

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)	17.000	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	✓

Nodes

Name	Area (ha)	T of E (mins)	Add Inflow (l/s)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1		5.00		52.442	1350	385545.523	398339.899	1.686
2				52.400	1350	385535.719	398335.163	1.779
3				52.556	1350	385511.999	398338.788	2.237
4				50.861	1350	385474.241	398301.400	1.206
5				51.652	1350	385470.060	398295.685	2.085
6				51.195	1350	385458.939	398284.127	1.829
7	0.007	5.00	0.0	51.062	1350	385457.022	398271.376	1.857
8		5.00		51.970	1350	385525.451	398306.451	0.814
9				52.050	1350	385498.441	398283.408	1.337
10	0.032	5.00		51.899	1350	385472.124	398260.490	1.623
11	0.020	5.00		51.328	600	385456.665	398243.761	1.336
12	0.034	5.00		50.514	600	385428.814	398247.778	1.414
13	0.055	5.00		50.762	1350	385443.944	398261.726	1.783
13_OUT				50.000	1350	385439.076	398269.222	1.110
GEO E		5.00		50.952		385453.777	398258.810	1.052

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)
1.007	13	13_OUT	8.938	0.600	48.979	48.890	0.089	100.4	225	6.74	50.0
1.006	7	13	16.253	0.600	49.205	49.002	0.203	80.1	225	6.62	50.0
4.000	GEO E	13	10.256	0.600	49.900	49.788	0.112	91.6	225	5.13	50.0
2.003	11	13	22.014	0.600	49.992	49.788	0.204	107.9	225	6.35	50.0
3.000	12	13	20.578	0.600	49.100	48.979	0.121	170.1	225	5.34	50.0
2.002	10	11	22.778	0.600	50.276	49.992	0.284	80.2	225	6.06	50.0
2.001	9	10	34.897	0.600	50.713	50.276	0.437	79.9	225	5.80	50.0
2.000	8	9	35.504	0.600	51.156	50.713	0.443	80.1	225	5.40	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)
1.007	1.304	51.9	20.1	1.558	0.885	0.148	0.0	97	1.223
1.006	1.462	58.1	0.9	1.632	1.535	0.007	0.0	20	0.542
4.000	1.367	54.3	0.0	0.827	0.749	0.000	0.0	0	0.000
2.003	1.258	50.0	7.0	1.111	0.749	0.052	0.0	57	0.893
3.000	0.999	39.7	4.6	1.189	1.558	0.034	0.0	51	0.670
2.002	1.461	58.1	4.3	1.398	1.111	0.032	0.0	42	0.868
2.001	1.464	58.2	0.0	1.112	1.398	0.000	0.0	0	0.000
2.000	1.462	58.1	0.0	0.589	1.112	0.000	0.0	0	0.000

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)
1.005	6	7	12.894	0.600	49.366	49.205	0.161	80.1	225	6.44	50.0
1.004	5	6	16.039	0.600	49.567	49.366	0.201	79.8	225	6.29	50.0
1.003	4	5	7.081	0.600	49.655	49.567	0.088	80.5	150	6.11	50.0
1.002	3	4	53.137	0.600	50.319	49.655	0.664	80.0	225	6.00	50.0
1.001	2	3	24.114	0.600	50.621	50.319	0.302	79.8	225	5.40	50.0
1.000	1	2	10.780	0.600	50.756	50.621	0.135	79.9	225	5.12	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)
1.005	1.462	58.1	0.0	1.604	1.632	0.000	0.0	0	0.000
1.004	1.465	58.2	0.0	1.860	1.604	0.000	0.0	0	0.000
1.003	1.121	19.8	0.0	1.056	1.935	0.000	0.0	0	0.000
1.002	1.463	58.2	0.0	2.012	0.981	0.000	0.0	0	0.000
1.001	1.464	58.2	0.0	1.554	2.012	0.000	0.0	0	0.000
1.000	1.464	58.2	0.0	1.461	1.554	0.000	0.0	0	0.000

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)
1.007	8.938	100.4	225	Circular	50.762	48.979	1.558	50.000	48.890	0.885
1.006	16.253	80.1	225	Circular	51.062	49.205	1.632	50.762	49.002	1.535
4.000	10.256	91.6	225	Circular	50.952	49.900	0.827	50.762	49.788	0.749
2.003	22.014	107.9	225	Circular	51.328	49.992	1.111	50.762	49.788	0.749
3.000	20.578	170.1	225	Circular	50.514	49.100	1.189	50.762	48.979	1.558
2.002	22.778	80.2	225	Circular	51.899	50.276	1.398	51.328	49.992	1.111
2.001	34.897	79.9	225	Circular	52.050	50.713	1.112	51.899	50.276	1.398
2.000	35.504	80.1	225	Circular	51.970	51.156	0.589	52.050	50.713	1.112
1.005	12.894	80.1	225	Circular	51.195	49.366	1.604	51.062	49.205	1.632
1.004	16.039	79.8	225	Circular	51.652	49.567	1.860	51.195	49.366	1.604
1.003	7.081	80.5	150	Circular	50.861	49.655	1.056	51.652	49.567	1.935
1.002	53.137	80.0	225	Circular	52.556	50.319	2.012	50.861	49.655	0.981
1.001	24.114	79.8	225	Circular	52.400	50.621	1.554	52.556	50.319	2.012
1.000	10.780	79.9	225	Circular	52.442	50.756	1.461	52.400	50.621	1.554

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.007	13	1350	Manhole	Adoptable	13_OUT	1350	Manhole	Adoptable
1.006	7	1350	Manhole	Adoptable	13	1350	Manhole	Adoptable
4.000	GEO E		Junction		13	1350	Manhole	Adoptable
2.003	11	600	Manhole	Adoptable	13	1350	Manhole	Adoptable
3.000	12	600	Manhole	Adoptable	13	1350	Manhole	Adoptable
2.002	10	1350	Manhole	Adoptable	11	600	Manhole	Adoptable
2.001	9	1350	Manhole	Adoptable	10	1350	Manhole	Adoptable
2.000	8	1350	Manhole	Adoptable	9	1350	Manhole	Adoptable
1.005	6	1350	Manhole	Adoptable	7	1350	Manhole	Adoptable
1.004	5	1350	Manhole	Adoptable	6	1350	Manhole	Adoptable
1.003	4	1350	Manhole	Adoptable	5	1350	Manhole	Adoptable
1.002	3	1350	Manhole	Adoptable	4	1350	Manhole	Adoptable
1.001	2	1350	Manhole	Adoptable	3	1350	Manhole	Adoptable
1.000	1	1350	Manhole	Adoptable	2	1350	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
1	385545.523	398339.899	52.442	1.686	1350		0	1.000	50.756	225
2	385535.719	398335.163	52.400	1.779	1350		1	1.000	50.621	225
							0	1.001	50.621	225
3	385511.999	398338.788	52.556	2.237	1350		1	1.001	50.319	225
							0	1.002	50.319	225
4	385474.241	398301.400	50.861	1.206	1350		1	1.002	49.655	225
							0	1.003	49.655	150
5	385470.060	398295.685	51.652	2.085	1350		1	1.003	49.567	150
							0	1.004	49.567	225
6	385458.939	398284.127	51.195	1.829	1350		1	1.004	49.366	225
							0	1.005	49.366	225
7	385457.022	398271.376	51.062	1.857	1350		1	1.005	49.205	225
							0	1.006	49.205	225
8	385525.451	398306.451	51.970	0.814	1350		0	2.000	51.156	225
9	385498.441	398283.408	52.050	1.337	1350		1	2.000	50.713	225
							0	2.001	50.713	225
10	385472.124	398260.490	51.899	1.623	1350		1	2.001	50.276	225
							0	2.002	50.276	225
11	385456.665	398243.761	51.328	1.336	600		1	2.002	49.992	225
							0	2.003	49.992	225
12	385428.814	398247.778	50.514	1.414	600		0	3.000	49.100	225
13	385443.944	398261.726	50.762	1.783	1350		1	4.000	49.788	225
							2	3.000	48.979	225
							3	2.003	49.788	225
							4	1.006	49.002	225
							0	1.007	48.979	225

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
13_OUT	385439.076	398269.222	50.000	1.110	1350	1	1.007	48.890	225
									
GEO E	385453.777	398258.810	50.952	1.052		0	4.000	49.900	225
									

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	17.000	Drain Down Time (mins)	240
Ratio-R	0.400	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 13 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	48.979	Product Number	CTL-SHE-0054-1500-1350-1500
Design Depth (m)	1.350	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.5	Min Node Diameter (mm)	1200

Node 6 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	49.366	Product Number	CTL-SHE-0052-1500-1500-1500
Design Depth (m)	1.500	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.5	Min Node Diameter (mm)	1200

Node 7 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	50.717
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	0

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	55.0	0.0	0.250	55.0	0.0	0.251	0.0	0.0

Node 11 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	50.983
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	0

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	203.0	0.0	0.250	203.0	0.0	0.251	0.0	0.0

Node 12 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	50.169
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	108

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	379.0	0.0	0.250	379.0	0.0	0.251	0.0	0.0

Node 13 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	50.417
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	0

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	550.0	0.0	0.250	550.0	0.0	0.251	0.0	0.0

Node GEO E Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	49.900
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	153.0	0.0	0.400	153.0	0.0	0.401	0.0	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 98.08%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	1	50.756	0.000	0.0	0.0000	0.0000	OK
15 minute summer	2	1	50.621	0.000	0.0	0.0000	0.0000	OK
15 minute summer	3	1	50.319	0.000	0.0	0.0000	0.0000	OK
180 minute winter	4	144	49.836	0.181	0.7	0.2595	0.0000	SURCHARGED
180 minute winter	5	144	49.836	0.269	0.9	0.3855	0.0000	SURCHARGED
180 minute winter	6	144	49.836	0.470	1.1	0.6731	0.0000	SURCHARGED
30 minute winter	7	22	49.960	0.755	5.3	1.1371	0.0000	SURCHARGED
15 minute summer	8	1	51.156	0.000	0.0	0.0000	0.0000	OK
15 minute summer	9	1	50.713	0.000	0.0	0.0000	0.0000	OK
15 minute winter	10	11	50.314	0.038	3.8	0.0697	0.0000	OK
15 minute winter	11	11	50.045	0.053	6.1	0.0311	0.0000	OK
30 minute winter	12	22	49.960	0.860	3.5	0.6568	0.0000	SURCHARGED
30 minute winter	13	22	49.959	0.980	10.8	2.0066	0.0000	SURCHARGED
15 minute summer	13_OUT	1	48.890	0.000	1.3	0.0000	0.0000	OK
60 minute winter	GEO E	48	49.915	0.015	4.7	2.1203	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	1.000	2	0.0	0.000	0.000	0.0000	
15 minute summer	2	1.001	3	0.0	0.000	0.000	0.0000	
15 minute summer	3	1.002	4	0.0	0.000	0.000	0.0035	
180 minute winter	4	1.003	5	-0.7	-0.065	-0.035	0.1247	
180 minute winter	5	1.004	6	-0.9	-0.026	-0.015	0.6379	
180 minute winter	6	Hydro-Brake®	7	0.8				
30 minute winter	7	1.006	13	-4.7	-0.126	-0.080	0.6464	
15 minute summer	8	2.000	9	0.0	0.000	0.000	0.0000	
15 minute summer	9	2.001	10	0.0	0.000	0.000	0.0755	
15 minute winter	10	2.002	11	3.7	0.642	0.063	0.1326	
15 minute winter	11	2.003	13	6.0	0.842	0.119	0.3607	
30 minute winter	12	3.000	13	1.9	0.161	0.047	0.8184	
30 minute winter	13	Hydro-Brake®	13_OUT	1.3				9.9
60 minute winter	GEO E	4.000	13	-4.7	-0.367	-0.087	0.1543	

Results for 30 year Critical Storm Duration. Lowest mass balance: 98.08%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	1	50.756	0.000	0.0	0.0000	0.0000	OK
15 minute summer	2	1	50.621	0.000	0.0	0.0000	0.0000	OK
15 minute summer	3	1	50.319	0.000	0.0	0.0000	0.0000	OK
180 minute winter	4	192	50.031	0.376	0.8	0.5378	0.0000	SURCHARGED
180 minute winter	5	192	50.031	0.464	0.9	0.6637	0.0000	SURCHARGED
180 minute winter	6	192	50.031	0.665	1.1	0.9513	0.0000	SURCHARGED
15 minute winter	7	10	50.070	0.865	11.8	1.3031	0.0000	SURCHARGED
15 minute summer	8	1	51.156	0.000	0.0	0.0000	0.0000	OK
15 minute summer	9	1	50.713	0.000	0.0	0.0000	0.0000	OK
15 minute winter	10	10	50.336	0.060	9.3	0.1093	0.0000	OK
15 minute winter	11	11	50.083	0.091	14.9	0.0529	0.0000	OK
15 minute winter	12	10	50.085	0.985	9.9	0.7527	0.0000	SURCHARGED
15 minute winter	13	11	50.070	1.091	40.6	2.2352	0.0000	SURCHARGED
15 minute summer	13_OUT	1	48.890	0.000	1.4	0.0000	0.0000	OK
180 minute winter	GEO E	176	50.036	0.136	7.6	19.7919	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	1.000	2	0.0	0.000	0.000	0.0000	
15 minute summer	2	1.001	3	0.0	0.000	0.000	0.0000	
15 minute summer	3	1.002	4	0.0	0.000	0.000	1.0567	
180 minute winter	4	1.003	5	-0.8	-0.072	-0.038	0.1247	
180 minute winter	5	1.004	6	-0.9	-0.025	-0.016	0.6379	
180 minute winter	6	Hydro-Brake®	7	0.1				
15 minute winter	7	1.006	13	-10.2	-0.260	-0.175	0.6464	
15 minute summer	8	2.000	9	0.0	0.000	0.000	0.0000	
15 minute summer	9	2.001	10	0.0	0.000	0.000	0.1431	
15 minute winter	10	2.002	11	9.1	0.812	0.156	0.2661	
15 minute winter	11	2.003	13	15.4	0.939	0.308	0.6029	
15 minute winter	12	3.000	13	9.4	0.237	0.237	0.8184	
15 minute winter	13	Hydro-Brake®	13_OUT	1.4				18.0
180 minute winter	GEO E	4.000	13	-7.6	-0.388	-0.140	0.3328	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 98.08%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	1	50.756	0.000	0.0	0.0000	0.0000	OK
15 minute summer	2	1	50.621	0.000	0.0	0.0000	0.0000	OK
15 minute summer	3	1	50.319	0.000	0.0	0.0000	0.0000	OK
360 minute winter	4	368	50.219	0.564	0.7	0.8075	0.0000	SURCHARGED
360 minute winter	5	368	50.219	0.652	0.9	0.9333	0.0000	SURCHARGED
360 minute winter	6	360	50.219	0.853	1.1	1.2209	0.0000	SURCHARGED
240 minute winter	7	236	50.223	1.018	1.6	1.5347	0.0000	SURCHARGED
15 minute summer	8	1	51.156	0.000	0.0	0.0000	0.0000	OK
15 minute summer	9	1	50.713	0.000	0.0	0.0000	0.0000	OK
15 minute winter	10	10	50.357	0.081	16.8	0.1486	0.0000	OK
15 minute summer	11	10	50.264	0.272	25.7	0.1580	0.0000	SURCHARGED
240 minute winter	12	236	50.223	1.123	4.6	7.0963	0.0000	FLOOD RISK
240 minute winter	13	236	50.223	1.244	13.9	2.5485	0.0000	SURCHARGED
15 minute summer	13_OUT	1	48.890	0.000	1.4	0.0000	0.0000	OK
240 minute winter	GEO E	236	50.223	0.323	12.1	47.0138	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	1	1.000	2	0.0	0.000	0.000	0.0000	
15 minute summer	2	1.001	3	0.0	0.000	0.000	0.0000	
15 minute summer	3	1.002	4	0.0	0.000	0.000	1.0567	
360 minute winter	4	1.003	5	-0.7	-0.059	-0.037	0.1247	
360 minute winter	5	1.004	6	-0.9	-0.025	-0.016	0.6379	
360 minute winter	6	Hydro-Brake®	7	0.1				
240 minute winter	7	1.006	13	-1.4	0.036	-0.025	0.6464	
15 minute summer	8	2.000	9	0.0	0.000	0.000	0.0000	
15 minute summer	9	2.001	10	0.0	0.000	0.000	0.2186	
15 minute winter	10	2.002	11	16.4	0.888	0.283	0.6003	
15 minute summer	11	2.003	13	26.2	0.929	0.523	0.8755	
240 minute winter	12	3.000	13	3.4	0.130	0.086	0.8184	
240 minute winter	13	Hydro-Brake®	13_OUT	1.5				38.7
240 minute winter	GEO E	4.000	13	-12.1	-0.369	-0.223	0.4079	