

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	0.041	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	0.362	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	5.6	1.616	1.904	0.041	0.0	49	0.746

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	9.8	1.904	1.910	0.072	0.0	64	0.876
2.002	1.349	95.3	17.2	1.910	1.871	0.127	0.0	86	1.030
2.003	1.601	113.2	28.9	1.871	1.882	0.213	0.0	103	1.344
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	75.1	1.882	1.812	0.554	0.0	168	1.380
2.005	1.659	263.8	80.0	1.812	1.864	0.590	0.0	169	1.461
1.004	2.572	409.0	123.3	1.864	1.200	0.910	0.0	169	2.266
1.005	3.802	604.7	129.0	1.200	1.232	0.952	0.0	140	3.050
1.006	3.506	557.5	141.2	1.232	1.200	1.042	0.0	153	2.943
1.007	2.270	641.9	190.3	1.200	0.950	1.404	0.0	223	1.990
1.008	1.063	300.6	190.3	0.950	1.000	1.404	0.0	347	1.122
1.009	1.148	182.6	190.3	1.150	1.470	1.404	0.0	392	1.293
1.010	2.096	148.2	190.3	1.620	0.762	1.404	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: 99.14%

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 summer	26	10	100.774	0.059	7.9	0.1040	0.0000	OK
15 minute winter	28	10	100.668	0.077	13.9	0.1352	0.0000	OK
15 minute winter	30	10	100.479	0.114	24.4	0.2017	0.0000	OK
15 minute winter	32	10	100.411	0.137	40.8	0.2413	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	47.1	0.1012	0.0000	OK
15 minute summer	42	10	101.547	0.097	54.1	0.1720	0.0000	OK
15 minute winter	34	10	100.234	0.234	106.2	0.4133	0.0000	OK
15 minute winter	36	10	100.132	0.232	113.1	0.4103	0.0000	OK
15 minute winter	10	10	100.013	0.223	174.4	0.5667	0.0000	OK
15 minute winter	12	10	99.431	0.181	181.7	0.3197	0.0000	OK
15 minute winter	14	10	98.702	0.202	197.6	0.3571	0.0000	OK
15 minute winter	16	10	97.936	0.336	266.2	0.5939	0.0000	OK
15 minute winter	18	11	97.819	0.369	263.0	0.6521	0.0000	OK
240 minute winter	20	188	97.691	0.291	49.1	177.2672	0.0000	OK
240 minute winter	22	188	97.690	0.310	11.9	2.1944	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 summer	26	2.000	28	7.9	0.667	0.083	0.1997	
15 minute winter	28	2.001	30	13.9	0.721	0.145	0.5911	
15 minute winter	30	2.002	32	24.2	0.872	0.254	0.3438	
15 minute winter	32	2.003	34	40.5	1.390	0.358	0.3486	
15 minute winter	38	3.000	40	20.6	1.179	0.175	0.3103	
15 minute winter	40	3.001	42	47.2	2.525	0.190	0.5870	
15 minute summer	42	3.002	34	54.2	2.835	0.209	0.4627	
15 minute winter	34	2.004	36	106.2	1.282	0.425	1.3826	
15 minute winter	36	2.005	10	112.9	1.414	0.428	1.3235	
15 minute winter	10	1.004	12	173.6	2.527	0.424	2.3301	
15 minute winter	12	1.005	14	180.2	2.819	0.298	1.3862	
15 minute winter	14	1.006	16	196.6	3.057	0.353	1.6586	
15 minute winter	16	1.007	18	263.0	1.536	0.410	2.9516	
15 minute winter	18	1.008	20	272.0	2.899	0.905	2.7515	
240 minute winter	20	1.009	22	11.9	0.298	0.065	0.6979	
240 minute winter	22	Hydro-Brake®	24	11.7				279.4
240 minute winter	22	Weir	24	0.0				0.0

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.14%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	2	10	101.557	0.057	9.5	0.1009	0.0000	OK
15 minute winter	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	100.798	0.083	15.0	0.1473	0.0000	OK
15 minute winter	28	10	100.697	0.106	26.3	0.1880	0.0000	OK
15 minute winter	30	10	100.542	0.177	46.3	0.3121	0.0000	OK
15 minute winter	32	10	100.496	0.222	77.3	0.3921	0.0000	OK
15 minute winter	38	10	103.327	0.127	39.2	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	100.385	0.385	201.7	0.6802	0.0000	OK
15 minute winter	36	10	100.273	0.373	214.1	0.6596	0.0000	OK
15 minute winter	10	10	100.135	0.345	330.2	0.8782	0.0000	OK
15 minute winter	12	10	99.526	0.276	344.2	0.4874	0.0000	OK
15 minute winter	14	10	98.808	0.308	375.1	0.5439	0.0000	OK
15 minute summer	16	10	98.150	0.550	503.1	0.9717	0.0000	OK
15 minute winter	18	10	98.012	0.562	500.8	0.9937	0.0000	OK
240 minute winter	20	232	97.977	0.577	88.9	377.9241	0.0000	SURCHARGED
240 minute winter	22	232	97.977	0.597	12.7	4.2222	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 winter	2	1.000	4	9.5	0.540	0.081	0.3211	
15 minute winter	4	1.001	6	36.9	1.198	0.322	0.7227	
15 minute summer	6	1.002	8	44.8	1.375	0.436	0.5715	
15 minute summer	8	1.003	10	79.8	2.231	0.415	1.2694	
15 minute summer	26	2.000	28	15.0	0.786	0.157	0.3207	
15 minute winter	28	2.001	30	26.3	0.809	0.275	0.9999	
15 minute winter	30	2.002	32	45.8	0.966	0.481	0.6102	
15 minute winter	32	2.003	34	76.9	1.537	0.679	0.6879	
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	2.833	0.398	1.0720	
15 minute winter	34	2.004	36	200.9	1.410	0.804	2.3777	
15 minute winter	36	2.005	10	213.2	1.590	0.808	2.2327	
15 minute winter	10	1.004	12	328.8	2.837	0.804	3.9285	
15 minute winter	12	1.005	14	342.3	3.176	0.566	2.3439	
15 minute winter	14	1.006	16	372.8	3.074	0.669	3.3199	
15 minute summer	16	1.007	18	509.4	1.930	0.794	4.5444	
15 minute winter	18	1.008	20	519.8	3.223	1.729	4.5498	
240 minute winter	20	1.009	22	12.7	0.336	0.070	0.9835	
240 minute winter	22	Hydro-Brake®	24	11.8				514.6
240 minute winter	22	Weir	24	0.0				0.0

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.14%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	2	12	101.706	0.206	17.3	0.3639	0.0000	OK
15 minute winter	4	12	101.688	0.387	67.1	0.4383	0.0000	SURCHARGED
15 minute winter	6	12	101.614	0.564	78.4	0.6381	0.0000	SURCHARGED
15 minute winter	8	11	101.568	0.668	138.1	0.7555	0.0000	SURCHARGED
15 minute winter	26	12	101.951	1.236	52.6	2.1836	0.0000	SURCHARGED
15 minute winter	28	12	101.939	1.348	39.7	2.3813	0.0000	SURCHARGED
15 minute winter	30	11	101.893	1.528	67.7	2.6997	0.0000	SURCHARGED
15 minute winter	32	11	101.841	1.567	104.6	2.7690	0.0000	SURCHARGED
15 minute summer	38	9	103.386	0.186	71.0	0.3286	0.0000	OK
15 minute winter	40	11	103.188	0.188	162.6	0.2128	0.0000	OK
15 minute winter	42	11	102.325	0.875	183.9	1.5457	0.0000	SURCHARGED
15 minute winter	34	11	101.686	1.686	291.6	2.9799	0.0000	SURCHARGED
15 minute winter	36	11	101.467	1.567	307.6	2.7691	0.0000	SURCHARGED
15 minute winter	10	11	101.222	1.432	468.0	3.6440	0.0000	SURCHARGED
15 minute winter	12	11	100.284	1.034	489.4	1.8267	0.0000	SURCHARGED
15 minute winter	14	11	99.539	1.039	539.0	1.8353	0.0000	SURCHARGED
15 minute winter	16	11	98.526	0.926	758.2	1.6366	0.0000	SURCHARGED
480 minute winter	18	464	98.502	1.052	94.6	1.8581	0.0000	SURCHARGED
480 minute winter	20	464	98.501	1.101	94.1	809.9230	0.0000	SURCHARGED
480 minute winter	22	464	98.501	1.121	12.5	7.9232	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	18.2	0.607	0.154	1.0833	
15 minute winter	4	1.001	6	64.4	1.303	0.561	1.6504	
15 minute winter	6	1.002	8	81.2	1.423	0.791	1.2356	
15 minute winter	8	1.003	10	128.3	2.230	0.667	2.2728	
15 minute winter	26	2.000	28	26.8	0.871	0.281	1.1790	
15 minute winter	28	2.001	30	51.7	0.822	0.542	2.1500	
15 minute winter	30	2.002	32	81.3	1.262	0.853	0.8680	
15 minute winter	32	2.003	34	118.3	1.710	1.045	0.8420	
15 minute summer	38	3.000	40	71.0	1.591	0.602	0.8054	
15 minute winter	40	3.001	42	160.0	3.326	0.645	1.8352	
15 minute winter	42	3.002	34	172.6	2.846	0.667	1.7051	
15 minute winter	34	2.004	36	290.6	1.834	1.163	2.6441	
15 minute winter	36	2.005	10	311.9	1.968	1.182	2.6105	
15 minute winter	10	1.004	12	470.7	2.971	1.151	5.3592	
15 minute winter	12	1.005	14	493.5	3.262	0.816	3.4168	
15 minute winter	14	1.006	16	538.6	3.400	0.966	4.0169	
15 minute winter	16	1.007	18	755.7	2.683	1.177	4.8570	
480 minute winter	18	1.008	20	94.1	1.204	0.313	7.2898	
480 minute winter	20	1.009	22	12.5	0.309	0.068	0.9835	
480 minute winter	22	Hydro-Brake®	24	11.8				1082.4
480 minute winter	22	Weir	24	0.0				0.0