

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)	0.200
Ratio-R	0.300	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)	Easting (m)	Northing (m)	Depth (m)
HW1			73.000	450	301699.002	514484.326	1.200
HW2			73.000	450	301687.786	514474.672	1.250
SW1	0.070	5.00	78.912	1200	301748.005	514628.248	2.512
SW2	0.025	5.00	79.014	1200	301751.598	514622.794	2.754
SW3	0.070	5.00	77.433	1350	301733.070	514594.764	1.377
SW4	0.071	5.00	74.831	1350	301658.181	514566.877	1.356
SW5	0.198	5.00	74.644	1350	301683.236	514566.920	1.519
SW6	0.079	5.00	75.995	1500	301732.423	514566.471	3.150
SW7	0.028	5.00	75.516	1350	301741.093	514546.004	2.764
SW8	0.085	5.00	81.094	1200	301808.531	514565.264	3.269
SW9	0.035	5.00	81.245	1200	301813.874	514557.416	3.495
SW10	0.022	5.00	80.286	1200	301806.159	514539.467	2.836
SW11	0.087	5.00	79.112	1200	301806.332	514514.755	1.799
SW12	0.029	5.00	77.729	1350	301781.335	514515.778	1.379
SW13	0.067	5.00	76.720	1800	301763.977	514524.451	4.173
SW14			75.174	1500	301747.073	514505.487	2.691
SW15	0.064	5.00	74.109	1500	301734.154	514502.307	1.659
SW16	0.140	5.00	73.403	1500	301705.292	514500.762	1.503
SW17			73.233	1500	301705.581	514490.264	1.383
SW18FC			73.087	1800	301679.783	514470.826	1.437
OUTFALL			73.000	1200	301666.626	514463.365	1.450

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)
S17A	HW2	SW18FC	8.879	0.600	71.750	71.700	0.050	177.6	300	8.00	50.0
S1	SW1	SW2	6.531	0.600	76.400	76.335	0.065	100.5	150	5.11	50.0
S2	SW2	SW3	33.600	0.600	76.260	76.056	0.204	164.7	225	5.66	50.0
S3	SW3	SW6	28.300	0.600	76.056	74.500	1.556	18.2	225	5.81	50.0
S4	SW4	SW5	25.055	0.600	73.475	73.275	0.200	125.3	225	5.36	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)
S17A	1.176	83.2	145.0	0.950	1.087	1.070	0.0	300	1.192
S1	1.002	17.7	9.5	2.362	2.529	0.070	0.0	78	1.020
S2	1.016	40.4	12.9	2.529	1.152	0.095	0.0	87	0.906
S3	3.082	122.6	22.4	1.152	1.270	0.165	0.0	65	2.356
S4	1.167	46.4	9.6	1.131	1.144	0.071	0.0	69	0.922

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)
S5	SW5	SW6	49.189	0.600	73.125	72.920	0.205	239.9	375	6.06	50.0
S6	SW6	SW7	22.227	0.600	72.845	72.752	0.093	239.0	450	6.34	50.0
S7	SW7	SW13	31.436	0.600	72.752	72.622	0.130	241.8	450	6.75	50.0
S8	SW8	SW9	9.494	0.600	77.825	77.750	0.075	126.6	225	5.14	50.0
S9	SW9	SW10	19.537	0.600	77.750	77.450	0.300	65.1	225	5.34	50.0
S10	SW10	SW11	24.713	0.600	77.450	77.313	0.137	180.4	225	5.76	50.0
S11	SW11	SW12	25.019	0.600	77.313	76.350	0.963	26.0	225	5.92	50.0
S12	SW12	SW13	19.404	0.600	76.350	75.500	0.850	22.8	225	6.04	50.0
S13	SW13	SW14	25.405	0.600	72.547	72.483	0.064	397.0	525	7.13	50.0
S14	SW14	SW15	13.304	0.600	72.483	72.450	0.033	403.2	525	7.33	50.0
S15	SW15	SW16	28.904	0.600	72.450	71.900	0.550	52.6	525	7.48	50.0
S16	SW16	SW17	10.503	0.600	71.900	71.850	0.050	210.1	525	7.59	50.0
S17	SW17	HW1	8.862	0.600	71.850	71.800	0.050	177.2	525	7.68	50.0
S18	SW18FC	OUTFALL	15.125	0.600	71.650	71.550	0.100	151.3	225	8.24	50.0
1.009	HW1	HW2	14.799	0.600	71.800	71.750	0.050	296.0	525	7.87	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)
S5	1.165	128.7	36.5	1.144	2.700	0.269	0.0	136	1.006
S6	1.310	208.4	69.5	2.700	2.314	0.513	0.0	179	1.185
S7	1.303	207.2	73.3	2.314	3.648	0.541	0.0	184	1.194
S8	1.160	46.1	11.5	3.044	3.270	0.085	0.0	76	0.965
S9	1.623	64.5	16.3	3.270	2.611	0.120	0.0	77	1.359
S10	0.970	38.6	19.2	2.611	1.574	0.142	0.0	112	0.969
S11	2.577	102.5	31.0	1.574	1.154	0.229	0.0	85	2.267
S12	2.750	109.3	35.0	1.154	0.995	0.258	0.0	87	2.456
S13	1.118	242.0	117.4	3.648	2.166	0.866	0.0	258	1.109
S14	1.109	240.1	117.4	2.166	1.134	0.866	0.0	259	1.103
S15	3.094	669.8	126.0	1.134	0.978	0.930	0.0	153	2.399
S16	1.541	333.7	145.0	0.978	0.858	1.070	0.0	242	1.489
S17	1.679	363.5	145.0	0.858	0.675	1.070	0.0	230	1.588
S18	1.061	42.2	145.0	1.212	1.225	1.070	0.0	225	1.080
1.009	1.296	280.7	145.0	0.675	0.725	1.070	0.0	268	1.307

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
Rainfall Events	Singular	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	20.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.300	Starting Level (m)	
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 %)
1	0	0	0
30	0	0	0
100	50	0	0

Node SW18FC Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	71.650	Product Number	CTL-SHE-0197-2020-1150-2020
Design Depth (m)	1.150	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	20.2	Min Node Diameter (mm)	1500

Node HW2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	71.800
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)
0.000	590.0	0.0	1.000	590.0	0.0	1.001	0.0	0.0

Node SW5 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	74.275	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	2	Depth (m)	
Safety Factor	2.0	Width (m)	9.000	Inf Depth (m)	
Porosity	0.30	Length (m)	10.000		

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.83%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	HW1	12	72.042	0.242	129.7	0.0385	0.0000	OK
120 minute winter	HW2	90	71.916	0.166	52.1	69.0417	0.0000	OK
15 minute winter	SW1	10	76.482	0.082	9.0	0.1388	0.0000	OK
15 minute winter	SW2	10	76.347	0.087	12.0	0.1147	0.0000	OK
15 minute winter	SW3	11	76.120	0.064	20.8	0.1558	0.0000	OK
15 minute winter	SW4	10	73.543	0.068	9.1	0.1690	0.0000	OK
15 minute winter	SW5	11	73.257	0.132	34.2	0.5342	0.0000	OK
15 minute winter	SW6	11	73.029	0.184	63.4	0.4179	0.0000	OK
15 minute winter	SW7	11	72.937	0.185	67.0	0.3025	0.0000	OK
15 minute winter	SW8	10	77.904	0.079	10.9	0.1306	0.0000	OK
15 minute winter	SW9	10	77.824	0.074	15.3	0.0982	0.0000	OK
15 minute winter	SW10	11	77.561	0.111	17.9	0.1428	0.0000	OK
15 minute winter	SW11	10	77.396	0.083	28.7	0.1736	0.0000	OK
15 minute winter	SW12	11	76.438	0.088	32.1	0.1628	0.0000	OK
15 minute winter	SW13	11	72.801	0.254	107.3	0.7273	0.0000	OK
15 minute winter	SW14	11	72.704	0.221	106.4	0.3910	0.0000	OK
15 minute winter	SW15	11	72.595	0.145	113.2	0.3682	0.0000	OK
15 minute winter	SW16	12	72.172	0.272	129.1	0.9886	0.0000	OK
15 minute winter	SW17	12	72.110	0.260	129.0	0.4589	0.0000	OK
120 minute winter	SW18FC	90	71.912	0.262	19.8	0.6661	0.0000	SURCHARGED
15 minute summer	OUTFALL	1	71.550	0.000	18.9	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	HW1	1.009	HW2	130.4	2.245	0.465	0.8960	
120 minute winter	HW2	S17A	SW18FC	19.8	0.745	0.239	0.4141	
15 minute winter	SW1	S1	SW2	8.8	0.949	0.499	0.0609	
15 minute winter	SW2	S2	SW3	11.8	1.019	0.293	0.3930	
15 minute winter	SW3	S3	SW6	20.5	2.267	0.167	0.2562	
15 minute winter	SW4	S4	SW5	8.8	0.893	0.190	0.2480	
15 minute winter	SW5	S5	SW6	33.4	0.982	0.259	1.6713	
15 minute winter	SW6	S6	SW7	63.6	1.040	0.305	1.3608	
15 minute winter	SW7	S7	SW13	67.0	1.132	0.323	1.8871	
15 minute winter	SW8	S8	SW9	10.8	0.909	0.234	0.1127	
15 minute winter	SW9	S9	SW10	15.1	0.987	0.234	0.3006	
15 minute winter	SW10	S10	SW11	17.8	1.090	0.462	0.4045	
15 minute winter	SW11	S11	SW12	28.6	2.072	0.279	0.3450	
15 minute winter	SW12	S12	SW13	32.3	2.329	0.295	0.2689	
15 minute winter	SW13	S13	SW14	106.4	1.122	0.440	2.4103	
15 minute winter	SW14	S14	SW15	105.7	1.594	0.440	0.8973	
15 minute winter	SW15	S15	SW16	113.4	1.424	0.169	2.3282	
15 minute winter	SW16	S16	SW17	129.0	1.176	0.387	1.1528	
15 minute winter	SW17	S17	HW1	129.7	1.275	0.357	0.9022	
120 minute winter	SW18FC	Hydro-Brake®	OUTFALL	19.8				151.2

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.83%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	HW1	11	72.199	0.399	314.6	0.0634	0.0000	OK
120 minute winter	HW2	116	72.183	0.433	120.1	226.4921	0.0000	SURCHARGED
15 minute winter	SW1	10	76.604	0.204	22.0	0.3449	0.0000	SURCHARGED
15 minute winter	SW2	10	76.407	0.147	29.2	0.1926	0.0000	OK
15 minute winter	SW3	11	76.161	0.105	50.6	0.2558	0.0000	OK
15 minute winter	SW4	10	73.588	0.113	22.3	0.2809	0.0000	OK
15 minute winter	SW5	10	73.352	0.227	83.9	0.9158	0.0000	OK
15 minute winter	SW6	11	73.191	0.346	156.6	0.7843	0.0000	OK
15 minute winter	SW7	11	73.104	0.351	163.9	0.5743	0.0000	OK
15 minute winter	SW8	10	77.961	0.136	26.7	0.2251	0.0000	OK
15 minute winter	SW9	10	77.877	0.127	37.5	0.1691	0.0000	OK
15 minute winter	SW10	11	77.683	0.233	44.3	0.2990	0.0000	SURCHARGED
15 minute winter	SW11	10	77.455	0.142	69.8	0.2985	0.0000	OK
15 minute winter	SW12	11	76.504	0.154	78.2	0.2850	0.0000	OK
15 minute winter	SW13	11	72.994	0.447	260.3	1.2817	0.0000	OK
15 minute winter	SW14	11	72.845	0.362	259.2	0.6393	0.0000	OK
15 minute winter	SW15	11	72.689	0.239	277.2	0.6081	0.0000	OK
15 minute winter	SW16	11	72.426	0.526	318.1	1.9101	0.0000	SURCHARGED
15 minute winter	SW17	11	72.320	0.470	315.8	0.8301	0.0000	OK
120 minute winter	SW18FC	116	72.178	0.528	20.7	1.3446	0.0000	SURCHARGED
15 minute summer	OUTFALL	1	71.550	0.000	20.2	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 winter	HW1	1.009	HW2	315.6	2.850	1.124	1.7268	
120 minute winter	HW2	S17A	SW18FC	20.7	0.744	0.249	0.6253	
15 minute winter	SW1	S1	SW2	21.4	1.216	1.207	0.1113	
15 minute winter	SW2	S2	SW3	29.0	1.275	0.717	0.7625	
15 minute winter	SW3	S3	SW6	50.2	2.867	0.410	0.4955	
15 minute winter	SW4	S4	SW5	21.7	1.127	0.468	0.4847	
15 minute winter	SW5	S5	SW6	82.2	1.110	0.639	3.7716	
15 minute winter	SW6	S6	SW7	155.6	1.197	0.746	2.9286	
15 minute winter	SW7	S7	SW13	162.8	1.199	0.786	4.2920	
15 minute winter	SW8	S8	SW9	26.5	1.122	0.574	0.2291	
15 minute winter	SW9	S9	SW10	37.4	1.173	0.580	0.6029	
15 minute winter	SW10	S10	SW11	42.5	1.345	1.101	0.8129	
15 minute winter	SW11	S11	SW12	69.2	2.498	0.675	0.6923	
15 minute winter	SW12	S12	SW13	77.7	2.839	0.711	0.5308	
15 minute winter	SW13	S13	SW14	259.2	1.452	1.071	4.5059	
15 minute winter	SW14	S14	SW15	258.3	2.026	1.076	1.6935	
15 minute winter	SW15	S15	SW16	276.7	1.647	0.413	4.5056	
15 minute winter	SW16	S16	SW17	315.8	1.491	0.946	2.2044	
15 minute winter	SW17	S17	HW1	314.6	1.678	0.865	1.6833	
120 minute winter	SW18FC	Hydro-Brake®	OUTFALL	20.2				350.9

Results for 100 year +50% CC Critical Storm Duration. Lowest mass balance: 99.83%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	HW1	232	72.767	0.967	142.7	0.1538	0.0000	FLOOD RISK
240 minute winter	HW2	232	72.766	1.016	142.5	570.4232	0.0000	FLOOD RISK
15 minute winter	SW1	11	77.126	0.726	42.6	1.2252	0.0000	SURCHARGED
15 minute winter	SW2	11	76.645	0.385	54.0	0.5056	0.0000	SURCHARGED
15 minute winter	SW3	11	76.215	0.159	93.5	0.3880	0.0000	OK
15 minute winter	SW4	12	74.516	1.041	43.2	2.5812	0.0000	SURCHARGED
15 minute winter	SW5	12	74.391	1.266	151.1	8.1140	0.0000	FLOOD RISK
15 minute winter	SW6	12	74.188	1.343	260.1	3.0477	0.0000	SURCHARGED
15 minute winter	SW7	12	74.004	1.252	257.8	2.0458	0.0000	SURCHARGED
15 minute winter	SW8	12	79.180	1.355	51.8	2.2364	0.0000	SURCHARGED
15 minute winter	SW9	12	79.096	1.346	61.6	1.7915	0.0000	SURCHARGED
15 minute winter	SW10	12	78.808	1.358	67.7	1.7465	0.0000	SURCHARGED
15 minute winter	SW11	12	78.319	1.006	112.2	2.1110	0.0000	SURCHARGED
15 minute winter	SW12	12	77.013	0.663	121.8	1.2272	0.0000	SURCHARGED
15 minute winter	SW13	12	73.739	1.192	411.4	3.4162	0.0000	SURCHARGED
15 minute winter	SW14	12	73.465	0.982	410.1	1.7356	0.0000	SURCHARGED
15 minute winter	SW15	11	73.280	0.830	442.0	2.1072	0.0000	SURCHARGED
15 minute winter	SW16	11	72.936	1.036	518.1	3.7592	0.0000	SURCHARGED
240 minute winter	SW17	228	72.767	0.917	143.7	1.6199	0.0000	SURCHARGED
240 minute winter	SW18FC	232	72.761	1.111	20.6	2.8277	0.0000	SURCHARGED
15 minute summer	OUTFALL	1	71.550	0.000	20.2	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)
240 minute winter	HW1	1.009	HW2	142.5	1.080	0.508	3.1971	
240 minute winter	HW2	S17A	SW18FC	20.6	0.743	0.247	0.6253	
15 minute winter	SW1	S1	SW2	39.7	2.256	2.242	0.1150	
15 minute winter	SW2	S2	SW3	53.4	1.415	1.323	1.1704	
15 minute winter	SW3	S3	SW6	93.7	3.275	0.765	0.8097	
15 minute winter	SW4	S4	SW5	38.5	1.157	0.830	0.9965	
15 minute winter	SW5	S5	SW6	142.7	1.294	1.109	5.4254	
15 minute winter	SW6	S6	SW7	241.8	1.526	1.160	3.5217	
15 minute winter	SW7	S7	SW13	255.7	1.614	1.234	4.9808	
15 minute winter	SW8	S8	SW9	41.1	1.084	0.891	0.3776	
15 minute winter	SW9	S9	SW10	56.0	1.408	0.868	0.7770	
15 minute winter	SW10	S10	SW11	67.2	1.690	1.742	0.9829	
15 minute winter	SW11	S11	SW12	107.5	2.702	1.049	0.9950	
15 minute winter	SW12	S12	SW13	121.3	3.051	1.110	0.7716	
15 minute winter	SW13	S13	SW14	410.1	1.899	1.695	5.4883	
15 minute winter	SW14	S14	SW15	411.6	1.987	1.714	2.8741	
15 minute winter	SW15	S15	SW16	444.1	2.056	0.663	6.2442	
15 minute winter	SW16	S16	SW17	514.0	2.380	1.541	2.2690	
240 minute winter	SW17	S17	HW1	142.7	0.985	0.393	1.9145	
240 minute winter	SW18FC	Hydro-Brake®	OUTFALL	20.2				505.1