

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)	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	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
RE10	0.100	5.00	4.200	600	561343.642	175223.270	1.650
Ex. SMH1	0.050	5.00	4.140	1050	561429.291	175118.136	2.132
S10	0.100	5.00	4.140	1050	561437.856	175107.980	2.185
S20	0.090	5.00	3.900	1050	561462.013	175130.379	2.077
Ex. SMH2	0.050	5.00	3.900	1200	561458.359	175136.330	2.105
Ex. SMH3	0.110	5.00	3.960	1200	561412.113	175190.487	2.450
SW-FCC	0.220	5.00	4.100	1500	561369.265	175241.618	2.757
Ex. SW Outfall MH			4.100	1200	561360.953	175258.843	2.844

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	RE10	Ex. SMH1	135.606	0.600	2.550	2.008	0.542	250.0	450	6.76	47.5
1.001	Ex. SMH1	S10	13.285	0.600	2.008	1.955	0.053	250.0	450	6.94	46.9
1.002	S10	S20	32.944	0.600	1.955	1.823	0.132	250.0	450	7.37	45.6
1.003	S20	Ex. SMH2	6.983	0.600	1.823	1.795	0.028	250.0	450	7.46	45.3
1.004	Ex. SMH2	Ex. SMH3	71.216	0.600	1.795	1.510	0.285	250.0	450	8.38	42.6
1.005	Ex. SMH3	SW-FCC	66.711	0.600	1.510	1.343	0.167	400.0	450	9.48	39.9
1.006	SW-FCC	Ex. SW Outfall MH	19.126	0.600	1.343	1.256	0.087	220.0	450	9.72	39.4

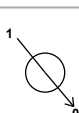
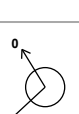
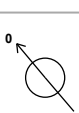
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.281	203.7	12.9	1.200	1.682	0.100	0.0	76	0.728
1.001	1.281	203.7	19.1	1.682	1.735	0.150	0.0	92	0.813
1.002	1.281	203.7	30.9	1.735	1.627	0.250	0.0	117	0.933
1.003	1.281	203.7	41.7	1.627	1.655	0.340	0.0	138	1.016
1.004	1.281	203.7	45.0	1.655	2.000	0.390	0.0	143	1.036
1.005	1.010	160.7	54.1	2.000	2.307	0.500	0.0	180	0.915
1.006	1.366	217.3	76.9	2.307	2.394	0.720	0.0	184	1.252

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	135.606	250.0	450	Circular	4.200	2.550	1.200	4.140	2.008	1.682
1.001	13.285	250.0	450	Circular	4.140	2.008	1.682	4.140	1.955	1.735
1.002	32.944	250.0	450	Circular	4.140	1.955	1.735	3.900	1.823	1.627
1.003	6.983	250.0	450	Circular	3.900	1.823	1.627	3.900	1.795	1.655
1.004	71.216	250.0	450	Circular	3.900	1.795	1.655	3.960	1.510	2.000
1.005	66.711	400.0	450	Circular	3.960	1.510	2.000	4.100	1.343	2.307
1.006	19.126	220.0	450	Circular	4.100	1.343	2.307	4.100	1.256	2.394

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	RE10	600	Manhole	Adoptable	Ex. SMH1	1050	Manhole	Adoptable
1.001	Ex. SMH1	1050	Manhole	Adoptable	S10	1050	Manhole	Adoptable
1.002	S10	1050	Manhole	Adoptable	S20	1050	Manhole	Adoptable
1.003	S20	1050	Manhole	Adoptable	Ex. SMH2	1200	Manhole	Adoptable
1.004	Ex. SMH2	1200	Manhole	Adoptable	Ex. SMH3	1200	Manhole	Adoptable
1.005	Ex. SMH3	1200	Manhole	Adoptable	SW-FCC	1500	Manhole	Adoptable
1.006	SW-FCC	1500	Manhole	Adoptable	Ex. SW Outfall MH	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
RE10	561343.642	175223.270	4.200	1.650	600		0	1.000	2.550	450
Ex. SMH1	561429.291	175118.136	4.140	2.132	1050		1	1.001	2.008	450
S10	561437.856	175107.980	4.140	2.185	1050		1	1.002	1.955	450
S20	561462.013	175130.379	3.900	2.077	1050		1	1.003	1.823	450
Ex. SMH2	561458.359	175136.330	3.900	2.105	1200		1	1.004	1.795	450
Ex. SMH3	561412.113	175190.487	3.960	2.450	1200		1	1.005	1.510	450
SW-FCC	561369.265	175241.618	4.100	2.757	1500		1	1.006	1.343	450

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
Ex. SW Outfall MH	561360.953	175258.843	4.100	2.844	1200	1	1.006	1.256	450



Simulation Settings

Rainfall Methodology	FSR	Drain Down Time (mins)	240
FSR Region	England and Wales	Additional Storage (m³/ha)	20.0
M5-60 (mm)	20.000	Check Discharge Rate(s)	✓
Ratio-R	0.400	1 year (l/s)	1.3
Summer CV	0.750	30 year (l/s)	3.7
Winter CV	0.840	100 year (l/s)	5.0
Analysis Speed	Normal	Check Discharge Volume	x
Skip Steady State	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	20	0	0
100	40	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)	0.720	Betterment (%)	0
SAAR (mm)	549	QBar	1.6
Soil Index	3	Q 1 year (l/s)	
SPR	0.37	Q 30 year (l/s)	
Region	7	Q 100 year (l/s)	
Growth Factor 1 year	0.85		

Node SW-FCC Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	1.343	Product Number	CTL-SHE-0198-1980-1000-1980
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	19.8	Min Node Diameter (mm)	1500

Node SW-FCC Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	1.343
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	148

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	125.0	0.0	1.600	125.0	0.0	1.601	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	109.521	30.991	100 year +20% CC 15 minute summer	418.486	118.417
1 year 15 minute winter	76.857	30.991	100 year +20% CC 15 minute winter	293.674	118.417
1 year 30 minute summer	71.439	20.215	100 year +20% CC 30 minute summer	274.758	77.747
1 year 30 minute winter	50.133	20.215	100 year +20% CC 30 minute winter	192.813	77.747
1 year 60 minute summer	48.435	12.800	100 year +20% CC 60 minute summer	183.946	48.611
1 year 60 minute winter	32.179	12.800	100 year +20% CC 60 minute winter	122.209	48.611
1 year 120 minute summer	30.053	7.942	100 year +20% CC 120 minute summer	111.074	29.354
1 year 120 minute winter	19.966	7.942	100 year +20% CC 120 minute winter	73.795	29.354
1 year 180 minute summer	23.233	5.979	100 year +20% CC 180 minute summer	83.767	21.556
1 year 180 minute winter	15.102	5.979	100 year +20% CC 180 minute winter	54.451	21.556
1 year 240 minute summer	18.475	4.882	100 year +20% CC 240 minute summer	65.123	17.210
1 year 240 minute winter	12.274	4.882	100 year +20% CC 240 minute winter	43.266	17.210
1 year 360 minute summer	14.169	3.646	100 year +20% CC 360 minute summer	48.580	12.501
1 year 360 minute winter	9.210	3.646	100 year +20% CC 360 minute winter	31.578	12.501
1 year 480 minute summer	11.185	2.956	100 year +20% CC 480 minute summer	37.697	9.962
1 year 480 minute winter	7.431	2.956	100 year +20% CC 480 minute winter	25.045	9.962
1 year 600 minute summer	9.182	2.511	100 year +20% CC 600 minute summer	30.518	8.347
1 year 600 minute winter	6.274	2.511	100 year +20% CC 600 minute winter	20.851	8.347
1 year 720 minute summer	8.203	2.199	100 year +20% CC 720 minute summer	26.943	7.221
1 year 720 minute winter	5.513	2.199	100 year +20% CC 720 minute winter	18.107	7.221
1 year 960 minute summer	6.768	1.782	100 year +20% CC 960 minute summer	21.799	5.740
1 year 960 minute winter	4.483	1.782	100 year +20% CC 960 minute winter	14.440	5.740
1 year 1440 minute summer	4.949	1.326	100 year +20% CC 1440 minute summer	15.476	4.148
1 year 1440 minute winter	3.326	1.326	100 year +20% CC 1440 minute winter	10.401	4.148
30 year 15 minute summer	268.706	76.035	100 year +40% CC 15 minute summer	488.233	138.153
30 year 15 minute winter	188.566	76.035	100 year +40% CC 15 minute winter	342.620	138.153
30 year 30 minute summer	174.929	49.499	100 year +40% CC 30 minute summer	320.551	90.705
30 year 30 minute winter	122.757	49.499	100 year +40% CC 30 minute winter	224.948	90.705
30 year 60 minute summer	116.589	30.811	100 year +40% CC 60 minute summer	214.603	56.713
30 year 60 minute winter	77.459	30.811	100 year +40% CC 60 minute winter	142.577	56.713
30 year 120 minute summer	70.438	18.615	100 year +40% CC 120 minute summer	129.587	34.246
30 year 120 minute winter	46.797	18.615	100 year +40% CC 120 minute winter	86.094	34.246
30 year 180 minute summer	53.298	13.715	100 year +40% CC 180 minute summer	97.729	25.149
30 year 180 minute winter	34.645	13.715	100 year +40% CC 180 minute winter	63.526	25.149
30 year 240 minute summer	41.604	10.995	100 year +40% CC 240 minute summer	75.977	20.078
30 year 240 minute winter	27.641	10.995	100 year +40% CC 240 minute winter	50.477	20.078
30 year 360 minute summer	31.221	8.034	100 year +40% CC 360 minute summer	56.677	14.585
30 year 360 minute winter	20.295	8.034	100 year +40% CC 360 minute winter	36.841	14.585
30 year 480 minute summer	24.324	6.428	100 year +40% CC 480 minute summer	43.979	11.622
30 year 480 minute winter	16.160	6.428	100 year +40% CC 480 minute winter	29.219	11.622
30 year 600 minute summer	19.756	5.404	100 year +40% CC 600 minute summer	35.604	9.738
30 year 600 minute winter	13.498	5.404	100 year +40% CC 600 minute winter	24.327	9.738
30 year 720 minute summer	17.490	4.687	100 year +40% CC 720 minute summer	31.433	8.424
30 year 720 minute winter	11.754	4.687	100 year +40% CC 720 minute winter	21.125	8.424
30 year 960 minute summer	14.215	3.743	100 year +40% CC 960 minute summer	25.432	6.697
30 year 960 minute winter	9.416	3.743	100 year +40% CC 960 minute winter	16.847	6.697
30 year 1440 minute summer	10.161	2.723	100 year +40% CC 1440 minute summer	18.055	4.839
30 year 1440 minute winter	6.829	2.723	100 year +40% CC 1440 minute winter	12.134	4.839

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.48%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	RE10	11	2.626	0.076	14.1	0.1139	0.0000	OK
15 minute winter	Ex. SMH1	12	2.105	0.097	19.7	0.1295	0.0000	OK
15 minute winter	S10	11	2.069	0.114	30.2	0.2028	0.0000	OK
15 minute winter	S20	11	1.977	0.154	41.4	0.2673	0.0000	OK
15 minute winter	Ex. SMH2	12	1.939	0.144	47.3	0.2305	0.0000	OK
15 minute winter	Ex. SMH3	12	1.699	0.189	60.4	0.3837	0.0000	OK
60 minute winter	SW-FCC	47	1.634	0.291	50.6	37.2923	0.0000	OK
15 minute summer	Ex. SW Outfall MH	1	1.256	0.000	19.0	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	RE10	1.000	Ex. SMH1	13.1	0.654	0.064	2.8578	
15 minute winter	Ex. SMH1	1.001	S10	18.0	0.651	0.088	0.3749	
15 minute winter	S10	1.002	S20	29.5	0.750	0.145	1.3094	
15 minute winter	S20	1.003	Ex. SMH2	40.7	0.894	0.200	0.3183	
15 minute winter	Ex. SMH2	1.004	Ex. SMH3	46.5	0.878	0.228	3.7980	
15 minute winter	Ex. SMH3	1.005	SW-FCC	59.1	1.207	0.368	4.1196	
60 minute winter	SW-FCC	Hydro-Brake®	Ex. SW Outfall MH	19.7				75.9

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.48%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	RE10	11	2.670	0.120	34.6	0.1795	0.0000	OK
15 minute winter	Ex. SMH1	12	2.184	0.176	49.1	0.2344	0.0000	OK
60 minute winter	S10	57	2.166	0.211	43.1	0.3766	0.0000	OK
60 minute winter	S20	57	2.167	0.344	58.6	0.5969	0.0000	OK
60 minute winter	Ex. SMH2	57	2.167	0.372	67.2	0.5980	0.0000	OK
60 minute winter	Ex. SMH3	57	2.166	0.656	86.1	1.3307	0.0000	SURCHARGED
60 minute winter	SW-FCC	59	2.166	0.823	105.9	105.5795	0.0000	SURCHARGED
15 minute summer	Ex. SW Outfall MH	1	1.256	0.000	19.8	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	RE10	1.000	Ex. SMH1	32.8	0.777	0.161	6.1198	
15 minute winter	Ex. SMH1	1.001	S10	46.6	0.776	0.229	0.8365	
60 minute winter	S10	1.002	S20	43.0	0.815	0.211	3.3498	
60 minute winter	S20	1.003	Ex. SMH2	58.6	0.975	0.288	0.9443	
60 minute winter	Ex. SMH2	1.004	Ex. SMH3	67.1	0.943	0.329	10.6360	
60 minute winter	Ex. SMH3	1.005	SW-FCC	70.0	0.904	0.436	10.5699	
60 minute winter	SW-FCC	Hydro-Brake®	Ex. SW Outfall MH	19.8				183.8

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 99.48%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	RE10	100	2.747	0.197	17.1	0.2943	0.0000	OK
120 minute winter	Ex. SMH1	102	2.747	0.739	25.6	0.9865	0.0000	SURCHARGED
120 minute winter	S10	102	2.746	0.791	40.5	1.4086	0.0000	SURCHARGED
120 minute winter	S20	100	2.748	0.925	55.2	1.6034	0.0000	SURCHARGED
120 minute winter	Ex. SMH2	98	2.746	0.951	57.9	1.5270	0.0000	SURCHARGED
120 minute winter	Ex. SMH3	100	2.745	1.235	71.9	2.5052	0.0000	SURCHARGED
120 minute winter	SW-FCC	100	2.743	1.400	99.2	179.6539	0.0000	SURCHARGED
15 minute summer	Ex. SW Outfall MH	1	1.256	0.000	19.8	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)
120 minute winter	RE10	1.000	Ex. SMH1	17.1	0.628	0.084	15.2603	
120 minute winter	Ex. SMH1	1.001	S10	23.8	0.675	0.117	2.1049	
120 minute winter	S10	1.002	S20	40.2	0.783	0.197	5.2198	
120 minute winter	S20	1.003	Ex. SMH2	49.9	0.932	0.245	1.1064	
120 minute winter	Ex. SMH2	1.004	Ex. SMH3	55.3	0.823	0.271	11.2837	
120 minute winter	Ex. SMH3	1.005	SW-FCC	64.0	0.858	0.399	10.5699	
120 minute winter	SW-FCC	Hydro-Brake®	Ex. SW Outfall MH	23.2				349.5

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.48%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	RE10	98	3.723	1.173	19.9	1.7530	0.0000	SURCHARGED
120 minute winter	Ex. SMH1	98	3.722	1.714	30.8	2.2882	0.0000	SURCHARGED
120 minute winter	S10	98	3.723	1.768	44.9	3.1490	0.0000	SURCHARGED
120 minute winter	S20	96	3.722	1.899	57.7	3.2905	0.0000	FLOOD RISK
120 minute winter	Ex. SMH2	98	3.725	1.930	63.8	3.0992	0.0000	FLOOD RISK
120 minute winter	Ex. SMH3	96	3.723	2.213	80.5	4.4905	0.0000	FLOOD RISK
120 minute winter	SW-FCC	96	3.724	2.381	120.1	208.0692	0.0000	SURCHARGED
15 minute summer	Ex. SW Outfall MH	1	1.256	0.000	19.9	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)
120 minute winter	RE10	1.000	Ex. SMH1	19.9	0.645	0.097	21.4859	
120 minute winter	Ex. SMH1	1.001	S10	26.2	0.677	0.128	2.1049	
120 minute winter	S10	1.002	S20	41.8	0.793	0.205	5.2198	
120 minute winter	S20	1.003	Ex. SMH2	54.5	0.951	0.267	1.1064	
120 minute winter	Ex. SMH2	1.004	Ex. SMH3	60.0	0.818	0.294	11.2837	
120 minute winter	Ex. SMH3	1.005	SW-FCC	79.1	0.882	0.493	10.5699	
120 minute winter	SW-FCC	Hydro-Brake®	Ex. SW Outfall MH	30.0				404.7