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)	0.200
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)	Depth (m)
1	0.040	5.00	107.944	1500	1.544
2	0.163	5.00	108.239	1350	1.931
3	0.115	5.00	109.033	1500	3.823
15	0.138	5.00	110.392	1350	2.092
16	0.073	5.00	109.898	1350	1.898
4	0.058	5.00	109.457	1800	4.457
5	0.078	5.00	108.853	1800	3.978
6	0.092	5.00	107.943	1800	3.221
7	0.097	5.00	107.829	1500	3.121
8	0.041	5.00	107.440	1500	2.783
9	0.098	5.00	107.190	1800	2.563
10	0.099	5.00	106.646	1800	2.086
17	0.025	5.00	106.121	1500	1.164
11	0.042	5.00	106.356	2100	1.836
12	0.000		106.300	1200	1.800
13	0.000		106.910	3000	2.450
14			105.500	1200	1.100

Links (Results)

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	1.010	40.1	5.4	1.319	1.706	0.040	0.0	56	0.709
1.001	2.031	80.8	27.5	1.706	3.448	0.203	0.0	90	1.840
1.002	1.036	114.5	43.1	3.448	3.932	0.318	0.0	159	0.966
2.000	1.558	61.9	18.7	1.867	1.673	0.138	0.0	85	1.370
2.001	4.658	185.2	28.6	1.673	3.932	0.211	0.0	59	3.399
1.003	1.088	235.5	79.6	3.932	3.378	0.587	0.0	209	0.986
1.004	1.082	305.8	90.1	3.378	2.546	0.665	0.0	222	0.946
1.005	1.178	421.5	102.6	2.546	2.446	0.757	0.0	226	0.980
1.006	1.169	418.4	115.7	2.446	2.108	0.854	0.0	242	1.006
1.007	1.173	419.6	121.3	2.108	1.888	0.895	0.0	248	1.021
1.008	1.165	417.1	134.6	1.888	1.411	0.993	0.0	263	1.044
1.009	1.224	438.1	148.0	1.411	1.161	1.092	0.0	269	1.110
3.000	1.031	72.8	3.4	0.864	1.161	0.025	0.0	44	0.530
1.010	1.176	420.9	157.1	1.161	1.125	1.159	0.0	285	1.094
1.011	1.777	635.9	157.1	1.125	1.775	1.159	0.0	227	1.484
1.012	1.009	40.1	0.0	2.225	0.875	1.159	0.0	0	0.000

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Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	15.337	166.7	225	107.944	106.400	1.319	108.239	106.308	1.706
1.001	39.541	41.7	225	108.239	106.308	1.706	109.033	105.360	3.448
1.002	18.147	302.4	375	109.033	105.210	3.448	109.457	105.150	3.932
2.000	21.193	70.6	225	110.392	108.300	1.867	109.898	108.000	1.673
2.001	21.566	8.0	225	109.898	108.000	1.673	109.457	105.300	3.932
1.003	20.937	418.7	525	109.457	105.000	3.932	108.853	104.950	3.378
1.004	39.026	500.3	600	108.853	104.875	3.378	107.943	104.797	2.546
1.005	6.850	489.3	675	107.943	104.722	2.546	107.829	104.708	2.446
1.006	25.318	496.4	675	107.829	104.708	2.446	107.440	104.657	2.108
1.007	14.807	493.6	675	107.440	104.657	2.108	107.190	104.627	1.888
1.008	33.474	499.6	675	107.190	104.627	1.888	106.646	104.560	1.411
1.009	18.126	453.1	675	106.646	104.560	1.411	106.356	104.520	1.161
3.000	14.307	230.8	300	106.121	104.957	0.864	106.356	104.895	1.161
1.010	9.814	490.7	675	106.356	104.520	1.161	106.300	104.500	1.125
1.011	8.660	216.5	675	106.300	104.500	1.125	106.910	104.460	1.775
1.012	10.020	167.0	225	106.910	104.460	2.225	105.500	104.400	0.875

Link	US Node	Dia (mm)	Node Type	DS Node	Dia (mm)	Node Type
1.000	1	1500	Manhole	2	1350	Manhole
1.001	2	1350	Manhole	3	1500	Manhole
1.002	3	1500	Manhole	4	1800	Manhole
2.000	15	1350	Manhole	16	1350	Manhole
2.001	16	1350	Manhole	4	1800	Manhole
1.003	4	1800	Manhole	5	1800	Manhole
1.004	5	1800	Manhole	6	1800	Manhole
1.005	6	1800	Manhole	7	1500	Manhole
1.006	7	1500	Manhole	8	1500	Manhole
1.007	8	1500	Manhole	9	1800	Manhole
1.008	9	1800	Manhole	10	1800	Manhole
1.009	10	1800	Manhole	11	2100	Manhole
3.000	17	1500	Manhole	11	2100	Manhole
1.010	11	2100	Manhole	12	1200	Manhole
1.011	12	1200	Manhole	13	3000	Manhole
1.012	13	3000	Manhole	14	1200	Manhole

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	✓
Rainfall Events	Singular	Drain Down Time (mins)	240
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	Detailed		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	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)		Betterment (%)	0
SAAR (mm)		QBar	
Soil Index	1		

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 (m^3)	

Node 13 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	104.460	Product Number	CTL-SHE-0132-9300-1600-9300
Design Depth (m)	1.600	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	9.3	Min Node Diameter (mm)	0

Node 12 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	104.500
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

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	207.0	0.0	1.800	653.0	0.0	1.810	0.0	0.0

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Results for 1 year Critical Storm Duration. Lowest mass balance: 98.68%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	106.456	0.056	5.6	0.0988	0.0000	OK
15 minute winter	2	10	106.402	0.094	28.5	0.1338	0.0000	OK
15 minute winter	3	10	105.378	0.168	44.0	0.2975	0.0000	OK
15 minute winter	15	10	108.394	0.094	19.5	0.1341	0.0000	OK
15 minute winter	16	10	108.063	0.062	29.6	0.0894	0.0000	OK
15 minute winter	4	11	105.218	0.218	80.5	0.5536	0.0000	OK
15 minute winter	5	11	105.107	0.232	91.5	0.5901	0.0000	OK
15 minute winter	6	11	105.009	0.287	103.5	0.7294	0.0000	OK
15 minute winter	7	11	104.988	0.280	116.3	0.4940	0.0000	OK
15 minute winter	8	11	104.946	0.289	121.5	0.5114	0.0000	OK
15 minute winter	9	11	104.910	0.283	132.1	0.7202	0.0000	OK
180 minute winter	10	144	104.854	0.294	37.5	0.7484	0.0000	OK
15 minute winter	17	10	105.002	0.045	3.5	0.0795	0.0000	OK
180 minute winter	11	144	104.854	0.334	38.4	1.1570	0.0000	OK
180 minute winter	12	144	104.854	0.354	37.3	89.1961	0.0000	OK
180 minute winter	13	144	104.854	0.394	9.9	2.7847	0.0000	SURCHARGED
15 minute summer	14	1	104.400	0.000	8.8	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	1	1.000	2	5.5	0.479	0.137	0.1784	
15 minute winter	2	1.001	3	27.8	1.824	0.344	0.6032	
15 minute winter	3	1.002	4	43.6	0.978	0.381	0.8092	
15 minute winter	15	2.000	16	19.3	1.576	0.311	0.2609	
15 minute winter	16	2.001	4	29.3	3.349	0.158	0.1887	
15 minute winter	4	1.003	5	81.1	1.054	0.344	1.6122	
15 minute winter	5	1.004	6	91.3	0.992	0.299	3.6915	
15 minute winter	6	1.005	7	103.4	0.729	0.245	0.9718	
15 minute winter	7	1.006	8	116.1	0.813	0.278	3.6155	
15 minute winter	8	1.007	9	119.7	0.838	0.285	2.1313	
15 minute winter	9	1.008	10	133.2	0.940	0.319	4.7427	
180 minute winter	10	1.009	11	36.0	0.590	0.082	2.9473	
15 minute winter	17	3.000	11	3.4	0.531	0.047	0.0914	
180 minute winter	11	1.010	12	37.3	0.921	0.089	1.7933	
180 minute winter	12	1.011	13	9.9	0.347	0.016	1.7564	
180 minute winter	13	Hydro-Brake®	14	9.2				169.8

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Results for 30 year Critical Storm Duration. Lowest mass balance: 98.95%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	106.491	0.091	13.8	0.1612	0.0000	OK
15 minute winter	2	10	106.476	0.168	69.8	0.2406	0.0000	OK
15 minute winter	3	10	105.504	0.294	108.0	0.5200	0.0000	OK
15 minute winter	15	10	108.464	0.164	47.7	0.2345	0.0000	OK
15 minute winter	16	10	108.103	0.103	72.5	0.1476	0.0000	OK
15 minute winter	4	11	105.391	0.391	198.3	0.9961	0.0000	OK
240 minute winter	5	232	105.310	0.435	42.7	1.1063	0.0000	OK
240 minute winter	6	232	105.310	0.588	48.2	1.4958	0.0000	OK
240 minute winter	7	232	105.310	0.602	52.4	1.0632	0.0000	OK
240 minute winter	8	236	105.310	0.653	53.3	1.1534	0.0000	OK
240 minute winter	9	236	105.310	0.683	57.4	1.7379	0.0000	SURCHARGED
240 minute winter	10	236	105.310	0.750	61.1	1.9087	0.0000	SURCHARGED
240 minute winter	17	236	105.310	0.353	1.6	0.6238	0.0000	SURCHARGED
240 minute winter	11	236	105.310	0.790	62.5	2.7367	0.0000	SURCHARGED
240 minute winter	12	236	105.310	0.810	60.4	249.8860	0.0000	SURCHARGED
240 minute winter	13	236	105.310	0.850	10.8	6.0088	0.0000	SURCHARGED
15 minute summer	14	1	104.400	0.000	9.3	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	1	1.000	2	13.4	0.577	0.334	0.3597	
15 minute winter	2	1.001	3	68.2	2.229	0.845	1.2144	
15 minute winter	3	1.002	4	106.3	1.266	0.929	1.5179	
15 minute winter	15	2.000	16	47.2	1.925	0.762	0.5162	
15 minute winter	16	2.001	4	72.0	4.227	0.389	0.3672	
15 minute winter	4	1.003	5	195.7	1.274	0.831	3.4278	
240 minute winter	5	1.004	6	42.3	0.814	0.138	9.2714	
240 minute winter	6	1.005	7	46.1	0.591	0.109	2.2805	
240 minute winter	7	1.006	8	50.7	0.632	0.121	8.7274	
240 minute winter	8	1.007	9	51.1	0.618	0.122	5.2594	
240 minute winter	9	1.008	10	54.7	0.586	0.131	11.9491	
240 minute winter	10	1.009	11	58.2	0.544	0.133	6.4706	
240 minute winter	17	3.000	11	1.6	0.424	0.022	1.0075	
240 minute winter	11	1.010	12	60.4	1.068	0.144	3.5034	
240 minute winter	12	1.011	13	10.8	0.407	0.017	3.0914	
240 minute winter	13	Hydro-Brake®	14	9.3				232.7

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Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.38%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	11	107.944	1.544	25.4	2.7282	1.5346	FLOOD
15 minute winter	2	11	107.918	1.610	108.3	2.3038	0.0000	SURCHARGED
15 minute winter	3	11	106.232	1.022	168.2	1.8050	0.0000	SURCHARGED
15 minute winter	15	11	108.904	0.603	86.6	0.8635	0.0000	SURCHARGED
15 minute winter	16	11	108.146	0.146	128.6	0.2086	0.0000	OK
15 minute winter	4	11	106.043	1.043	331.1	2.6548	0.0000	SURCHARGED
360 minute winter	5	352	105.983	1.108	53.9	2.8200	0.0000	SURCHARGED
360 minute winter	6	352	105.983	1.261	59.3	3.2094	0.0000	SURCHARGED
360 minute winter	7	352	105.983	1.275	66.9	2.2530	0.0000	SURCHARGED
360 minute winter	8	352	105.983	1.326	70.0	2.3431	0.0000	SURCHARGED
360 minute winter	9	352	105.983	1.356	77.9	3.4512	0.0000	SURCHARGED
360 minute winter	10	352	105.983	1.423	85.7	3.6217	0.0000	SURCHARGED
360 minute winter	17	352	105.983	1.026	2.1	1.8130	0.0000	FLOOD RISK
360 minute winter	11	352	105.983	1.463	90.5	5.0680	0.0000	SURCHARGED
360 minute winter	12	352	105.983	1.483	89.9	581.1403	0.0000	SURCHARGED
360 minute winter	13	352	105.983	1.523	10.6	10.7661	0.0000	SURCHARGED
15 minute summer	14	1	104.400	0.000	9.3	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	1	1.000	2	31.9	0.803	0.795	0.6100	
15 minute winter	2	1.001	3	102.1	2.567	1.264	1.5726	
15 minute winter	3	1.002	4	169.3	1.535	1.479	2.0016	
15 minute winter	15	2.000	16	83.7	2.272	1.352	0.7097	
15 minute winter	16	2.001	4	127.5	4.189	0.688	0.7222	
15 minute winter	4	1.003	5	331.7	1.536	1.408	4.5231	
360 minute winter	5	1.004	6	51.6	0.744	0.169	10.9927	
360 minute winter	6	1.005	7	58.8	0.542	0.140	2.4453	
360 minute winter	7	1.006	8	66.6	0.562	0.159	9.0380	
360 minute winter	8	1.007	9	69.7	0.550	0.166	5.2858	
360 minute winter	9	1.008	10	77.4	0.534	0.186	11.9495	
360 minute winter	10	1.009	11	85.3	0.578	0.195	6.4706	
360 minute winter	17	3.000	11	1.8	0.403	0.025	1.0075	
360 minute winter	11	1.010	12	89.9	1.102	0.214	3.5034	
360 minute winter	12	1.011	13	10.6	0.445	0.017	3.0914	
360 minute winter	13	Hydro-Brake®	14	9.3				294.6

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