

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	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)	1.000
Ratio-R	0.470	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	3.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S1	0.009	3.00	86.250	1200	505871.285	190439.471	0.750
S2			86.250	1200	505864.477	190430.115	0.943
S3	0.012	3.00	86.250	1200	505876.385	190421.906	1.184
S4	0.005	3.00	86.150	1200	505883.193	190417.164	0.650
S5	0.008	3.00	86.500	1200	505876.880	190390.615	1.231
S6	0.002	3.00	86.500	1200	505875.883	190372.579	0.927
S7			86.510	1200	505866.337	190373.141	0.776
S8	0.001	3.00	86.510	1200	505862.628	190374.517	0.710
S10			86.200	1200	505870.737	190413.934	1.501
S9	0.044	3.00	86.200	1200	505868.516	190413.204	1.386
OUT			85.900	1200	505874.412	190409.126	1.237

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	11.571	0.600	85.500	85.307	0.193	60.0	100	3.19	50.0
1.001	S2	S3	14.463	0.600	85.307	85.066	0.241	60.0	100	3.44	50.0
1.002	S3	S10	9.770	0.600	85.066	84.824	0.242	40.4	100	3.57	50.0
2.000	S4	S3	8.297	0.600	85.500	85.066	0.434	19.1	100	3.08	50.0
3.000	S8	S7	3.956	0.600	85.800	85.734	0.066	60.0	100	3.07	50.0
3.001	S7	S6	9.563	0.600	85.734	85.573	0.161	59.4	100	3.23	50.0
3.002	S6	S5	18.064	0.600	85.573	85.269	0.304	59.4	100	3.53	50.0
3.003	S5	S9	24.088	0.600	85.269	84.864	0.405	59.5	100	3.93	50.0
3.004	S9	S10	2.338	0.600	84.814	84.774	0.040	58.4	150	3.96	50.0
4.000	S10	OUT	6.052	0.600	84.699	84.663	0.036	168.1	225	4.06	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)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	0.996	7.8	1.2	0.650	0.843	0.009	0.0	27	0.727
1.001	0.996	7.8	1.2	0.843	1.084	0.009	0.0	27	0.727
1.002	1.217	9.6	3.5	1.084	1.276	0.026	0.0	42	1.122
2.000	1.774	13.9	0.7	0.550	1.084	0.005	0.0	15	0.918
3.000	0.996	7.8	0.1	0.610	0.676	0.001	0.0	9	0.360
3.001	1.001	7.9	0.1	0.676	0.827	0.001	0.0	9	0.362
3.002	1.001	7.9	0.4	0.827	1.131	0.003	0.0	15	0.515
3.003	1.000	7.9	1.5	1.131	1.236	0.011	0.0	29	0.765
3.004	1.318	23.3	7.5	1.236	1.276	0.055	0.0	58	1.175
4.000	1.005	40.0	11.0	1.276	1.012	0.081	0.0	80	0.860

Pipeline Schedule

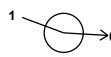
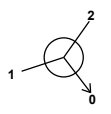
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	11.571	60.0	100	Circular	86.250	85.500	0.650	86.250	85.307	0.843
1.001	14.463	60.0	100	Circular	86.250	85.307	0.843	86.250	85.066	1.084
1.002	9.770	40.4	100	Circular	86.250	85.066	1.084	86.200	84.824	1.276
2.000	8.297	19.1	100	Circular	86.150	85.500	0.550	86.250	85.066	1.084
3.000	3.956	60.0	100	Circular	86.510	85.800	0.610	86.510	85.734	0.676
3.001	9.563	59.4	100	Circular	86.510	85.734	0.676	86.500	85.573	0.827
3.002	18.064	59.4	100	Circular	86.500	85.573	0.827	86.500	85.269	1.131
3.003	24.088	59.5	100	Circular	86.500	85.269	1.131	86.200	84.864	1.236
3.004	2.338	58.4	150	Circular	86.200	84.814	1.236	86.200	84.774	1.276
4.000	6.052	168.1	225	Circular	86.200	84.699	1.276	85.900	84.663	1.012

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	S10	1200	Manhole	Adoptable
2.000	S4	1200	Manhole	Adoptable	S3	1200	Manhole	Adoptable
3.000	S8	1200	Manhole	Adoptable	S7	1200	Manhole	Adoptable
3.001	S7	1200	Manhole	Adoptable	S6	1200	Manhole	Adoptable
3.002	S6	1200	Manhole	Adoptable	S5	1200	Manhole	Adoptable
3.003	S5	1200	Manhole	Adoptable	S9	1200	Manhole	Adoptable
3.004	S9	1200	Manhole	Adoptable	S10	1200	Manhole	Adoptable
4.000	S10	1200	Manhole	Adoptable	OUT	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1	505871.285	190439.471	86.250	0.750	1200		1.000	85.500	100
S2	505864.477	190430.115	86.250	0.943	1200		1.001	85.307	100
S3	505876.385	190421.906	86.250	1.184	1200		2.000	85.066	100
S4	505883.193	190417.164	86.150	0.650	1200		2.000	85.500	100
S5	505876.880	190390.615	86.500	1.231	1200		3.002	85.269	100
S6	505875.883	190372.579	86.500	0.927	1200		3.001	85.573	100
							3.002	85.573	100

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
S7	505866.337	190373.141	86.510	0.776	1200		1	3.000	85.734	100
						0	3.001	85.734	100	
S8	505862.628	190374.517	86.510	0.710	1200		0	3.000	85.800	100
S10	505870.737	190413.934	86.200	1.501	1200		1	3.004	84.774	150
						2	1.002	84.824	100	
						0	4.000	84.699	225	
S9	505868.516	190413.204	86.200	1.386	1200		1	3.003	84.864	100
						0	3.004	84.814	150	
OUT	505874.412	190409.126	85.900	1.237	1200		1	4.000	84.663	225

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.470	Additional Storage (m³/ha)	20.0
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 %)
1	0	0	0
30	0	0	0
100	40	0	0

Node S10 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	84.699	Product Number	CTL-SHE-0066-2000-1100-2000
Design Depth (m)	1.100	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node S10 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	85.620	Slope (1:X)	500.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	108	Depth (m)	0.350
Safety Factor	2.0	Width (m)	11.300	Inf Depth (m)	
Porosity	0.30	Length (m)	29.100		

Results for 1 year Critical Storm Duration. Lowest mass balance: 98.85%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	9	85.532	0.032	1.7	0.0438	0.0000	OK
30 minute winter	S2	29	85.519	0.212	1.5	0.2395	0.0000	SURCHARGED
30 minute winter	S3	28	85.519	0.453	3.3	0.6039	0.0000	SURCHARGED
30 minute winter	S4	27	85.519	0.019	0.6	0.0242	0.0000	OK
30 minute winter	S5	28	85.519	0.250	2.7	0.3149	0.0000	SURCHARGED
15 minute summer	S6	10	85.590	0.017	0.5	0.0195	0.0000	OK
15 minute winter	S7	11	85.745	0.011	0.2	0.0119	0.0000	OK
15 minute winter	S8	9	85.812	0.012	0.2	0.0135	0.0000	OK
30 minute winter	S10	28	85.518	0.819	5.1	0.9258	0.0000	SURCHARGED
30 minute winter	S9	28	85.518	0.704	6.4	1.2428	0.0000	SURCHARGED
15 minute summer	OUT	1	84.663	0.000	1.9	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	S1	1.000	S2	1.6	0.791	0.205	0.0490	
30 minute winter	S2	1.001	S3	1.1	0.429	0.139	0.1132	
30 minute winter	S3	1.002	S10	2.2	0.691	0.233	0.0764	
30 minute winter	S4	2.000	S3	0.6	0.346	0.043	0.0367	
30 minute winter	S5	3.003	S9	-1.5	0.512	-0.194	0.1885	
15 minute summer	S6	3.002	S5	0.5	0.314	0.060	0.0766	
15 minute winter	S7	3.001	S6	0.2	0.300	0.023	0.0059	
15 minute winter	S8	3.000	S7	0.2	0.516	0.026	0.0018	
30 minute winter	S10	Hydro-Brake®	OUT	1.9				7.1
30 minute winter	S9	3.004	S10	3.9	0.656	0.167	0.0412	

Results for 30 year Critical Storm Duration. Lowest mass balance: 98.85%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	12	85.798	0.298	4.7	0.4090	0.0000	SURCHARGED
15 minute winter	S2	12	85.786	0.479	6.2	0.5423	0.0000	SURCHARGED
15 minute winter	S3	12	85.770	0.704	8.4	0.9387	0.0000	SURCHARGED
15 minute winter	S4	12	85.773	0.273	4.2	0.3505	0.0000	SURCHARGED
15 minute winter	S5	11	85.762	0.493	7.5	0.6217	0.0000	SURCHARGED
15 minute winter	S6	12	85.761	0.188	2.6	0.2207	0.0000	SURCHARGED
15 minute winter	S7	12	85.765	0.031	0.6	0.0353	0.0000	OK
15 minute summer	S8	9	85.817	0.017	0.5	0.0200	0.0000	OK
60 minute winter	S10	59	85.730	1.031	12.7	9.0932	0.0000	SURCHARGED
60 minute winter	S9	58	85.730	0.916	9.5	1.6174	0.0000	SURCHARGED
15 minute summer	OUT	1	84.663	0.000	1.9	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 winter	S1	1.000	S2	3.2	0.879	0.414	0.0905	
15 minute winter	S2	1.001	S3	-3.0	0.472	-0.380	0.1132	
15 minute winter	S3	1.002	S10	5.2	0.701	0.541	0.0764	
15 minute winter	S4	2.000	S3	-2.1	0.417	-0.153	0.0649	
15 minute winter	S5	3.003	S9	-3.5	-0.445	-0.443	0.1885	
15 minute winter	S6	3.002	S5	-1.4	0.312	-0.174	0.1413	
15 minute winter	S7	3.001	S6	0.5	0.292	0.069	0.0474	
15 minute summer	S8	3.000	S7	0.5	0.563	0.058	0.0033	
60 minute winter	S10	Hydro-Brake®	OUT	1.9				21.0
60 minute winter	S9	3.004	S10	9.2	0.684	0.395	0.0412	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 98.85%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	12	86.158	0.658	6.9	0.9016	0.0000	FLOOD RISK
15 minute winter	S2	12	86.116	0.809	5.0	0.9152	0.0000	FLOOD RISK
15 minute winter	S3	12	86.063	0.997	11.3	1.3294	0.0000	FLOOD RISK
15 minute winter	S4	12	86.074	0.574	4.6	0.7381	0.0000	FLOOD RISK
15 minute winter	S5	12	85.956	0.687	8.7	0.8663	0.0000	SURCHARGED
15 minute winter	S6	12	85.970	0.397	5.8	0.4665	0.0000	SURCHARGED
15 minute winter	S7	12	85.971	0.237	3.8	0.2677	0.0000	SURCHARGED
15 minute winter	S8	12	85.970	0.170	1.7	0.1975	0.0000	SURCHARGED
120 minute winter	S10	116	85.887	1.188	14.3	24.7283	0.0000	SURCHARGED
120 minute winter	S9	116	85.887	1.073	10.2	1.8948	0.0000	SURCHARGED
15 minute summer	OUT	1	84.663	0.000	2.0	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	S1	1.000	S2	3.7	0.862	0.472	0.0905	
15 minute winter	S2	1.001	S3	3.6	0.503	0.463	0.1132	
15 minute winter	S3	1.002	S10	9.9	1.266	1.036	0.0764	
15 minute winter	S4	2.000	S3	2.0	0.424	0.145	0.0649	
15 minute winter	S5	3.003	S9	4.3	0.553	0.550	0.1885	
15 minute winter	S6	3.002	S5	-3.9	-0.492	-0.490	0.1413	
15 minute winter	S7	3.001	S6	-3.0	-0.393	-0.386	0.0748	
15 minute winter	S8	3.000	S7	-1.0	0.610	-0.131	0.0310	
120 minute winter	S10	Hydro-Brake®	OUT	2.1				41.3
120 minute winter	S9	3.004	S10	10.0	0.674	0.428	0.0412	