

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	200.0
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)
50	0.125	4.00	115.543	1500	446605.725	298216.293	1.743
52	0.058	4.00	114.557	1500	446573.704	298231.006	1.557
54	0.041	4.00	114.187	1500	446564.439	298237.033	1.687
56	0.019	4.00	113.839	1200	446559.510	298244.667	1.839
58	0.059	4.00	112.434	1200	446553.558	298273.013	1.884
60	0.064	4.00	110.994	1500	446548.407	298301.264	1.844
62	0.022	4.00	110.178	1500	446544.593	298317.084	1.878
64	0.042	4.00	109.328	1500	446541.528	298333.249	1.978
66	0.249	4.00	108.574	1500	446542.169	298346.827	2.724
68	0.013	4.00	107.694	1500	446546.847	298361.876	2.194
70	0.027	4.00	106.783	1500	446556.230	298375.115	2.008
72	0.026	4.00	105.491	1500	446574.029	298391.278	1.791
74	0.067	4.00	104.373	1500	446592.528	298403.255	1.773
76	0.132	4.00	103.450	1500	446608.619	298411.333	2.100
78			102.200		446602.494	298426.779	1.140
80			102.200		446604.505	298447.819	1.200
82			102.500	3000	446607.950	298451.020	1.515
84			100.196		446626.102	298468.191	0.696

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	50	52	35.239	0.600	113.800	113.000	0.800	44.0	300	4.25	50.0
1.001	52	54	11.053	0.600	113.000	112.500	0.500	22.1	300	4.30	50.0
1.002	54	56	9.087	0.600	112.500	112.000	0.500	18.2	300	4.34	50.0
1.003	56	58	28.964	0.600	112.000	110.550	1.450	20.0	300	4.48	50.0
1.004	58	60	28.717	0.600	110.550	109.150	1.400	20.5	300	4.62	72.6
1.005	60	62	16.273	0.600	109.150	108.300	0.850	19.1	300	4.69	72.1
1.006	62	64	16.453	0.600	108.300	107.350	0.950	17.3	300	4.76	71.7

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	2.375	167.9	16.9	1.443	1.257	0.125	0.0	64	1.544
1.001	3.358	237.4	24.8	1.257	1.387	0.183	0.0	65	2.196
1.002	3.705	261.9	30.4	1.387	1.539	0.224	0.0	68	2.497
1.003	3.533	249.7	32.9	1.539	1.584	0.243	0.0	73	2.472
1.004	3.486	246.4	59.4	1.584	1.544	0.302	0.0	100	2.887
1.005	3.609	255.1	71.5	1.544	1.578	0.366	0.0	108	3.110
1.006	3.795	268.3	75.4	1.578	1.678	0.388	0.0	109	3.279

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	64	66	13.593	0.600	107.350	105.850	1.500	9.1	300	4.81	71.4
1.008	66	68	15.759	0.600	105.850	105.650	0.200	78.8	300	4.96	70.7
1.009	68	70	16.227	0.600	105.500	104.775	0.725	22.4	450	5.02	70.4
1.010	70	72	24.043	0.600	104.775	103.700	1.075	22.4	450	5.11	69.8
1.011	72	74	22.038	0.600	103.700	102.600	1.100	20.0	450	5.19	69.3
1.012	74	76	18.005	0.600	102.600	101.500	1.100	16.4	450	5.25	69.0
1.013	76	78	16.616	0.600	101.350	101.200	0.150	110.8	600	5.37	50.0
1.014	78	80	21.136	0.600	101.060	101.000	0.060	352.3	600	5.64	50.0
1.015	80	82	4.703	0.600	101.000	100.985	0.015	313.5	450	5.71	50.0
1.016	82	84	24.987	0.600	100.985	99.500	1.485	16.8	300	5.82	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	5.252	371.2	83.2	1.678	2.424	0.430	0.0	96	4.257
1.008	1.772	125.3	130.1	2.424	1.744	0.679	0.0	260	1.999
1.009	4.311	685.7	132.0	1.744	1.558	0.692	0.0	133	3.367
1.010	4.313	685.9	136.0	1.558	1.341	0.719	0.0	135	3.391
1.011	4.557	724.8	139.9	1.341	1.323	0.745	0.0	133	3.559
1.012	5.044	802.1	151.9	1.323	1.500	0.812	0.0	131	3.912
1.013	2.313	653.9	127.9	1.500	0.400	0.944	0.0	178	1.813
1.014	1.291	365.1	127.9	0.540	0.600	0.944	0.0	245	1.182
1.015	1.143	181.7	127.9	0.750	1.065	0.944	0.0	279	1.233
1.016	3.851	272.2	127.9	1.215	0.396	0.944	0.0	144	3.791

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	SPR	0.10
Greenfield Method	IH124	Region	1
Positively Drained Area (ha)		Growth Factor 1 year	0.85
SAAR (mm)		Growth Factor 30 year	1.95
Soil Index	1	Growth Factor 100 year	2.48

Pre-development Discharge Rate

Betterment (%)	0	Q 30 year (l/s)
QBar		Q 100 year (l/s)
Q 1 year (l/s)		

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 82 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	100.985	Product Number	CTL-SHE-0134-8100-0915-8100
Design Depth (m)	0.915	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	8.1	Min Node Diameter (mm)	1200

Node 82 Online Weir Control

Flap Valve	x	Invert Level (m)	101.900	Discharge Coefficient	0.590
Replaces Downstream Link	✓	Width (m)	3.000		

Node 80 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	101.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	472

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	630.0	0.0	0.900	976.0	0.0	1.200	1102.0	0.0

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.04%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	50	10	113.877	0.077	24.1	0.1364	0.0000	OK
15 minute summer	52	10	113.082	0.082	35.3	0.1457	0.0000	OK
15 minute summer	54	10	112.590	0.090	43.2	0.1591	0.0000	OK
15 minute summer	56	10	112.089	0.089	46.9	0.1001	0.0000	OK
15 minute summer	58	10	110.650	0.100	58.3	0.1134	0.0000	OK
15 minute summer	60	10	109.265	0.115	70.7	0.2024	0.0000	OK
15 minute summer	62	10	108.420	0.120	74.9	0.2122	0.0000	OK
15 minute winter	64	10	107.446	0.096	82.9	0.1688	0.0000	OK
15 minute winter	66	10	106.214	0.364	130.7	0.6437	0.0000	SURCHARGED
15 minute winter	68	10	105.643	0.143	128.7	0.2526	0.0000	OK
15 minute winter	70	10	104.917	0.142	132.8	0.2512	0.0000	OK
15 minute winter	72	11	103.840	0.140	137.4	0.2466	0.0000	OK
15 minute winter	74	11	102.744	0.144	148.6	0.2545	0.0000	OK
15 minute summer	76	10	101.571	0.221	173.1	0.3913	0.0000	OK
15 minute summer	78	10	101.342	0.282	173.8	0.0000	0.0000	OK
240 minute winter	80	188	101.188	0.188	33.1	125.4868	0.0000	OK
240 minute winter	82	188	101.188	0.203	8.0	1.4361	0.0000	OK
15 minute summer	84	1	99.500	0.000	5.8	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	50	1.000	52	24.1	1.606	0.144	0.5289	
15 minute summer	52	1.001	54	35.3	2.112	0.149	0.1849	
15 minute summer	54	1.002	56	43.2	2.462	0.165	0.1595	
15 minute summer	56	1.003	58	47.0	2.476	0.188	0.5498	
15 minute summer	58	1.004	60	58.4	2.580	0.237	0.6509	
15 minute summer	60	1.005	62	70.7	2.772	0.277	0.4152	
15 minute summer	62	1.006	64	74.8	3.287	0.279	0.3751	
15 minute winter	64	1.007	66	82.8	1.720	0.223	0.6097	
15 minute winter	66	1.008	68	126.2	1.885	1.007	1.0789	
15 minute winter	68	1.009	70	127.6	2.976	0.186	0.6990	
15 minute winter	70	1.010	72	132.4	3.135	0.193	1.0181	
15 minute winter	72	1.011	74	137.6	3.219	0.190	0.9421	
15 minute winter	74	1.012	76	150.8	3.695	0.188	0.7354	
15 minute summer	76	1.013	78	173.8	1.939	0.266	1.4965	
15 minute summer	78	1.014	80	172.2	2.841	0.472	1.5121	
240 minute winter	80	1.015	82	8.0	0.259	0.044	0.3111	
240 minute winter	82	Hydro-Brake®	84	7.9				186.3
240 minute winter	82	Weir	84	0.0				0.0

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.04%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	50	10	113.908	0.108	45.7	0.1912	0.0000	OK
15 minute winter	52	10	113.119	0.119	66.9	0.2098	0.0000	OK
15 minute winter	54	10	112.632	0.132	81.9	0.2327	0.0000	OK
15 minute winter	56	10	112.126	0.126	88.9	0.1426	0.0000	OK
15 minute summer	58	10	110.694	0.144	110.5	0.1628	0.0000	OK
15 minute summer	60	10	109.322	0.172	134.1	0.3042	0.0000	OK
15 minute summer	62	10	108.469	0.169	142.3	0.2986	0.0000	OK
15 minute winter	64	10	107.550	0.200	158.1	0.3527	0.0000	OK
15 minute winter	66	10	107.014	1.164	247.3	2.0561	0.0000	SURCHARGED
15 minute winter	68	10	105.713	0.213	248.4	0.3770	0.0000	OK
15 minute winter	70	10	104.984	0.209	257.7	0.3687	0.0000	OK
15 minute winter	72	10	103.906	0.206	266.1	0.3637	0.0000	OK
15 minute winter	74	10	102.814	0.214	289.1	0.3779	0.0000	OK
15 minute winter	76	10	101.675	0.325	335.4	0.5734	0.0000	OK
15 minute winter	78	10	101.470	0.410	333.6	0.0000	0.0000	OK
240 minute winter	80	232	101.373	0.373	60.5	261.8022	0.0000	OK
240 minute winter	82	232	101.373	0.388	8.6	2.7430	0.0000	SURCHARGED
15 minute summer	84	1	99.500	0.000	7.9	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	50	1.000	52	45.7	1.873	0.272	0.8600	
15 minute winter	52	1.001	54	66.9	2.403	0.282	0.3077	
15 minute winter	54	1.002	56	81.9	2.832	0.313	0.2628	
15 minute winter	56	1.003	58	88.9	2.893	0.356	0.8904	
15 minute summer	58	1.004	60	110.8	2.945	0.449	1.0797	
15 minute summer	60	1.005	62	134.3	3.249	0.526	0.6728	
15 minute summer	62	1.006	64	142.7	3.518	0.532	0.7429	
15 minute winter	64	1.007	66	156.3	2.375	0.421	0.8170	
15 minute winter	66	1.008	68	243.6	3.459	1.944	1.0985	
15 minute winter	68	1.009	70	247.8	3.402	0.361	1.1838	
15 minute winter	70	1.010	72	256.6	3.608	0.374	1.7136	
15 minute winter	72	1.011	74	264.6	3.672	0.365	1.5963	
15 minute winter	74	1.012	76	287.2	4.278	0.358	1.2130	
15 minute winter	76	1.013	78	333.6	2.282	0.510	2.4407	
15 minute winter	78	1.014	80	343.7	3.206	0.941	2.5737	
240 minute winter	80	1.015	82	8.6	0.300	0.047	0.6722	
240 minute winter	82	Hydro-Brake®	84	8.1				343.8
240 minute winter	82	Weir	84	0.0				0.0

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.04%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	50	10	113.953	0.153	83.0	0.2698	0.0000	OK
15 minute winter	52	10	113.175	0.175	121.6	0.3095	0.0000	OK
15 minute summer	54	10	112.698	0.198	148.9	0.3503	0.0000	OK
15 minute winter	56	11	112.253	0.253	161.9	0.2865	0.0000	OK
15 minute winter	58	11	111.776	1.226	195.1	1.3864	0.0000	SURCHARGED
15 minute winter	60	11	110.918	1.768	219.8	3.1243	0.0000	FLOOD RISK
15 minute winter	62	11	110.152	1.852	213.7	3.2717	0.0000	FLOOD RISK
15 minute winter	64	11	109.320	1.970	234.5	3.4809	0.0000	FLOOD RISK
15 minute winter	66	11	108.438	2.588	373.4	4.5731	0.0000	FLOOD RISK
15 minute winter	68	11	105.785	0.285	379.3	0.5037	0.0000	OK
15 minute winter	70	11	105.051	0.276	394.8	0.4884	0.0000	OK
15 minute winter	72	11	103.975	0.275	410.1	0.4866	0.0000	OK
15 minute winter	74	11	102.881	0.281	448.9	0.4969	0.0000	OK
15 minute winter	76	10	101.795	0.445	534.4	0.7856	0.0000	OK
480 minute winter	78	464	101.718	0.658	65.1	0.0000	0.0000	SURCHARGED
480 minute winter	80	464	101.718	0.718	63.8	551.0574	0.0000	SURCHARGED
480 minute winter	82	464	101.718	0.733	8.6	5.1783	0.0000	SURCHARGED
15 minute summer	84	1	99.500	0.000	8.1	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	50	1.000	52	83.1	2.110	0.495	1.3870	
15 minute winter	52	1.001	54	121.6	2.647	0.512	0.5074	
15 minute summer	54	1.002	56	149.5	3.110	0.571	0.4500	
15 minute winter	56	1.003	58	155.9	3.107	0.624	1.9387	
15 minute winter	58	1.004	60	177.2	3.074	0.719	2.0222	
15 minute winter	60	1.005	62	201.2	3.223	0.789	1.1459	
15 minute winter	62	1.006	64	217.1	3.384	0.809	1.1586	
15 minute winter	64	1.007	66	243.1	3.452	0.655	0.9572	
15 minute winter	66	1.008	68	371.9	5.282	2.968	1.0985	
15 minute winter	68	1.009	70	379.5	3.650	0.553	1.6872	
15 minute winter	70	1.010	72	395.3	3.880	0.576	2.4493	
15 minute winter	72	1.011	74	410.6	3.990	0.567	2.2682	
15 minute winter	74	1.012	76	449.3	4.466	0.560	1.9243	
15 minute winter	76	1.013	78	532.3	2.528	0.814	3.5082	
480 minute winter	78	1.014	80	63.8	1.211	0.175	5.9535	
480 minute winter	80	1.015	82	8.6	0.290	0.047	0.7452	
480 minute winter	82	Hydro-Brake®	84	8.1				721.3
480 minute winter	82	Weir	84	0.0				0.0