Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	75.0
Additional Flow (%)	0	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	0.300	Preferred Cover Depth (m)	1.200
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
H1	0.047	5.00	186.898	1200	420473.425	428493.054	1.421
H2	0.050	5.00	187.660	1200	420439.622	428478.202	2.430
S1	0.069	5.00	187.118	1500	420431.303	428451.936	1.950
S2	0.014	5.00	187.314	1500	420428.814	428460.647	2.297
S3	0.169	5.00	187.830	1500	420407.680	428454.611	3.035
S4	0.052	5.00	186.917	1500	420346.365	428456.584	2.717
Tank	0.000	5.00	185.501	300	420340.359	428433.126	2.751
S5	0.057	5.00	185.347	2100	420345.557	428433.061	3.097
CW			185.450	1200	420346.440	428428.331	2.798

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)	Design Flow (l/s)
1.000	H1	H2	36.922	0.600	185.477	185.230	0.247	149.5	225	5.58	75.0	
1.001	H2	S2	20.615	0.600	185.230	185.092	0.138	149.4	225	5.90	75.0	
2.000	S1	S2	9.060	0.600	185.168	185.092	0.076	119.2	225	5.13	75.0	
1.002	S2	S3	21.979	0.600	185.017	184.870	0.147	149.5	300	6.18	75.0	
1.003	S3	S4	61.347	0.600	184.795	184.200	0.595	103.1	375	6.76	75.0	
1.004	S4	S5	23.537	0.600	184.200	182.700	1.500	15.7	375	6.84	75.0	
3.000	Tank	S5	5.198	0.600	182.750	182.700	0.050	104.0	300	5.06	75.0	
1.005	S5	CW	4.812	0.600	182.700	182.652	0.048	100.2	150	6.92	75.0	3.5

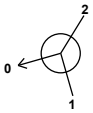
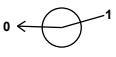
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.067	42.4	12.7	1.196	2.205	0.047	0.0	85	0.938
1.001	1.067	42.4	26.3	2.205	1.997	0.097	0.0	128	1.121
2.000	1.196	47.6	18.7	1.725	1.997	0.069	0.0	98	1.127
1.002	1.283	90.7	48.8	1.997	2.660	0.180	0.0	157	1.306
1.003	1.784	197.0	94.6	2.660	2.342	0.349	0.0	183	1.765
1.004	4.593	507.3	108.7	2.342	2.272	0.401	0.0	117	3.680
3.000	1.541	109.0	0.0	2.451	2.347	0.000	0.0	0	0.000
1.005	1.003	17.7	3.5	2.497	2.648	0.458	0.0	45	0.785

Pipeline Schedule

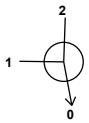
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	36.922	149.5	225	Circular_Default Sewer Type	186.898	185.477	1.196	187.660	185.230	2.205
1.001	20.615	149.4	225	Circular_Default Sewer Type	187.660	185.230	2.205	187.314	185.092	1.997
2.000	9.060	119.2	225	Circular_Default Sewer Type	187.118	185.168	1.725	187.314	185.092	1.997
1.002	21.979	149.5	300	Circular_Default Sewer Type	187.314	185.017	1.997	187.830	184.870	2.660
1.003	61.347	103.1	375	Circular_Default Sewer Type	187.830	184.795	2.660	186.917	184.200	2.342
1.004	23.537	15.7	375	Circular_Default Sewer Type	186.917	184.200	2.342	185.347	182.700	2.272
3.000	5.198	104.0	300	Circular_Default Sewer Type	185.501	182.750	2.451	185.347	182.700	2.347
1.005	4.812	100.2	150	Circular_Default Sewer Type	185.347	182.700	2.497	185.450	182.652	2.648

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	H1	1200	Manhole	Adoptable	H2	1200	Manhole	Adoptable
1.001	H2	1200	Manhole	Adoptable	S2	1500	Manhole	Adoptable
2.000	S1	1500	Manhole	Adoptable	S2	1500	Manhole	Adoptable
1.002	S2	1500	Manhole	Adoptable	S3	1500	Manhole	Adoptable
1.003	S3	1500	Manhole	Adoptable	S4	1500	Manhole	Adoptable
1.004	S4	1500	Manhole	Adoptable	S5	2100	Manhole	Adoptable
3.000	Tank	300	Manhole	Adoptable	S5	2100	Manhole	Adoptable
1.005	S5	2100	Manhole	Adoptable	CW	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
H1	420473.425	428493.054	186.898	1.421	1200	 0	1.000	185.477	225
H2	420439.622	428478.202	187.660	2.430	1200	1  0	1.000 1.001	185.230 185.230	225 225
S1	420431.303	428451.936	187.118	1.950	1500	 0	2.000	185.168	225
S2	420428.814	428460.647	187.314	2.297	1500	1 2  0	2.000 1.001 1.002	185.092 185.092 185.017	225 225 300
S3	420407.680	428454.611	187.830	3.035	1500	1  0	1.002 1.003	184.870 184.795	300 375
S4	420346.365	428456.584	186.917	2.717	1500	1  0	1.003 1.004	184.200 184.200	375 375
Tank	420340.359	428433.126	185.501	2.751	300	 0	3.000	182.750	300

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S5	420345.557	428433.061	185.347	3.097	2100		1	3.000	182.700	300
							2	1.004	182.700	375
							0	1.005	182.700	150
CW	420346.440	428428.331	185.450	2.798	1200		1	1.005	182.652	150

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	✓
Rainfall Events	Singular	Drain Down Time (mins)	240
FSR Region	England and Wales	Additional Storage (m³/ha)	0.0
M5-60 (mm)	17.000	Starting Level (m)	
Ratio-R	0.300	Check Discharge Rate(s)	✓
Summer CV	1.000	Check Discharge Volume	✓
Winter CV	1.000	100 year 360 minute (m³)	
Analysis Speed	Detailed		

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	45	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	1.95
Greenfield Method	IH124	Growth Factor 100 year	2.48
Positively Drained Area (ha)		Betterment (%)	0
SAAR (mm)		QBar	
Soil Index	1	Q 1 year (l/s)	
SPR	0.10	Q 30 year (l/s)	
Region	1	Q 100 year (l/s)	
Growth Factor 1 year	0.85		

Pre-development Discharge Volume

Site Makeup	Greenfield	Return Period (years)	100
Greenfield Method	FSR/FEH	Climate Change (%)	0
Positively Drained Area (ha)		Storm Duration (mins)	360
Soil Index	1	Betterment (%)	0
SPR	0.10	PR	
CWI		Runoff Volume (m³)	

Node S5 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	182.700	Product Number	CTL-SHE-0081-3500-1580-3500
Design Depth (m)	1.580	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	3.5	Min Node Diameter (mm)	1200

Node Tank Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	182.750
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	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)
0.000	286.0	0.0	1.450	286.0	0.0	1.451	0.0	0.0

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	84.280	23.848	30 year 240 minute winter	26.139	10.398
1 year 15 minute winter	59.144	23.848	30 year 360 minute summer	30.343	7.808
1 year 30 minute summer	57.102	16.158	30 year 360 minute winter	19.724	7.808
1 year 30 minute winter	40.072	16.158	30 year 480 minute summer	24.111	6.372
1 year 60 minute summer	40.398	10.676	30 year 480 minute winter	16.019	6.372
1 year 60 minute winter	26.839	10.676	30 year 600 minute summer	19.882	5.438
1 year 120 minute summer	26.432	6.985	30 year 600 minute winter	13.585	5.438
1 year 120 minute winter	17.561	6.985	30 year 720 minute summer	17.819	4.776
1 year 180 minute summer	21.115	5.434	30 year 720 minute winter	11.975	4.776
1 year 180 minute winter	13.725	5.434	30 year 960 minute summer	14.763	3.887
1 year 240 minute summer	17.197	4.545	30 year 960 minute winter	9.779	3.887
1 year 240 minute winter	11.425	4.545	30 year 1440 minute summer	10.836	2.904
1 year 360 minute summer	13.694	3.524	30 year 1440 minute winter	7.282	2.904
1 year 360 minute winter	8.901	3.524	100 year +45% CC 15 minute summer	382.027	108.100
1 year 480 minute summer	11.066	2.925	100 year +45% CC 15 minute winter	268.089	108.100
1 year 480 minute winter	7.352	2.925	100 year +45% CC 30 minute summer	264.212	74.763
1 year 600 minute summer	9.254	2.531	100 year +45% CC 30 minute winter	185.412	74.763
1 year 600 minute winter	6.323	2.531	100 year +45% CC 60 minute summer	187.417	49.529
1 year 720 minute summer	8.394	2.250	100 year +45% CC 60 minute winter	124.515	49.529
1 year 720 minute winter	5.641	2.250	100 year +45% CC 120 minute summer	120.234	31.774
1 year 960 minute summer	7.097	1.869	100 year +45% CC 120 minute winter	79.881	31.774
1 year 960 minute winter	4.701	1.869	100 year +45% CC 180 minute summer	93.863	24.154
1 year 1440 minute summer	5.374	1.440	100 year +45% CC 180 minute winter	61.013	24.154
1 year 1440 minute winter	3.611	1.440	100 year +45% CC 240 minute summer	74.679	19.735
30 year 15 minute summer	205.071	58.028	100 year +45% CC 240 minute winter	49.615	19.735
30 year 15 minute winter	143.910	58.028	100 year +45% CC 360 minute summer	57.145	14.705
30 year 30 minute summer	140.191	39.669	100 year +45% CC 360 minute winter	37.146	14.705
30 year 30 minute winter	98.380	39.669	100 year +45% CC 480 minute summer	45.177	11.939
30 year 60 minute summer	98.615	26.061	100 year +45% CC 480 minute winter	30.014	11.939
30 year 60 minute winter	65.517	26.061	100 year +45% CC 600 minute summer	37.095	10.146
30 year 120 minute summer	63.038	16.659	100 year +45% CC 600 minute winter	25.346	10.146
30 year 120 minute winter	41.881	16.659	100 year +45% CC 720 minute summer	33.125	8.878
30 year 180 minute summer	49.285	12.683	100 year +45% CC 720 minute winter	22.262	8.878
30 year 180 minute winter	32.037	12.683	100 year +45% CC 960 minute summer	27.277	7.183
30 year 240 minute summer	39.344	10.398	100 year +45% CC 960 minute winter	18.069	7.183

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +45% CC 1440 minute summer	19.835	5.316	100 year +45% CC 1440 minute winter	13.330	5.316

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.36%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	H1	10	185.536	0.058	6.5	0.0662	0.0000	OK
15 minute summer	H2	11	185.319	0.089	13.3	0.1003	0.0000	OK
15 minute summer	S1	10	185.240	0.072	9.5	0.1277	0.0000	OK
15 minute summer	S2	11	185.127	0.110	24.1	0.1949	0.0000	OK
15 minute summer	S3	11	184.928	0.133	46.4	0.2357	0.0000	OK
15 minute summer	S4	11	184.281	0.081	53.5	0.1439	0.0000	OK
600 minute summer	Tank	405	182.960	0.210	8.8	57.0653	0.0000	OK
15 minute summer	S5	10	183.543	0.843	61.1	2.9213	0.0000	SURCHARGED
15 minute winter	CW	8	182.694	0.042	3.0	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 summer	H1	1.000	H2	6.4	0.571	0.150	0.4179	
15 minute summer	H2	1.001	S2	13.0	0.925	0.307	0.2908	
15 minute summer	S1	2.000	S2	9.4	0.897	0.198	0.0949	
15 minute summer	S2	1.002	S3	24.2	1.068	0.267	0.4981	
15 minute summer	S3	1.003	S4	46.7	1.796	0.237	1.6162	
15 minute summer	S4	1.004	S5	53.6	0.853	0.106	1.5050	
600 minute summer	Tank	3.000	S5	-8.8	0.358	-0.081	0.3055	
15 minute summer	S5	1.005	CW	3.0	0.718	0.170	0.0203	22.8

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.36%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	H1	10	185.570	0.093	15.7	0.1054	0.0000	OK
15 minute summer	H2	11	185.384	0.154	32.2	0.1738	0.0000	OK
15 minute summer	S1	10	185.289	0.121	23.1	0.2146	0.0000	OK
15 minute summer	S2	11	185.205	0.188	58.5	0.3328	0.0000	OK
15 minute summer	S3	11	185.015	0.220	113.8	0.3892	0.0000	OK
15 minute summer	S4	10	184.339	0.139	129.8	0.2456	0.0000	OK
720 minute summer	Tank	570	183.346	0.596	19.3	161.8512	0.0000	SURCHARGED
15 minute summer	S5	9	184.016	1.316	152.6	4.5587	0.0000	SURCHARGED
15 minute winter	CW	9	182.695	0.043	3.2	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	H1	1.000	H2	15.5	0.703	0.365	0.8159	
15 minute summer	H2	1.001	S2	31.7	1.140	0.746	0.5725	
15 minute summer	S1	2.000	S2	22.9	1.104	0.481	0.1877	
15 minute summer	S2	1.002	S3	58.8	1.325	0.649	0.9756	
15 minute summer	S3	1.003	S4	113.2	2.234	0.574	3.1945	
15 minute summer	S4	1.004	S5	134.4	1.570	0.265	1.7349	
720 minute summer	Tank	3.000	S5	-19.3	-0.274	-0.177	0.3660	
15 minute summer	S5	1.005	CW	3.1	0.724	0.177	0.0208	41.2

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.36%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	H1	11	185.827	0.350	29.3	0.3957	0.0000	SURCHARGED
15 minute summer	H2	11	185.707	0.477	56.9	0.5400	0.0000	SURCHARGED
15 minute summer	S1	11	185.485	0.317	43.1	0.5604	0.0000	SURCHARGED
15 minute summer	S2	11	185.401	0.384	105.0	0.6790	0.0000	SURCHARGED
15 minute summer	S3	11	185.147	0.352	205.0	0.6216	0.0000	OK
15 minute summer	S4	10	184.499	0.299	234.8	0.5282	0.0000	OK
960 minute winter	Tank	915	184.101	1.351	20.2	367.2079	0.0000	SURCHARGED
15 minute winter	S5	8	184.281	1.581	262.2	5.4770	0.0000	SURCHARGED
15 minute winter	CW	8	182.697	0.045	3.5	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	H1	1.000	H2	27.1	0.779	0.639	1.4684	
15 minute summer	H2	1.001	S2	56.3	1.416	1.327	0.8199	
15 minute summer	S1	2.000	S2	41.2	1.177	0.866	0.3603	
15 minute summer	S2	1.002	S3	104.4	1.482	1.151	1.5206	
15 minute summer	S3	1.003	S4	203.9	2.380	1.035	6.1108	
15 minute summer	S4	1.004	S5	247.3	2.381	0.487	2.4067	
960 minute winter	Tank	3.000	S5	-20.2	-0.287	-0.185	0.3660	
15 minute winter	S5	1.005	CW	3.5	0.745	0.195	0.0224	45.8