

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)	20.000	Minimum Backdrop Height (m)	0.000
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	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)
2	0.026	4.00	103.225	1500	446827.975	298435.873	1.725
4	0.075	4.00	103.272	1200	446810.241	298434.819	1.972
6	0.021	4.00	102.875	1200	446786.983	298437.712	1.825
8	0.096	4.00	102.544	1200	446769.787	298434.220	1.644
26	0.086	4.00	102.631	1500	446639.578	298416.752	1.916
28	0.031	4.00	102.795	1500	446656.206	298414.802	2.204
30	0.055	4.00	102.575	1500	446685.792	298407.266	2.210
32	0.086	4.00	102.445	1500	446698.111	298406.845	2.171
38	0.107	4.00	104.800	1500	446744.022	298363.178	1.600
40	0.138	4.00	105.193	1200	446727.915	298355.670	2.193
42	0.036	4.00	103.126	1500	446714.603	298384.099	1.676
34	0.060	4.00	102.332	1500	446710.024	298407.875	2.332
36	0.036	4.00	102.162	1500	446725.922	298412.950	2.262
10	0.102	4.00	102.104	1800	446740.677	298420.282	2.314
12	0.042	4.00	100.900	1500	446726.400	298450.945	1.650
14	0.090	4.00	100.182	1500	446714.363	298468.838	1.682
16	0.316	4.00	99.400	1500	446699.195	298489.152	1.800
18	0.000		99.000	1500	446683.941	298497.192	1.550
20			99.000		446660.779	298508.738	1.600
22			99.300	3000	446660.585	298514.942	1.920
24			98.312		446661.007	298522.272	1.062

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	2	4	17.765	0.600	101.500	101.300	0.200	88.8	300	4.18	50.0
1.001	4	6	23.437	0.600	101.300	101.050	0.250	93.7	300	4.42	50.0
1.002	6	8	17.547	0.600	101.050	100.900	0.150	117.0	300	4.62	50.0
1.003	8	10	32.275	0.600	100.900	99.940	0.960	33.6	300	4.82	50.0
2.000	26	28	16.742	0.600	100.715	100.591	0.124	135.0	300	4.21	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	1.669	118.0	3.5	1.425	1.672	0.026	0.0	35	0.757
1.001	1.624	114.8	13.7	1.672	1.525	0.101	0.0	69	1.103
1.002	1.452	102.7	16.5	1.525	1.344	0.122	0.0	81	1.076
1.003	2.720	192.3	29.5	1.344	1.864	0.218	0.0	79	1.985
2.000	1.351	95.5	11.7	1.616	1.904	0.086	0.0	71	0.926

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)
2.001	28	30	30.531	0.600	100.591	100.365	0.226	135.1	300	4.58	50.0
2.002	30	32	12.326	0.600	100.365	100.274	0.091	135.5	300	4.74	50.0
2.003	32	34	11.957	0.600	100.274	100.150	0.124	96.4	300	4.86	50.0
3.000	38	40	17.771	0.600	103.200	103.000	0.200	88.9	300	4.18	50.0
3.001	40	42	31.391	0.600	103.000	101.450	1.550	20.3	300	4.33	50.0
3.002	42	34	24.213	0.600	101.450	100.150	1.300	18.6	300	4.44	50.0
2.004	34	36	16.688	0.600	100.000	99.900	0.100	166.9	450	5.04	50.0
2.005	36	10	16.476	0.600	99.900	99.790	0.110	149.8	450	5.20	50.0
1.004	10	12	33.824	0.600	99.790	99.250	0.540	62.6	450	5.42	50.0
1.005	12	14	21.565	0.600	99.250	98.500	0.750	28.8	450	5.52	50.0
1.006	14	16	25.352	0.600	98.500	97.750	0.750	33.8	450	5.64	50.0
1.007	16	18	17.243	0.600	97.600	97.450	0.150	115.0	600	5.76	50.0
1.008	18	20	25.880	0.600	97.450	97.400	0.050	517.6	600	6.17	50.0
1.009	20	22	6.207	0.600	97.400	97.380	0.020	310.4	450	6.26	50.0
1.010	22	24	7.342	0.600	97.380	97.250	0.130	56.5	300	6.32	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)
2.001	1.351	95.5	15.9	1.904	1.910	0.117	0.0	82	1.008
2.002	1.349	95.3	23.3	1.910	1.871	0.172	0.0	100	1.119
2.003	1.601	113.2	35.0	1.871	1.882	0.258	0.0	114	1.415
3.000	1.668	117.9	14.5	1.300	1.893	0.107	0.0	71	1.144
3.001	3.509	248.0	33.2	1.893	1.376	0.245	0.0	74	2.466
3.002	3.659	258.7	38.1	1.376	1.882	0.281	0.0	77	2.639
2.004	1.571	249.8	81.2	1.882	1.812	0.599	0.0	176	1.410
2.005	1.659	263.8	86.1	1.812	1.864	0.635	0.0	176	1.489
1.004	2.572	409.0	129.4	1.864	1.200	0.955	0.0	174	2.294
1.005	3.802	604.7	135.1	1.200	1.232	0.997	0.0	144	3.089
1.006	3.506	557.5	147.3	1.232	1.200	1.087	0.0	157	2.977
1.007	2.270	641.9	190.1	1.200	0.950	1.403	0.0	223	1.990
1.008	1.063	300.6	190.1	0.950	1.000	1.403	0.0	347	1.122
1.009	1.148	182.6	190.1	1.150	1.470	1.403	0.0	392	1.293
1.010	2.096	148.2	190.1	1.620	0.762	1.403	0.0	300	2.123

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	✓
Rainfall Events	Singular	Drain Down Time (mins)	1440
FSR Region	England and Wales	Additional Storage (m³/ha)	0.0
M5-60 (mm)	20.000	Starting Level (m)	
Ratio-R	0.400	Check Discharge Rate(s)	✓
Summer CV	0.750	Check Discharge Volume	✓
Winter CV	0.840	100 year 360 minute (m³)	
Analysis Speed	Normal		

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 %)
2	0	0	0
30	0	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)		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 22 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	97.380	Product Number	CTL-SHE-0152-1180-1320-1180
Design Depth (m)	1.320	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	11.8	Min Node Diameter (mm)	1200

Node 22 Online Weir Control

Flap Valve	x	Invert Level (m)	98.700	Discharge Coefficient	0.590
Replaces Downstream Link	✓	Width (m)	3.000		

Node 20 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	97.400
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	536

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	565.0	0.0	1.300	968.0	0.0	1.600	1075.0	0.0

Results for 2 year Critical Storm Duration. Lowest mass balance: 98.94%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	2	10	101.542	0.042	5.0	0.0739	0.0000	OK
15 minute summer	4	10	101.385	0.085	19.5	0.0958	0.0000	OK
15 minute summer	6	10	101.153	0.103	23.5	0.1163	0.0000	OK
15 minute winter	8	10	100.998	0.098	42.0	0.1111	0.0000	OK
15 minute winter	26	10	100.804	0.089	16.6	0.1566	0.0000	OK
15 minute summer	28	10	100.690	0.099	22.6	0.1748	0.0000	OK
15 minute summer	30	10	100.503	0.138	33.4	0.2440	0.0000	OK
15 minute winter	32	10	100.428	0.154	49.7	0.2720	0.0000	OK
15 minute winter	38	10	103.288	0.088	20.6	0.1562	0.0000	OK
15 minute winter	40	10	103.090	0.090	47.2	0.1013	0.0000	OK
15 minute summer	42	10	101.547	0.097	54.0	0.1710	0.0000	OK
15 minute winter	34	10	100.246	0.246	115.2	0.4348	0.0000	OK
15 minute winter	36	10	100.142	0.242	121.8	0.4278	0.0000	OK
15 minute winter	10	10	100.019	0.229	182.7	0.5828	0.0000	OK
15 minute winter	12	10	99.436	0.186	189.9	0.3287	0.0000	OK
15 minute winter	14	10	98.707	0.207	205.9	0.3665	0.0000	OK
15 minute winter	16	10	97.935	0.335	264.1	0.5920	0.0000	OK
15 minute winter	18	11	97.822	0.372	261.7	0.6574	0.0000	OK
240 minute winter	20	188	97.690	0.290	49.1	177.1111	0.0000	OK
240 minute winter	22	188	97.690	0.310	11.9	2.1927	0.0000	SURCHARGED
15 minute summer	24	1	97.250	0.000	10.7	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	2	1.000	4	5.0	0.463	0.042	0.1976	
15 minute summer	4	1.001	6	19.5	1.039	0.170	0.4413	
15 minute summer	6	1.002	8	23.5	1.138	0.229	0.3630	
15 minute winter	8	1.003	10	41.9	2.148	0.218	0.6290	
15 minute winter	26	2.000	28	16.6	0.884	0.174	0.3146	
15 minute summer	28	2.001	30	22.8	0.880	0.238	0.7922	
15 minute summer	30	2.002	32	33.1	0.975	0.347	0.4193	
15 minute winter	32	2.003	34	49.3	1.457	0.436	0.4048	
15 minute winter	38	3.000	40	20.6	1.179	0.175	0.3105	
15 minute winter	40	3.001	42	47.1	2.533	0.190	0.5846	
15 minute summer	42	3.002	34	54.3	2.784	0.210	0.4724	
15 minute winter	34	2.004	36	114.9	1.309	0.460	1.4650	
15 minute winter	36	2.005	10	121.1	1.457	0.459	1.3835	
15 minute winter	10	1.004	12	181.8	2.556	0.444	2.4161	
15 minute winter	12	1.005	14	188.5	2.846	0.312	1.4354	
15 minute winter	14	1.006	16	204.4	3.091	0.367	1.6834	
15 minute winter	16	1.007	18	261.7	1.539	0.408	2.9522	
15 minute winter	18	1.008	20	290.1	3.139	0.965	2.7632	
240 minute winter	20	1.009	22	11.9	0.298	0.065	0.6973	
240 minute winter	22	Hydro-Brake®	24	11.7				279.2
240 minute winter	22	Weir	24	0.0				0.0

Results for 30 year Critical Storm Duration. Lowest mass balance: 98.94%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	2	10	101.557	0.057	9.5	0.1009	0.0000	OK
15 minute summer	4	10	101.422	0.122	36.9	0.1378	0.0000	OK
15 minute summer	6	10	101.199	0.149	44.6	0.1683	0.0000	OK
15 minute summer	8	10	101.034	0.133	79.8	0.1510	0.0000	OK
15 minute summer	26	10	100.843	0.128	31.5	0.2270	0.0000	OK
15 minute summer	28	10	100.730	0.139	42.8	0.2459	0.0000	OK
15 minute winter	30	10	100.590	0.225	62.9	0.3982	0.0000	OK
15 minute winter	32	10	100.537	0.263	93.3	0.4648	0.0000	OK
15 minute winter	38	10	103.327	0.127	39.1	0.2247	0.0000	OK
15 minute winter	40	10	103.130	0.129	89.6	0.1464	0.0000	OK
15 minute winter	42	10	101.580	0.130	102.8	0.2303	0.0000	OK
15 minute winter	34	10	100.415	0.415	217.4	0.7327	0.0000	OK
15 minute winter	36	10	100.295	0.395	228.8	0.6986	0.0000	OK
15 minute winter	10	10	100.148	0.358	344.2	0.9104	0.0000	OK
15 minute winter	12	10	99.534	0.284	358.0	0.5021	0.0000	OK
15 minute winter	14	10	98.818	0.318	389.1	0.5613	0.0000	OK
15 minute summer	16	10	98.154	0.554	500.4	0.9785	0.0000	OK
15 minute winter	18	10	98.007	0.557	508.2	0.9834	0.0000	OK
240 minute winter	20	232	97.977	0.577	88.9	377.6581	0.0000	SURCHARGED
240 minute winter	22	232	97.977	0.597	12.7	4.2196	0.0000	SURCHARGED
15 minute summer	24	1	97.250	0.000	11.7	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	2	1.000	4	9.5	0.540	0.081	0.3211	
15 minute summer	4	1.001	6	36.9	1.198	0.322	0.7228	
15 minute summer	6	1.002	8	44.7	1.374	0.436	0.5714	
15 minute summer	8	1.003	10	79.8	2.231	0.415	1.3270	
15 minute summer	26	2.000	28	31.5	1.037	0.330	0.5086	
15 minute summer	28	2.001	30	42.9	0.982	0.449	1.3540	
15 minute winter	30	2.002	32	61.9	1.074	0.649	0.7535	
15 minute winter	32	2.003	34	92.5	1.613	0.818	0.7848	
15 minute winter	38	3.000	40	39.2	1.363	0.332	0.5109	
15 minute winter	40	3.001	42	89.7	3.068	0.361	0.9174	
15 minute winter	42	3.002	34	102.9	2.814	0.398	1.1520	
15 minute winter	34	2.004	36	215.6	1.435	0.863	2.5057	
15 minute winter	36	2.005	10	227.2	1.631	0.861	2.3287	
15 minute winter	10	1.004	12	342.6	2.852	0.838	4.0687	
15 minute winter	12	1.005	14	356.2	3.192	0.589	2.4268	
15 minute winter	14	1.006	16	386.3	3.126	0.693	3.4089	
15 minute summer	16	1.007	18	490.3	1.844	0.764	4.5792	
15 minute winter	18	1.008	20	522.4	3.108	1.738	4.5987	
240 minute winter	20	1.009	22	12.7	0.338	0.070	0.9835	
240 minute winter	22	Hydro-Brake®	24	11.8				514.3
240 minute winter	22	Weir	24	0.0				0.0

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 98.94%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	2	12	101.835	0.335	17.3	0.5920	0.0000	SURCHARGED
15 minute winter	4	12	101.825	0.525	67.2	0.5939	0.0000	SURCHARGED
15 minute winter	6	12	101.758	0.708	78.4	0.8008	0.0000	SURCHARGED
15 minute winter	8	12	101.680	0.780	138.0	0.8819	0.0000	SURCHARGED
15 minute winter	26	12	102.358	1.643	57.2	2.9024	0.0000	FLOOD RISK
15 minute winter	28	12	102.326	1.735	64.3	3.0659	0.0000	SURCHARGED
15 minute winter	30	11	102.217	1.852	84.6	3.2725	0.0000	SURCHARGED
15 minute winter	32	11	102.117	1.843	127.3	3.2568	0.0000	SURCHARGED
15 minute winter	38	10	103.387	0.187	71.1	0.3303	0.0000	OK
15 minute winter	40	11	103.209	0.209	162.4	0.2361	0.0000	OK
15 minute winter	42	11	102.510	1.060	184.3	1.8737	0.0000	SURCHARGED
15 minute winter	34	11	101.883	1.883	313.0	3.3279	0.0000	SURCHARGED
15 minute winter	36	11	101.626	1.726	330.5	3.0495	0.0000	SURCHARGED
15 minute winter	10	11	101.341	1.551	483.1	3.9475	0.0000	SURCHARGED
15 minute winter	12	11	100.350	1.100	504.2	1.9432	0.0000	SURCHARGED
15 minute winter	14	11	99.563	1.063	553.2	1.8784	0.0000	SURCHARGED
480 minute winter	16	464	98.500	0.900	95.7	1.5903	0.0000	SURCHARGED
480 minute winter	18	464	98.500	1.050	94.5	1.8550	0.0000	SURCHARGED
480 minute winter	20	464	98.500	1.100	94.1	808.9066	0.0000	SURCHARGED
480 minute winter	22	464	98.500	1.120	12.5	7.9152	0.0000	SURCHARGED
15 minute summer	24	1	97.250	0.000	11.8	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	2	1.000	4	26.3	0.594	0.223	1.2510	
15 minute winter	4	1.001	6	64.4	1.298	0.561	1.6504	
15 minute winter	6	1.002	8	74.3	1.425	0.724	1.2356	
15 minute winter	8	1.003	10	125.2	2.230	0.651	2.2728	
15 minute winter	26	2.000	28	46.7	1.086	0.489	1.1790	
15 minute winter	28	2.001	30	72.9	1.117	0.764	2.1500	
15 minute winter	30	2.002	32	92.9	1.319	0.974	0.8680	
15 minute winter	32	2.003	34	132.2	1.877	1.168	0.8420	
15 minute winter	38	3.000	40	70.7	1.556	0.599	0.8439	
15 minute winter	40	3.001	42	160.4	3.303	0.647	1.9269	
15 minute winter	42	3.002	34	167.3	2.723	0.647	1.7051	
15 minute winter	34	2.004	36	310.1	1.957	1.241	2.6441	
15 minute winter	36	2.005	10	329.5	2.080	1.249	2.6105	
15 minute winter	10	1.004	12	486.8	3.073	1.190	5.3592	
15 minute winter	12	1.005	14	509.1	3.214	0.842	3.4168	
15 minute winter	14	1.006	16	553.2	3.492	0.992	4.0169	
480 minute winter	16	1.007	18	94.5	0.863	0.147	4.8570	
480 minute winter	18	1.008	20	94.1	1.209	0.313	7.2898	
480 minute winter	20	1.009	22	12.5	0.310	0.068	0.9835	
480 minute winter	22	Hydro-Brake®	24	11.8				1081.5
480 minute winter	22	Weir	24	0.0				0.0