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)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	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)	Diameter (mm)	Width (mm)	Easting (m)	Northing (m)	Depth (m)
1A	0.039	5.00	180.850	450		409651.779	175220.046	0.750
1B			180.200	750	675	409676.433	175216.909	0.900
1	0.004	5.00	179.600	450		409683.208	175210.475	0.850
2			179.480	450		409684.849	175198.279	0.830
3			179.400	450		409675.321	175190.879	0.925
4	0.010	5.00	179.425	1200		409666.259	175191.252	1.050
5			179.400	500		409663.608	175184.237	1.150
Soakaway			179.400			409662.794	175181.858	1.175
Dummy pipe			179.400			409658.050	175183.437	1.225
8	0.012	5.00	177.850	450		409657.847	175199.064	0.750
9	0.014	5.00	178.100	450		409676.994	175196.727	1.200
Pump			179.450	450		409684.139	175194.881	3.825
10	0.002	5.00	178.600	450		409676.699	175201.185	1.350
6	0.013	5.00	181.000	450		409648.173	175201.629	0.900
7			181.000	450		409647.793	175198.933	1.000

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	1A	1B	24.853	0.600	180.100	179.450	0.650	38.2	150	5.25	50.0
1.001	1B	1	9.343	0.600	179.450	178.750	0.700	13.3	100	5.33	50.0
1.002	1	2	12.306	0.600	178.750	178.650	0.100	123.1	100	5.62	50.0
1.003	2	3	12.064	0.600	178.650	178.525	0.125	96.5	100	5.88	50.0
1.004	3	4	9.070	0.600	178.475	178.375	0.100	90.7	150	6.02	50.0
1.005	4	5	7.499	0.600	178.375	178.250	0.125	60.0	150	6.12	50.0
1.006	5	Soakaway	2.514	0.600	178.250	178.225	0.025	100.6	150	6.16	50.0
1.007	Soakaway	Dummy pipe	5.000	0.600	178.225	178.175	0.050	100.0	150	6.24	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	1.632	28.8	5.3	0.600	0.600	0.039	0.0	44	1.251
1.001	2.126	16.7	5.3	0.650	0.750	0.039	0.0	39	1.887
1.002	0.692	5.4	5.8	0.750	0.730	0.043	0.0	92	0.772
1.003	0.783	6.1	5.8	0.730	0.775	0.043	0.0	78	0.890
1.004	1.055	18.7	9.6	0.775	0.900	0.071	0.0	76	1.064
1.005	1.301	23.0	12.7	0.900	1.000	0.094	0.0	80	1.335
1.006	1.002	17.7	12.7	1.000	1.025	0.094	0.0	94	1.088
1.007	1.005	17.8	12.7	1.025	1.075	0.094	0.0	94	1.091

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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)
2.000	8	9	19.289	0.600	177.100	176.900	0.200	96.4	150	5.31	50.0
2.001	9	Pump	7.380	0.600	176.900	176.825	0.075	98.4	150	5.44	50.0
2.002	Pump	3	9.684	0.600	175.625	178.525	-2.900	-3.3	100	5.60	50.0
3.000	10	9	4.468	0.600	177.250	176.950	0.300	14.9	100	5.04	50.0
4.000	6	7	2.723	0.600	180.100	180.000	0.100	27.2	100	5.03	50.0
4.001	7	4	20.000	0.600	180.000	178.425	1.575	12.7	100	5.18	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)
2.000	1.023	18.1	1.6	0.600	1.050	0.012	0.0	30	0.632
2.001	1.013	17.9	3.8	1.050	2.475	0.028	0.0	47	0.803
2.002	1.000	7.9	3.8	3.725	0.775	0.028	0.0	100	0.000
3.000	2.012	15.8	0.3	1.250	1.050	0.002	0.0	9	0.735
4.000	1.485	11.7	1.8	0.800	0.900	0.013	0.0	26	1.067
4.001	2.180	17.1	1.8	0.900	0.900	0.013	0.0	21	1.396

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	24.853	38.2	150	Circular	180.850	180.100	0.600	180.200	179.450	0.600
1.001	9.343	13.3	100	Circular	180.200	179.450	0.650	179.600	178.750	0.750
1.002	12.306	123.1	100	Circular	179.600	178.750	0.750	179.480	178.650	0.730
1.003	12.064	96.5	100	Circular	179.480	178.650	0.730	179.400	178.525	0.775
1.004	9.070	90.7	150	Circular	179.400	178.475	0.775	179.425	178.375	0.900
1.005	7.499	60.0	150	Circular	179.425	178.375	0.900	179.400	178.250	1.000
1.006	2.514	100.6	150	Circular	179.400	178.250	1.000	179.400	178.225	1.025
1.007	5.000	100.0	150	Circular	179.400	178.225	1.025	179.400	178.175	1.075
2.000	19.289	96.4	150	Circular	177.850	177.100	0.600	178.100	176.900	1.050
2.001	7.380	98.4	150	Circular	178.100	176.900	1.050	179.450	176.825	2.475
2.002	9.684	-3.3	100	Circular	179.450	175.625	3.725	179.400	178.525	0.775
3.000	4.468	14.9	100	Circular	178.600	177.250	1.250	178.100	176.950	1.050
4.000	2.723	27.2	100	Circular	181.000	180.100	0.800	181.000	180.000	0.900
4.001	20.000	12.7	100	Circular	181.000	180.000	0.900	179.425	178.425	0.900

Link	US Node	Dia (mm)	Width (mm)	Node Type	MH Type	DS Node	Dia (mm)	Width (mm)	Node Type	MH Type
1.000	1A	450		Manhole	Adoptable	1B	750	675	Manhole	Adoptable
1.001	1B	750	675	Manhole	Adoptable	1	450		Manhole	Adoptable
1.002	1	450		Manhole	Adoptable	2	450		Manhole	Adoptable
1.003	2	450		Manhole	Adoptable	3	450		Manhole	Adoptable
1.004	3	450		Manhole	Adoptable	4	1200		Manhole	Adoptable
1.005	4	1200		Manhole	Adoptable	5	500		Manhole	Adoptable
1.006	5	500		Manhole	Adoptable	Soakaway			Junction	
1.007	Soakaway			Junction		Dummy pipe			Junction	
2.000	8	450		Manhole	Adoptable	9	450		Manhole	Adoptable
2.001	9	450		Manhole	Adoptable	Pump	450		Manhole	Adoptable
2.002	Pump	450		Manhole	Adoptable	3	450		Manhole	Adoptable
3.000	10	450		Manhole	Adoptable	9	450		Manhole	Adoptable
4.000	6	450		Manhole	Adoptable	7	450		Manhole	Adoptable
4.001	7	450		Manhole	Adoptable	4	1200		Manhole	Adoptable

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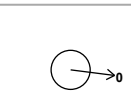
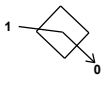
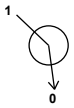
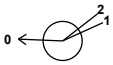
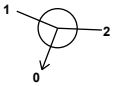
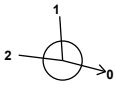
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Width (mm)	Connections	Link	IL (m)	Dia (mm)
1A	409651.779	175220.046	180.850	0.750	450			0	1.000	180.100	150
1B	409676.433	175216.909	180.200	0.900	750	675		1	1.000	179.450	150
								0	1.001	179.450	100
1	409683.208	175210.475	179.600	0.850	450			1	1.001	178.750	100
								0	1.002	178.750	100
2	409684.849	175198.279	179.480	0.830	450			1	1.002	178.650	100
								0	1.003	178.650	100
3	409675.321	175190.879	179.400	0.925	450			1	2.002	178.525	100
								2	1.003	178.525	100
								0	1.004	178.475	150
4	409666.259	175191.252	179.425	1.050	1200			1	4.001	178.425	100
								2	1.004	178.375	150
								0	1.005	178.375	150
5	409663.608	175184.237	179.400	1.150	500			1	1.005	178.250	150
								0	1.006	178.250	150
Soakaway	409662.794	175181.858	179.400	1.175				1	1.006	178.225	150
								0	1.007	178.225	150
Dummy pipe	409658.050	175183.437	179.400	1.225				1	1.007	178.175	150
8	409657.847	175199.064	177.850	0.750	450			0	2.000	177.100	150
9	409676.994	175196.727	178.100	1.200	450			1	3.000	176.950	100
								2	2.000	176.900	150
								0	2.001	176.900	150
Pump	409684.139	175194.881	179.450	3.825	450			1	2.001	176.825	150
								0	2.002	175.625	100
10	409676.699	175201.185	178.600	1.350	450			0	3.000	177.250	100

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Width (mm)	Connections	Link	IL (m)	Dia (mm)
6	409648.173	175201.629	181.000	0.900	450		0	4.000	180.100	100
7	409647.793	175198.933	181.000	1.000	450		1	4.000	180.000	100
							0	4.001	180.000	100

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Detailed
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	1440
Ratio-R	0.400	Additional Storage (m³/ha)	0.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

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

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

Node Soakaway Online Depth/Flow Control

Flap Valve x | Replaces Downstream Link ✓ | Invert Level (m) 178.225

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.001	0.000	5.000	0.000

Node Pump Online Pump Control

Flap Valve x | Replaces Downstream Link ✓ | Invert Level (m) 175.625 | Switch on depth (m) 0.001 | Switch off depth (m) 0.000

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.001	0.000	2.500	0.000

Node 1B Online Orifice Control

Flap Valve x | Replaces Downstream Link ✓ | Invert Level (m) 179.450 | Diameter (m) 0.050 | Discharge Coefficient 0.600

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Node Soakaway Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.06400	Safety Factor	3.0	Invert Level (m)	177.175
Side Inf Coefficient (m/hr)	0.06400	Porosity	0.95	Time to half empty (mins)	392

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	50.0	50.0	1.200	50.0	114.8	1.201	0.0	114.8

Node Pump Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	1.0	Invert Level (m)	175.625
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	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)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	5.3	0.0	2.500	5.3	0.0	3.000	0.6	0.0	3.825	0.6	0.0

Node 1B Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	179.600	Slope (1:X)	36.9
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	22	Depth (m)	
Safety Factor	1.0	Width (m)	24.000	Inf Depth (m)	
Porosity	0.30	Length (m)	14.000		

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Results for 30 year Critical Storm Duration. Lowest mass balance: 95.97%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1A	10	180.172	0.072	13.5	0.0114	0.0000	OK
30 minute winter	1B	26	179.771	0.320	10.4	4.0363	0.0000	SURCHARGED
15 minute winter	1	11	178.816	0.066	3.9	0.0105	0.0000	OK
15 minute winter	2	11	178.711	0.061	3.9	0.0096	0.0000	OK
15 minute winter	3	12	178.522	0.047	3.9	0.0074	0.0000	OK
15 minute winter	4	11	178.458	0.083	11.6	0.0942	0.0000	OK
15 minute winter	5	11	178.346	0.096	11.6	0.0188	0.0000	OK
360 minute winter	Soakaway	352	177.596	-0.629	3.1	19.9888	0.0000	OK
15 minute summer	Dummy pipe	1	178.175	0.000	0.0	0.0000	0.0000	OK
4320 minute winter	8	3120	177.770	0.670	0.1	0.1065	0.0000	FLOOD RISK
4320 minute winter	9	5340	177.769	0.869	0.2	0.1382	0.0000	SURCHARGED
4320 minute winter	Pump	4740	177.769	2.144	0.2	11.7054	0.0000	SURCHARGED
4320 minute winter	10	3840	177.769	0.519	0.0	0.0826	0.0000	SURCHARGED
15 minute winter	6	10	180.150	0.050	4.5	0.0080	0.0000	OK
15 minute winter	7	10	180.035	0.035	4.5	0.0056	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	1A	1.000	1B	13.4	0.898	0.464	0.3222	
30 minute winter	1B	Orifice	1	2.8				
15 minute winter	1	1.002	2	3.9	0.756	0.725	0.0642	
15 minute winter	2	1.003	3	3.9	0.811	0.637	0.0582	
15 minute winter	3	1.004	4	3.9	0.774	0.210	0.0665	
15 minute winter	4	1.005	5	11.6	1.057	0.503	0.0822	
15 minute winter	5	1.006	Soakaway	11.6	1.025	0.656	0.0285	
360 minute winter	Soakaway	Depth/Flow	Dummy pipe	0.0				0.0
360 minute winter	Soakaway	Infiltration		0.4				
4320 minute winter	8	2.000	9	0.1	0.212	0.006	0.3396	
4320 minute winter	9	2.001	Pump	0.2	0.334	0.013	0.1299	
4320 minute winter	Pump	Pump	3	0.0				
4320 minute winter	10	3.000	9	0.0	0.005	0.002	0.0350	
15 minute winter	6	4.000	7	4.5	1.397	0.383	0.0087	
15 minute winter	7	4.001	4	4.4	1.801	0.257	0.0488	

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Results for 100 year Critical Storm Duration. Lowest mass balance: 95.97%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1A	10	180.184	0.084	17.5	0.0133	0.0000	OK
30 minute winter	1B	27	179.810	0.360	13.6	6.0504	0.0000	SURCHARGED
15 minute winter	1	11	178.823	0.073	4.5	0.0115	0.0000	OK
15 minute winter	2	11	178.716	0.066	4.5	0.0105	0.0000	OK
15 minute winter	3	12	178.525	0.050	4.4	0.0079	0.0000	OK
15 minute winter	4	11	178.472	0.097	14.4	0.1101	0.0000	OK
15 minute winter	5	11	178.361	0.111	14.3	0.0218	0.0000	OK
240 minute winter	Soakaway	240	177.744	-0.481	4.6	27.0213	0.0000	OK
15 minute summer	Dummy pipe	1	178.175	0.000	0.0	0.0000	0.0000	OK
5760 minute winter	8	3420	177.850	0.750	0.2	0.1193	3.4357	FLOOD
720 minute winter	9	555	177.850	0.950	1.0	0.1511	0.0000	FLOOD RISK
720 minute summer	Pump	630	177.851	2.225	1.1	12.1489	0.0000	SURCHARGED
600 minute winter	10	510	177.851	0.601	0.1	0.0955	0.0000	SURCHARGED
15 minute winter	6	10	180.159	0.059	5.8	0.0094	0.0000	OK
15 minute winter	7	10	180.040	0.040	5.8	0.0064	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	1A	1.000	1B	17.4	1.112	0.602	0.3447	
30 minute winter	1B	Orifice	1	3.0				
15 minute winter	1	1.002	2	4.5	0.774	0.822	0.0712	
15 minute winter	2	1.003	3	4.4	0.832	0.721	0.0643	
15 minute winter	3	1.004	4	4.4	0.787	0.237	0.0779	
15 minute winter	4	1.005	5	14.3	1.097	0.622	0.0979	
15 minute winter	5	1.006	Soakaway	14.4	1.072	0.811	0.0337	
240 minute winter	Soakaway	Depth/Flow	Dummy pipe	0.0				0.0
240 minute winter	Soakaway	Infiltration		0.5				
5760 minute winter	8	2.000	9	-0.1	0.212	-0.006	0.3396	
720 minute winter	9	2.001	Pump	1.0	0.523	0.056	0.1299	
720 minute summer	Pump	Pump	3	0.0				
600 minute winter	10	3.000	9	0.1	0.554	0.006	0.0350	
15 minute winter	6	4.000	7	5.8	1.488	0.494	0.0105	
15 minute winter	7	4.001	4	5.7	1.859	0.334	0.0651	

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Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 95.97%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1A	10	180.221	0.121	24.5	0.0192	0.0000	OK
30 minute winter	1B	30	179.867	0.417	18.9	9.7043	0.0000	SURCHARGED
15 minute winter	1	11	178.837	0.087	5.4	0.0138	0.0000	OK
15 minute winter	2	11	178.726	0.076	5.3	0.0120	0.0000	OK
15 minute winter	3	12	178.530	0.054	5.3	0.0087	0.0000	OK
15 minute winter	4	11	178.503	0.128	19.4	0.1450	0.0000	OK
15 minute winter	5	11	178.400	0.150	19.2	0.0295	0.0000	SURCHARGED
360 minute winter	Soakaway	352	178.025	-0.200	4.8	40.3880	0.0000	OK
15 minute summer	Dummy pipe	1	178.175	0.000	0.0	0.0000	0.0000	OK
10080 minute winter	8	5160	177.850	0.750	0.2	0.1193	12.8286	FLOOD
960 minute winter	9	525	177.853	0.953	1.0	0.1515	0.0000	FLOOD RISK
960 minute winter	Pump	525	177.854	2.229	0.9	12.1657	0.0000	SURCHARGED
120 minute winter	10	102	177.853	0.603	0.7	0.0959	0.0000	SURCHARGED
15 minute winter	6	10	180.176	0.076	8.2	0.0121	0.0000	OK
15 minute winter	7	10	180.049	0.048	8.1	0.0077	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	1A	1.000	1B	24.0	1.388	0.833	0.4079	
30 minute winter	1B	Orifice	1	3.3				
15 minute winter	1	1.002	2	5.3	0.790	0.981	0.0836	
15 minute winter	2	1.003	3	5.3	0.857	0.858	0.0743	
15 minute winter	3	1.004	4	5.3	0.802	0.283	0.0988	
15 minute winter	4	1.005	5	19.2	1.133	0.833	0.1261	
15 minute winter	5	1.006	Soakaway	19.2	1.129	1.085	0.0421	
360 minute winter	Soakaway	Depth/Flow	Dummy pipe	0.0				0.0
360 minute winter	Soakaway	Infiltration		0.6				
10080 minute winter	8	2.000	9	-0.1	0.211	-0.006	0.3396	
960 minute winter	9	2.001	Pump	0.9	0.505	0.050	0.1299	
960 minute winter	Pump	Pump	3	0.0				
120 minute winter	10	3.000	9	0.4	0.842	0.026	0.0350	
15 minute winter	6	4.000	7	8.1	1.588	0.697	0.0138	
15 minute winter	7	4.001	4	8.1	1.859	0.471	0.1024	

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