	30.250	29.000	1.100	30.407	28.906	1.351
Perm 4	13.587	80.0	150	Circular	30.250	29.000	1.100	30.407	28.830	1.427
Perm 1	36.222	55.1	100	Circular	30.250	28.950	1.200	30.407	28.293	2.014
Perm 5	39.100	59.5	100	Circular	30.250	28.950	1.200	30.407	28.293	2.014
Perm 6	7.873	59.2	100	Circular	30.250	28.950	1.200	30.528	28.817	1.611

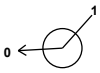
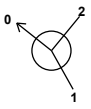
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S1	1200	Manhole	Adoptable	S2	1200	Manhole	Adoptable
1.001	S2	1200	Manhole	Adoptable	S3	1200	Manhole	Adoptable
1.002	S3	1200	Manhole	Adoptable	S4	1200	Manhole	Adoptable
1.003	S4	1200	Manhole	Adoptable	S5	1800	Manhole	Adoptable
1.004	S5	1800	Manhole	Adoptable	S6	2100	Manhole	Adoptable
1.005	S6	2100	Manhole	Adoptable	S7	1500	Manhole	Adoptable
Perm 2	Perm Paving 2	1200	Manhole	Adoptable	S6	2100	Manhole	Adoptable
Perm 3	Perm Paving 3	1200	Manhole	Adoptable	S6	2100	Manhole	Adoptable
Perm 4	Perm Paving 4	1200	Manhole	Adoptable	S6	2100	Manhole	Adoptable
Perm 1	Perm Paving 1	1200	Manhole	Adoptable	S6	2100	Manhole	Adoptable
Perm 5	Perm Paving 5	1200	Manhole	Adoptable	S6	2100	Manhole	Adoptable
Perm 6	Perm Paving 6	1200	Manhole	Adoptable	S5	1800	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1	380656.732	390278.711	30.225	0.600	1200	 0	1.000	29.625	150

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S2	380673.360	390264.415	30.075	0.596	1200	 1	1.000	29.479	150
						0	1.001	29.479	150
S3	380663.660	390253.590	30.075	0.693	1200	 1	1.001	29.382	150
						0	1.002	29.382	150
S4	380659.194	390253.334	30.075	0.798	1200	 1	1.002	29.352	150
						0	1.003	29.277	225
S5	380651.430	390243.878	30.528	2.211	1800	 1	Perm 6	28.817	100
						2	1.003	29.195	225
						0	1.004	28.317	600
S6	380618.137	390270.309	30.407	2.614	2100	 1	Perm 3	28.906	150
						2	Perm 2	28.898	150
						3	Perm 4	28.830	150
						4	Perm 1	28.293	100
						5	Perm 5	28.293	100
						6	1.004	28.211	600
						0	1.005	27.793	600
S7	380626.246	390281.553	29.980	2.249	1500	 1	1.005	27.731	600
Perm Paving 2	380643.760	390241.021	30.250	1.250	1200	 0	Perm 2	29.000	150
Perm Paving 3	380643.184	390255.712	30.250	1.250	1200	 0	Perm 3	29.000	150
Perm Paving 4	380638.155	390246.773	30.250	1.250	1200	 0	Perm 4	29.000	150
Perm Paving 1	380637.005	390239.389	30.250	1.300	1200	 0	Perm 1	28.950	100
Perm Paving 5	380652.542	390251.731	30.250	1.300	1200	 0	Perm 5	28.950	100
Perm Paving 6	380655.279	390237.010	30.250	1.300	1200	 0	Perm 6	28.950	100

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Node S6 Online Orifice Control

Flap Valve	x	Design Depth (m)	1.000	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	5.0		
Invert Level (m)	27.793	Diameter (m)	0.049		

Node Perm Paving 1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	28.950	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	72	Depth (m)	0.600
Safety Factor	2.0	Width (m)	16.400	Inf Depth (m)	
Porosity	1.00	Length (m)	4.800		

Node Perm Paving 2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	29.000	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	0.600
Safety Factor	2.0	Width (m)	8.000	Inf Depth (m)	
Porosity	1.00	Length (m)	18.000		

Node Perm Paving 3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	29.000	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	120	Depth (m)	0.450
Safety Factor	2.0	Width (m)	13.000	Inf Depth (m)	
Porosity	1.00	Length (m)	6.000		

Node Perm Paving 4 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	29.000	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	0.600
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	1.00	Length (m)	4.800		

Node Perm Paving 5 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	28.950	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	96	Depth (m)	0.600
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	1.00	Length (m)	4.800		

Node Perm Paving 6 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	28.950	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	88	Depth (m)	0.600
Safety Factor	2.0	Width (m)	6.700	Inf Depth (m)	
Porosity	1.00	Length (m)	6.700		

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Results for 2 year Critical Storm Duration. Lowest mass balance: 99.78%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	1	29.625	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S2	8	29.553	0.074	7.5	0.0838	0.0000	OK
15 minute summer	S3	9	29.459	0.077	6.3	0.0869	0.0000	OK
15 minute summer	S4	8	29.406	0.129	24.7	0.1456	0.0000	OK
180 minute winter	S5	124	28.962	0.645	6.5	1.6406	0.0000	SURCHARGED
180 minute winter	S6	124	28.962	1.169	9.8	4.0489	0.0000	SURCHARGED
180 minute winter	S7	124	27.775	0.044	5.3	0.0000	0.0000	OK
360 minute winter	Perm Paving 2	216	29.007	0.007	0.1	0.2096	0.0000	OK
60 minute winter	Perm Paving 3	38	29.033	0.033	3.3	2.3422	0.0000	OK
60 minute summer	Perm Paving 4	36	29.012	0.012	0.5	0.2220	0.0000	OK
240 minute winter	Perm Paving 1	140	28.961	0.011	0.3	0.6885	0.0000	OK
180 minute winter	Perm Paving 5	128	28.959	0.009	0.1	0.1646	0.0000	OK
180 minute winter	Perm Paving 6	128	28.959	0.009	0.4	0.2390	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	S1	1.000	S2	0.0	0.000	0.000	0.0951	
15 minute summer	S2	1.001	S3	6.3	0.759	0.437	0.1233	
15 minute summer	S3	1.002	S4	6.6	0.762	0.453	0.0385	
15 minute summer	S4	1.003	S5	22.5	1.043	0.531	0.2686	
180 minute winter	S5	1.004	S6	4.8	0.393	0.014	11.9738	
180 minute winter	S6	1.005	S7	5.3	0.557	0.012	0.1323	52.8
360 minute winter	Perm Paving 2	Perm 2	S6	0.1	0.274	0.004	0.0024	
60 minute winter	Perm Paving 3	Perm 3	S6	1.9	0.698	0.096	0.0205	
60 minute summer	Perm Paving 4	Perm 4	S6	0.2	0.378	0.012	0.0084	
240 minute winter	Perm Paving 1	Perm 1	S6	0.2	0.298	0.026	0.1502	
180 minute winter	Perm Paving 5	Perm 5	S6	-0.1	0.037	-0.018	0.1599	
180 minute winter	Perm Paving 6	Perm 6	S5	-0.4	0.311	-0.050	0.0321	

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Results for 30 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	S1	1	29.625	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S2	8	29.594	0.115	14.1	0.1295	0.0000	OK
15 minute summer	S3	9	29.515	0.133	11.9	0.1508	0.0000	OK
15 minute summer	S4	8	29.485	0.208	45.8	0.2349	0.0000	OK
60 minute summer	S5	33	29.114	0.797	29.9	2.0275	0.0000	SURCHARGED
30 minute winter	S6	19	29.123	1.330	40.2	4.6079	0.0000	SURCHARGED
60 minute summer	S7	33	27.777	0.046	5.7	0.0000	0.0000	OK
180 minute winter	Perm Paving 2	132	29.075	0.075	4.8	9.5567	0.0000	OK
60 minute winter	Perm Paving 3	40	29.093	0.093	13.2	7.0957	0.0000	OK
60 minute winter	Perm Paving 4	39	29.091	0.091	6.7	2.1449	0.0000	OK
240 minute winter	Perm Paving 1	188	29.069	0.119	2.7	9.3407	0.0000	SURCHARGED
120 minute winter	Perm Paving 5	86	29.077	0.127	2.7	3.0213	0.0000	SURCHARGED
120 minute winter	Perm Paving 6	84	29.076	0.126	4.9	5.6574	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	0.0	0.000	0.000	0.1582	
15 minute summer	S2	1.001	S3	11.9	0.813	0.826	0.2182	
15 minute summer	S3	1.002	S4	13.0	0.824	0.899	0.0703	
15 minute summer	S4	1.003	S5	41.3	1.187	0.975	0.4314	
60 minute summer	S5	1.004	S6	19.2	0.445	0.056	11.9738	
30 minute winter	S6	1.005	S7	5.7	0.563	0.012	0.1392	42.5
180 minute winter	Perm Paving 2	Perm 2	S6	-4.6	0.426	-0.231	0.1079	
60 minute winter	Perm Paving 3	Perm 3	S6	-7.2	0.787	-0.363	0.1089	
60 minute winter	Perm Paving 4	Perm 4	S6	-6.1	-0.493	-0.308	0.1956	
240 minute winter	Perm Paving 1	Perm 1	S6	2.3	0.370	0.282	0.2834	
120 minute winter	Perm Paving 5	Perm 5	S6	-2.5	-0.354	-0.312	0.3059	
120 minute winter	Perm Paving 6	Perm 6	S5	-4.7	-0.683	-0.592	0.0616	

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.03%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	9	29.967	0.342	9.1	0.3865	0.0000	FLOOD RISK
15 minute summer	S2	9	29.948	0.469	25.9	0.5305	0.0000	FLOOD RISK
15 minute summer	S3	9	29.760	0.378	18.0	0.4274	0.0000	SURCHARGED
15 minute summer	S4	8	29.729	0.452	73.8	0.5116	0.0000	SURCHARGED
30 minute summer	S5	17	29.411	1.094	66.3	2.7835	0.0000	SURCHARGED
30 minute summer	S6	17	29.389	1.596	108.9	5.5275	0.0000	SURCHARGED
30 minute summer	S7	17	27.779	0.048	6.3	0.0000	0.0000	OK
360 minute winter	Perm Paving 2	272	29.273	0.273	9.2	38.3866	0.0000	SURCHARGED
360 minute winter	Perm Paving 3	272	29.274	0.274	4.1	21.4295	0.0000	SURCHARGED
360 minute winter	Perm Paving 4	272	29.273	0.273	2.2	6.5507	0.0000	SURCHARGED
360 minute winter	Perm Paving 1	296	29.270	0.320	3.5	25.3888	0.0000	SURCHARGED
360 minute winter	Perm Paving 5	272	29.274	0.324	1.9	7.7645	0.0000	SURCHARGED
360 minute winter	Perm Paving 6	272	29.273	0.323	3.5	14.7285	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	-9.1	-0.619	-0.628	0.3861	
15 minute summer	S2	1.001	S3	18.0	1.020	1.242	0.2559	
15 minute summer	S3	1.002	S4	21.3	1.210	1.473	0.0787	
15 minute summer	S4	1.003	S5	70.4	1.770	1.662	0.4789	
30 minute summer	S5	1.004	S6	72.8	0.518	0.212	11.9738	
30 minute summer	S6	1.005	S7	6.3	0.579	0.014	0.1502	70.5
360 minute winter	Perm Paving 2	Perm 2	S6	-9.0	-0.526	-0.453	0.1441	
360 minute winter	Perm Paving 3	Perm 3	S6	2.1	0.667	0.104	0.1321	
360 minute winter	Perm Paving 4	Perm 4	S6	-1.9	0.349	-0.096	0.2392	
360 minute winter	Perm Paving 1	Perm 1	S6	-2.8	-0.361	-0.337	0.2834	
360 minute winter	Perm Paving 5	Perm 5	S6	-1.8	-0.280	-0.227	0.3059	
360 minute winter	Perm Paving 6	Perm 6	S5	-3.3	-0.494	-0.419	0.0616	

Water Quality (TSS)

Node	Treatment	Effectiveness	SuDS Component	Mitigation TSS	Cumulative TSS
Perm Paving 6	Carpark	1.0	Pond	0.700	0.000
Perm Paving 5	Carpark	1.0	Pond	0.700	0.000
S7					0.000

Water Quality (Metals)

Node	Treatment	Effectiveness	SuDS Component	Mitigation Metals	Cumulative Metals
Perm Paving 6	Carpark	1.0	Pond	0.700	0.000
Perm Paving 5	Carpark	1.0	Pond	0.700	0.000
S7					0.000

Water Quality (Hydrocarbons)

Node	Treatment	Effectiveness	SuDS Component	Mitigation Hydrocarbons	Cumulative Hydrocarbons
Perm Paving 6	Carpark	1.0	Pond	0.500	0.000
Perm Paving 5	Carpark	1.0	Pond	0.500	0.000
S7					0.000

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