

[Print](#)[Close Report](#)

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:

Site name:

Site location:

Site Details

Latitude:

Longitude:

Reference:

Date:

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Runoff estimation approach

Site characteristics

Total site area (ha):

Methodology

Q_{MED} estimation method:

BFI and SPR method:

HOST class:

BFI / BFIHOST:

Q_{MED} (l/s):

Q_{BAR} / Q_{MED} factor:

Hydrological characteristics

	Default	Edited
SAAR (mm):	955	941
Hydrological region:	4	4
Growth curve factor 1 year:	0.83	0.83
Growth curve factor 30 years:	2	2
Growth curve factor 100 years:	2.57	2.57
Growth curve factor 200 years:	3.04	3.04

Notes

(1) Is $Q_{BAR} < 2.0$ l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is $SPR/SPRHOST \leq 0.3$?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):		2.09
1 in 1 year (l/s):		1.73
1 in 30 years (l/s):		4.18
1 in 100 year (l/s):		5.37
1 in 200 years (l/s):		6.35

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
BF1	0.805	5.00	10.000	1350	0.000	0.000	1.650
BF2			10.000	1350	10.000	0.000	1.675
BF1 restricted	0.805	5.00	10.000	1200	0.000	10.000	1.350
BF2 restricted			10.000	1200	10.000	10.000	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)
BF	BF1	BF2	10.000	0.600	8.350	8.325	0.025	400.0	450	5.16	50.0
restricted	BF1 restricted	BF2 restricted	10.000	0.600	8.650	8.550	0.100	100.0	150	5.17	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)
BF	1.010	160.7	145.5	1.200	1.225	0.805	0.0	337	1.137
restricted	1.005	17.8	145.5	1.200	1.300	0.805	0.0	150	1.023

Simulation Settings

Rainfall Methodology	FEH-13	Analysis Speed	Normal	Additional Storage (m³/ha)	20.0	30 year (l/s)	0.0
Summer CV	1.000	Skip Steady State	x	Check Discharge Rate(s)	✓	100 year (l/s)	0.0
Winter CV	1.000	Drain Down Time (mins)	240	2 year (l/s)	0.0	Check Discharge Volume	x

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0	100	0	0	0
30	0	0	0				

Pre-development Discharge Rate

Site Makeup	Greenfield	BFIHost	0.788	Growth Factor 100 year	2.48	Q 30 year (l/s)
Greenfield Method	FEH	Region	4	Betterment (%)	0	Q 100 year (l/s)
Positively Drained Area (ha)	1.000	QBar/QMed conversion factor	1.124	QMed		
SAAR (mm)	941	Growth Factor 1 year	0.85	QBar		
Host	1	Growth Factor 30 year	1.95	Q 1 year (l/s)		

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.92%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	BF1	10	8.657	0.307	133.2	3.4405	0.0000	OK
15 minute summer	BF2	10	8.579	0.254	131.4	0.0000	0.0000	OK
30 minute summer	BF1 restricted	18	10.000	1.350	119.5	17.6270	9.2114	FLOOD
15 minute summer	BF2 restricted	8	8.692	0.142	56.5	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	BF1	BF	BF2	131.4	1.264	0.818	1.0375	57.6
30 minute summer	BF1 restricted	restricted	BF2 restricted	56.5	3.210	3.183	0.1743	66.5

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.92%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	BF1	10	8.964	0.614	338.7	6.8682	0.0000	SURCHARGED
15 minute summer	BF2	10	8.723	0.398	333.8	0.0000	0.0000	OK
60 minute summer	BF1 restricted	27	10.000	1.350	236.0	17.6270	98.1932	FLOOD
15 minute summer	BF2 restricted	5	8.692	0.142	56.5	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	BF1	BF	BF2	333.8	2.110	2.078	1.5336	146.5
60 minute summer	BF1 restricted	restricted	BF2 restricted	56.5	3.210	3.183	0.1743	151.9

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.92%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	BF1	10	9.163	0.813	457.2	9.1000	0.0000	SURCHARGED
15 minute summer	BF2	10	8.751	0.426	450.3	0.0000	0.0000	OK
60 minute summer	BF1 restricted	24	10.000	1.350	326.4	17.6270	170.9862	FLOOD
15 minute summer	BF2 restricted	5	8.692	0.142	56.5	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	BF1	BF	BF2	450.3	2.842	2.803	1.5684	197.6
60 minute summer	BF1 restricted	restricted	BF2 restricted	56.5	3.210	3.183	0.1743	175.6

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.063	5.00	147.000	1200	398077.132	355311.110	1.500
2			147.500	1200	398034.613	355298.664	2.181
3	0.015	5.00	147.400	1200	398068.255	355340.700	1.425
4			147.350	1200	398045.573	355334.115	1.515
5			147.350	1200	398048.554	355322.794	1.584
6_PP	0.002	5.00	147.500	1200	398015.339	355332.361	0.500
7_PP	0.006	5.00	147.300	1200	398031.067	355335.792	0.450
8_PP	0.010	5.00	147.400	1200	398030.033	355326.128	0.500
9	0.043	5.00	147.400	1200	398025.927	355325.115	1.500
10	0.136	5.00	147.400	1200	398030.248	355314.666	2.149
11_PP	0.012	5.00	147.450	1200	398020.485	355313.922	0.574
Tank 1			147.450	1200	398023.003	355309.781	2.500
12_OUT			148.020	1200	398008.942	355310.394	3.128
13	0.031	5.00	147.750	1200	398078.166	355379.065	1.086
14	0.027	5.00	147.750	1200	398070.719	355383.459	1.212
15	0.013	5.00	147.700	1200	398045.327	355376.411	1.270
16	0.059	5.00	147.700	1200	398040.501	355392.284	1.200
17_PP	0.011	5.00	147.750	1200	398023.269	355373.016	1.144
18_PP	0.012	5.00	147.700	1200	398020.877	355383.150	1.127
19	0.013	5.00	147.750	1350	398022.785	355379.993	1.564
20_PP	0.032	5.00	147.600	1200	398015.418	355363.189	1.133
21	0.031	5.00	147.700	1200	398014.622	355370.871	1.354
22_PP	0.004	5.00	147.800	1200	398006.508	355381.928	1.156
Tank 2	0.026	5.00	147.840	1500	398013.637	355378.850	1.752
23_OUT			147.300	1500	398004.515	355388.797	1.240

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	1	2	44.303	0.600	145.500	145.319	0.181	244.8	300	5.74	152.0
1.001	2	10	16.587	0.600	145.319	145.251	0.068	243.9	300	6.01	149.5
2.000	3	4	23.619	0.600	145.975	145.835	0.140	168.7	225	5.39	155.2
2.001	4	5	11.707	0.600	145.835	145.766	0.069	169.7	225	5.59	153.4
2.002	5	10	20.029	0.600	145.766	145.648	0.118	169.7	225	5.92	150.4
3.000	6_PP	9	12.830	0.600	147.000	146.100	0.900	14.3	100	5.10	157.8
4.000	7_PP	9	11.850	0.600	146.850	146.100	0.750	15.8	100	5.10	157.8
5.000	8_PP	9	4.229	0.600	146.900	146.100	0.800	5.3	100	5.02	158.5
3.001	9	10	11.307	0.600	145.900	145.853	0.047	240.6	300	5.29	156.1
1.002	10	Tank 1	8.738	0.600	145.251	145.215	0.036	242.7	300	6.16	148.3
6.000	11_PP	Tank 1	4.849	0.600	146.876	146.150	0.726	6.7	100	5.03	158.5
1.003	Tank 1	12_OUT	14.074	0.600	144.950	144.892	0.058	242.7	300	6.39	146.3
7.000	13	14	8.647	0.600	146.664	146.613	0.051	169.5	225	5.14	157.4
7.001	14	15	26.352	0.600	146.538	146.430	0.108	244.0	300	5.58	153.4

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	1.000	70.7	48.2	1.200	1.881	0.063	0.0	182	1.073
1.001	1.002	70.8	47.4	1.881	1.849	0.063	0.0	180	1.071
2.000	1.004	39.9	11.7	1.200	1.290	0.015	0.0	83	0.873
2.001	1.001	39.8	11.6	1.290	1.359	0.015	0.0	83	0.870
2.002	1.000	39.8	11.4	1.359	1.527	0.015	0.0	82	0.866
3.000	2.057	16.2	2.0	0.400	1.200	0.002	0.0	24	1.401
4.000	1.953	15.3	5.0	0.350	1.200	0.006	0.0	39	1.751
5.000	3.386	26.6	7.8	0.400	1.200	0.010	0.0	37	2.945
3.001	1.009	71.3	48.2	1.200	1.247	0.061	0.0	181	1.080
1.002	1.005	71.0	205.7	1.849	1.935	0.274	0.0	300	1.017
6.000	3.011	23.6	9.5	0.474	1.200	0.012	0.0	44	2.850
1.003	1.005	71.0	211.6	2.200	2.828	0.286	0.0	300	1.018
7.000	1.001	39.8	24.6	0.861	0.912	0.031	0.0	128	1.052
7.001	1.002	70.8	45.1	0.912	0.970	0.058	0.0	174	1.060

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)
7.002	15	19	22.825	0.600	146.430	146.336	0.094	242.8	300	5.96	150.0
8.000	16	19	21.562	0.600	146.500	146.336	0.164	131.5	300	5.26	156.3
9.000	17_PP	19	6.994	0.600	146.606	146.486	0.120	58.3	150	5.09	157.9
10.000	18_PP	19	3.689	0.600	146.573	146.486	0.087	42.4	150	5.04	158.4
7.003	19	Tank 2	9.219	0.600	146.186	146.163	0.023	400.8	450	6.11	148.7
11.000	20_PP	21	7.723	0.600	146.467	146.421	0.046	167.9	225	5.13	157.6
11.001	21	Tank 2	8.040	0.600	146.346	146.313	0.033	243.6	300	5.26	156.4
12.000	22_PP	Tank 2	7.765	0.600	146.644	146.513	0.131	59.3	100	5.13	157.6
7.004	Tank 2	23_OUT	13.496	0.600	146.088	146.060	0.028	482.0	525	6.34	146.8

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)
7.002	1.004	71.0	53.7	0.970	1.114	0.071	0.0	195	1.100
8.000	1.369	96.8	47.1	0.900	1.114	0.059	0.0	147	1.359
9.000	1.320	23.3	9.0	0.994	1.114	0.011	0.0	65	1.237
10.000	1.550	27.4	9.6	0.977	1.114	0.012	0.0	61	1.415
7.003	1.009	160.5	125.1	1.114	1.227	0.166	0.0	300	1.111
11.000	1.006	40.0	25.2	0.908	1.054	0.032	0.0	130	1.062
11.001	1.003	70.9	49.3	1.054	1.227	0.062	0.0	184	1.080
12.000	1.002	7.9	3.0	1.056	1.227	0.004	0.0	43	0.940
7.004	1.013	219.3	191.9	1.227	0.715	0.258	0.0	383	1.136

Simulation Settings

Rainfall Methodology	FEH-13	Analysis Speed	Detailed	Drain Down Time (mins)	240	Check Discharge Rate(s)	x
Summer CV	0.840	Skip Steady State	x	Additional Storage (m³/ha)	20.0	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440	2160
----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	------	------

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0	100	30	0	0
30	0	0	0	100	40	0	0
100	0	0	0				

Node Tank 1 Online Pump Control

Flap Valve	x	Invert Level (m)	144.950	Design Flow (l/s)	8.0	Switch off depth (m)	0.001
Replaces Downstream Link	✓	Design Depth (m)	0.900	Switch on depth (m)	0.300		

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.001	4.000	1.200	4.000

Node Tank 2 Online Orifice Control

Flap Valve	x	Invert Level (m)	146.088	Design Flow (l/s)	2.0	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Depth (m)	1.500	Diameter (m)	0.030		

Node 6 PP Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	5.000	Depth (m)	0.400
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	147.000	Length (m)	5.000	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	0	Slope (1:X)	1000.0		

Node 7 PP Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	5.000	Depth (m)	0.350
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	146.850	Length (m)	12.500	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	64	Slope (1:X)	1000.0		

Node 8 PP Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	6.100	Depth (m)	0.400
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	146.900	Length (m)	15.800	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	0	Slope (1:X)	1000.0		

Node 11 PP Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	5.300	Depth (m)	0.400
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	146.950	Length (m)	22.100	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	0	Slope (1:X)	1000.0		

Node Tank 1 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Pit Width (m)	9.000	Inf Depth (m)	
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	144.950	Pit Length (m)	10.000	Number Required	1
Safety Factor	2.0	Time to half empty (mins)		Depth (m)	1.500		

Node 22 PP Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	5.000	Depth (m)	0.400
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	147.300	Length (m)	7.600	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	288	Slope (1:X)	1000.0		

Node 17 PP Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	5.000	Depth (m)	0.400
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	147.250	Length (m)	22.600	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)		Slope (1:X)	1000.0		

Node 18 PP Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	5.400	Depth (m)	0.400
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	147.200	Length (m)	22.000	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)		Slope (1:X)	1000.0		

Node 20 PP Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	5.000	Depth (m)	0.400
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	147.100	Length (m)	63.000	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)		Slope (1:X)	1000.0		

Node Tank 2 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Pit Width (m)	9.000	Inf Depth (m)	
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	146.088	Pit Length (m)	8.000	Number Required	1
Safety Factor	2.0	Time to half empty (mins)		Depth (m)	1.200		

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	145.569	0.069	8.7	0.1364	0.0000	OK
15 minute summer	2	11	145.417	0.098	8.5	0.1112	0.0000	OK
15 minute summer	3	10	146.010	0.035	2.1	0.0471	0.0000	OK
15 minute summer	4	11	145.871	0.036	2.1	0.0402	0.0000	OK
15 minute summer	5	12	145.801	0.035	2.1	0.0391	0.0000	OK
15 minute summer	6_PP	13	147.009	0.009	0.3	0.0574	0.0000	OK
30 minute summer	7_PP	20	146.864	0.013	0.8	0.1539	0.0000	OK
15 minute summer	8_PP	12	146.914	0.014	1.3	0.1973	0.0000	OK
15 minute summer	9	11	145.968	0.068	7.3	0.1147	0.0000	OK
15 minute summer	10	11	145.413	0.162	35.4	0.3883	0.0000	OK
15 minute summer	11_PP	11	146.894	0.018	1.6	0.0282	0.0000	OK
360 minute summer	Tank 1	224	145.355	0.405	10.5	35.1208	0.0000	SURCHARGED
15 minute summer	12_OUT	1	144.892	0.000	0.0	0.0000	0.0000	OK
15 minute summer	13	10	146.716	0.052	4.3	0.0879	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	1	1.000	2	8.5	0.636	0.120	0.7163	
15 minute summer	2	1.001	10	9.0	0.377	0.127	0.4890	
15 minute summer	3	2.000	4	2.1	0.528	0.052	0.0931	
15 minute summer	4	2.001	5	2.1	0.543	0.052	0.0453	
15 minute summer	5	2.002	10	2.0	0.523	0.050	0.0762	
15 minute summer	6_PP	3.000	9	0.2	0.744	0.015	0.0042	
30 minute summer	7_PP	4.000	9	0.6	0.928	0.038	0.0074	
15 minute summer	8_PP	5.000	9	1.0	1.607	0.039	0.0027	
15 minute summer	9	3.001	10	7.3	0.642	0.103	0.1292	
15 minute summer	10	1.002	Tank 1	35.0	0.968	0.493	0.3159	
15 minute summer	11_PP	6.000	Tank 1	1.6	1.676	0.068	0.0046	
360 minute summer	Tank 1	Pump	12_OUT	4.0				59.5
15 minute summer	13	7.000	14	4.2	0.637	0.106	0.0574	

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	14	10	146.607	0.068	8.0	0.1082	0.0000	OK
600 minute summer	15	435	146.567	0.137	1.8	0.1824	0.0000	OK
600 minute summer	16	435	146.567	0.067	1.5	0.1425	0.0000	OK
15 minute summer	17_PP	10	146.633	0.027	1.6	0.0363	0.0000	OK
15 minute summer	18_PP	10	146.600	0.027	1.7	0.0359	0.0000	OK
600 minute summer	19	435	146.567	0.381	4.2	0.6081	0.0000	OK
600 minute summer	20_PP	435	146.567	0.100	0.8	0.1692	0.0000	OK
600 minute summer	21	435	146.567	0.221	1.6	0.3507	0.0000	OK
15 minute summer	22_PP	11	146.661	0.017	0.5	0.0209	0.0000	OK
600 minute summer	Tank 2	435	146.567	0.479	6.1	33.7708	0.0000	OK
15 minute summer	23_OUT	1	146.060	0.000	0.8	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 summer	14	7.001	15	7.9	0.623	0.112	0.3418	
600 minute summer	15	7.002	19	1.8	0.416	0.025	1.0233	
600 minute summer	16	8.000	19	1.5	0.471	0.015	0.7549	
15 minute summer	17_PP	9.000	19	1.6	0.736	0.067	0.0149	
15 minute summer	18_PP	10.000	19	1.7	0.825	0.061	0.0075	
600 minute summer	19	7.003	Tank 2	3.7	0.333	0.023	1.3518	
600 minute summer	20_PP	11.000	21	0.8	0.396	0.020	0.1715	
600 minute summer	21	11.001	Tank 2	1.6	0.391	0.022	0.4798	
15 minute summer	22_PP	12.000	Tank 2	0.5	0.555	0.063	0.0070	
600 minute summer	Tank 2	Orifice	23_OUT	1.3				44.4

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute summer	1	188	145.789	0.289	6.4	0.5680	0.0000	OK
240 minute summer	2	188	145.789	0.470	6.3	0.5314	0.0000	SURCHARGED
15 minute summer	3	10	146.031	0.056	5.3	0.0750	0.0000	OK
15 minute summer	4	11	145.892	0.057	5.2	0.0643	0.0000	OK
15 minute summer	5	11	145.822	0.056	5.2	0.0630	0.0000	OK
15 minute summer	6_PP	12	147.015	0.015	0.9	0.1102	0.0000	OK
15 minute summer	7_PP	12	146.873	0.023	2.2	0.3379	0.0000	OK
15 minute summer	8_PP	12	146.923	0.023	3.4	0.4656	0.0000	OK
15 minute summer	9	11	146.014	0.114	19.3	0.1932	0.0000	OK
240 minute summer	10	188	145.789	0.538	25.4	1.2866	0.0000	SURCHARGED
15 minute summer	11_PP	10	146.906	0.030	4.2	0.0466	0.0000	OK
240 minute summer	Tank 1	188	145.789	0.839	25.2	72.6552	0.0000	SURCHARGED
15 minute summer	12_OUT	1	144.892	0.000	4.0	0.0000	0.0000	OK
360 minute summer	13	320	147.059	0.395	2.4	0.6718	0.0000	SURCHARGED

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 summer	1	1.000	2	6.3	0.563	0.090	3.1016	
240 minute summer	2	1.001	10	4.0	0.264	0.056	1.1680	
15 minute summer	3	2.000	4	5.2	0.677	0.131	0.1818	
15 minute summer	4	2.001	5	5.2	0.680	0.130	0.0906	
15 minute summer	5	2.002	10	5.1	0.683	0.128	0.1495	
15 minute summer	6_PP	3.000	9	0.7	1.035	0.046	0.0091	
15 minute summer	7_PP	4.000	9	1.7	1.269	0.110	0.0158	
15 minute summer	8_PP	5.000	9	2.8	2.118	0.103	0.0055	
15 minute summer	9	3.001	10	19.3	0.831	0.271	0.2631	
240 minute summer	10	1.002	Tank 1	24.0	0.781	0.338	0.6153	
15 minute summer	11_PP	6.000	Tank 1	4.2	2.181	0.176	0.0093	
240 minute summer	Tank 1	Pump	12_OUT	4.0				90.7
360 minute summer	13	7.000	14	2.4	0.538	0.060	0.3439	

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute summer	14	328	147.059	0.521	4.5	0.8235	0.0000	SURCHARGED
360 minute summer	15	328	147.059	0.629	4.6	0.8368	0.0000	SURCHARGED
360 minute summer	16	328	147.059	0.559	4.6	1.1866	0.0000	SURCHARGED
360 minute summer	17_PP	328	147.059	0.453	0.9	0.6023	0.0000	SURCHARGED
360 minute summer	18_PP	328	147.059	0.486	0.9	0.6530	0.0000	SURCHARGED
360 minute summer	19	328	147.059	0.873	9.0	1.3927	0.0000	SURCHARGED
360 minute summer	20_PP	328	147.059	0.592	2.5	0.9996	0.0000	SURCHARGED
360 minute summer	21	328	147.059	0.713	4.5	1.1304	0.0000	SURCHARGED
360 minute summer	22_PP	328	147.059	0.415	0.4	0.4970	0.0000	SURCHARGED
360 minute summer	Tank 2	328	147.059	0.971	14.9	68.4352	0.0000	SURCHARGED
15 minute summer	23_OUT	1	146.060	0.000	1.3	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)
360 minute summer	14	7.001	15	3.8	0.451	0.054	1.8557	
360 minute summer	15	7.002	19	3.1	0.457	0.044	1.6073	
360 minute summer	16	8.000	19	3.3	0.522	0.034	1.5184	
360 minute summer	17_PP	9.000	19	0.8	0.556	0.034	0.1231	
360 minute summer	18_PP	10.000	19	1.5	0.643	0.056	0.0649	
360 minute summer	19	7.003	Tank 2	8.5	0.370	0.053	1.4607	
360 minute summer	20_PP	11.000	21	2.1	0.465	0.052	0.3072	
360 minute summer	21	11.001	Tank 2	4.1	0.437	0.058	0.5662	
360 minute summer	22_PP	12.000	Tank 2	0.3	0.424	0.038	0.0608	
360 minute summer	Tank 2	Orifice	23_OUT	1.8				49.8

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute summer	1	220	146.127	0.627	8.8	1.2334	0.0000	SURCHARGED
240 minute summer	2	220	146.127	0.808	7.0	0.9142	0.0000	SURCHARGED
240 minute summer	3	220	146.127	0.152	2.1	0.2043	0.0000	OK
240 minute summer	4	216	146.127	0.292	2.1	0.3306	0.0000	SURCHARGED
240 minute summer	5	216	146.127	0.361	2.2	0.4086	0.0000	SURCHARGED
15 minute summer	6_PP	11	147.017	0.017	1.2	0.1337	0.0000	OK
15 minute summer	7_PP	12	146.878	0.028	3.0	0.4313	0.0000	OK
15 minute summer	8_PP	12	146.927	0.027	4.6	0.5934	0.0000	OK
240 minute summer	9	220	146.127	0.227	8.4	0.3860	0.0000	OK
240 minute summer	10	220	146.127	0.876	33.5	2.0961	0.0000	SURCHARGED
15 minute summer	11_PP	10	146.912	0.035	5.6	0.0547	0.0000	OK
240 minute summer	Tank 1	220	146.127	1.177	34.3	101.9739	0.0000	SURCHARGED
15 minute summer	12_OUT	1	144.892	0.000	4.0	0.0000	0.0000	OK
360 minute summer	13	360	147.275	0.611	3.2	1.0392	0.0000	SURCHARGED

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 summer	1	1.000	2	7.0	0.546	0.098	3.1198	
240 minute summer	2	1.001	10	6.2	0.260	0.088	1.1680	
240 minute summer	3	2.000	4	2.1	0.524	0.052	0.8076	
240 minute summer	4	2.001	5	2.1	0.521	0.052	0.4656	
240 minute summer	5	2.002	10	2.1	0.528	0.052	0.7966	
15 minute summer	6_PP	3.000	9	1.0	1.141	0.064	0.0116	
15 minute summer	7_PP	4.000	9	2.5	1.408	0.160	0.0206	
15 minute summer	8_PP	5.000	9	3.8	2.307	0.142	0.0069	
240 minute summer	9	3.001	10	8.4	0.664	0.117	0.7056	
240 minute summer	10	1.002	Tank 1	32.6	0.773	0.459	0.6153	
15 minute summer	11_PP	6.000	Tank 1	5.6	2.350	0.236	0.0115	
240 minute summer	Tank 1	Pump	12_OUT	4.0				93.6
360 minute summer	13	7.000	14	2.4	0.536	0.060	0.3439	

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute summer	14	360	147.275	0.737	5.2	1.1649	0.0000	SURCHARGED
360 minute summer	15	360	147.275	0.845	5.9	1.1242	0.0000	SURCHARGED
360 minute summer	16	360	147.275	0.775	6.2	1.6451	0.0000	SURCHARGED
360 minute summer	17_PP	360	147.275	0.669	1.2	1.3569	0.0000	SURCHARGED
360 minute summer	18_PP	360	147.275	0.702	1.2	3.2343	0.0000	SURCHARGED
360 minute summer	19	360	147.275	1.089	13.9	1.7373	0.0000	SURCHARGED
360 minute summer	20_PP	360	147.275	0.808	6.4	14.9516	0.0000	SURCHARGED
360 minute summer	21	360	147.275	0.929	6.0	1.4728	0.0000	SURCHARGED
360 minute summer	22_PP	360	147.276	0.631	0.5	0.7559	0.0000	SURCHARGED
360 minute summer	Tank 2	360	147.275	1.187	21.7	83.6588	0.0000	SURCHARGED
15 minute summer	23_OUT	1	146.060	0.000	1.4	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)
360 minute summer	14	7.001	15	4.6	0.429	0.064	1.8557	
360 minute summer	15	7.002	19	5.4	0.438	0.076	1.6073	
360 minute summer	16	8.000	19	5.6	0.503	0.058	1.5184	
360 minute summer	17_PP	9.000	19	0.8	0.555	0.035	0.1231	
360 minute summer	18_PP	10.000	19	1.0	0.616	0.035	0.0649	
360 minute summer	19	7.003	Tank 2	13.5	0.385	0.084	1.4607	
360 minute summer	20_PP	11.000	21	-4.5	0.445	-0.111	0.3072	
360 minute summer	21	11.001	Tank 2	5.6	0.396	0.078	0.5662	
360 minute summer	22_PP	12.000	Tank 2	0.3	0.417	0.037	0.0608	
360 minute summer	Tank 2	Orifice	23_OUT	2.0				57.3

Results for 100 year +30% CC Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute summer	1	240	146.963	1.463	11.4	2.8767	0.0000	FLOOD RISK
240 minute summer	2	240	146.963	1.644	10.6	1.8596	0.0000	SURCHARGED
240 minute summer	3	240	146.963	0.988	2.7	1.3251	0.0000	SURCHARGED
240 minute summer	4	240	146.963	1.128	2.7	1.2760	0.0000	SURCHARGED
240 minute summer	5	240	146.963	1.197	2.7	1.3540	0.0000	SURCHARGED
15 minute summer	6_PP	11	147.020	0.020	1.5	0.1548	0.0000	OK
240 minute summer	7_PP	240	146.963	0.113	1.7	2.1008	0.0000	SURCHARGED
240 minute summer	8_PP	240	146.963	0.063	1.8	1.6916	0.0000	OK
240 minute summer	9	240	146.963	1.063	11.0	1.8052	0.0000	SURCHARGED
240 minute summer	10	240	146.963	1.712	46.3	4.0954	0.0000	SURCHARGED
240 minute summer	11_PP	240	146.963	0.087	2.1	0.2684	0.0000	OK
240 minute summer	Tank 1	240	146.963	2.013	46.9	130.5694	0.0000	SURCHARGED
15 minute summer	12_OUT	1	144.892	0.000	4.0	0.0000	0.0000	OK
360 minute summer	13	360	147.488	0.824	4.2	1.4016	0.0000	FLOOD RISK

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 summer	1	1.000	2	10.6	0.537	0.150	3.1198	
240 minute summer	2	1.001	10	10.1	0.248	0.143	1.1680	
240 minute summer	3	2.000	4	2.7	0.572	0.067	0.9394	
240 minute summer	4	2.001	5	2.7	0.551	0.067	0.4656	
240 minute summer	5	2.002	10	2.4	0.528	0.060	0.7966	
15 minute summer	6_PP	3.000	9	1.3	1.233	0.083	0.0140	
240 minute summer	7_PP	4.000	9	2.2	1.118	0.142	0.0927	
240 minute summer	8_PP	5.000	9	2.0	1.860	0.077	0.0276	
240 minute summer	9	3.001	10	10.9	0.713	0.153	0.7962	
240 minute summer	10	1.002	Tank 1	44.8	0.727	0.631	0.6153	
240 minute summer	11_PP	6.000	Tank 1	2.1	1.810	0.089	0.0365	
240 minute summer	Tank 1	Pump	12_OUT	4.0				96.5
360 minute summer	13	7.000	14	3.5	0.515	0.089	0.3439	

Results for 100 year +30% CC Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute summer	14	360	147.488	0.950	7.2	1.5017	0.0000	FLOOD RISK
360 minute summer	15	360	147.488	1.058	8.3	1.4077	0.0000	FLOOD RISK
360 minute summer	16	360	147.488	0.988	8.1	2.0975	0.0000	FLOOD RISK
360 minute summer	17_PP	360	147.488	0.882	3.5	8.8673	0.0000	FLOOD RISK
360 minute summer	18_PP	360	147.488	0.915	3.9	11.1182	0.0000	FLOOD RISK
360 minute summer	19	360	147.488	1.302	18.9	2.0774	0.0000	FLOOD RISK
360 minute summer	20_PP	360	147.488	1.021	15.4	35.4578	0.0000	FLOOD RISK
360 minute summer	21	360	147.488	1.142	11.9	1.8108	0.0000	FLOOD RISK
360 minute summer	22_PP	360	147.488	0.844	0.9	3.1138	0.0000	SURCHARGED
360 minute summer	Tank 2	360	147.488	1.400	29.1	85.0061	0.0000	SURCHARGED
15 minute summer	23_OUT	1	146.060	0.000	1.6	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)
360 minute summer	14	7.001	15	6.6	0.413	0.094	1.8557	
360 minute summer	15	7.002	19	7.8	0.417	0.110	1.6073	
360 minute summer	16	8.000	19	7.3	0.471	0.075	1.5184	
360 minute summer	17_PP	9.000	19	-2.6	0.496	-0.111	0.1231	
360 minute summer	18_PP	10.000	19	-2.7	0.584	-0.097	0.0649	
360 minute summer	19	7.003	Tank 2	18.2	0.417	0.114	1.4607	
360 minute summer	20_PP	11.000	21	-11.7	0.421	-0.292	0.3072	
360 minute summer	21	11.001	Tank 2	-8.3	0.397	-0.117	0.5662	
360 minute summer	22_PP	12.000	Tank 2	-0.7	0.353	-0.094	0.0608	
360 minute summer	Tank 2	Orifice	23_OUT	2.2				62.8

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute summer	1	172	147.000	1.500	12.3	2.9490	10.9073	FLOOD
240 minute summer	2	172	147.002	1.683	11.1	1.9033	0.0000	SURCHARGED
240 minute summer	3	172	147.003	1.028	2.9	1.3782	0.0000	SURCHARGED
240 minute summer	4	172	147.003	1.168	2.9	1.3205	0.0000	SURCHARGED
180 minute summer	5	148	147.003	1.237	4.6	1.3986	0.0000	SURCHARGED
15 minute summer	6_PP	11	147.021	0.021	1.6	0.1648	0.0000	OK
180 minute summer	7_PP	148	147.004	0.154	3.7	2.9043	0.0000	FLOOD RISK
180 minute summer	8_PP	148	147.003	0.103	2.9	2.9156	0.0000	SURCHARGED
240 minute summer	9	172	147.003	1.103	11.8	1.8726	0.0000	SURCHARGED
240 minute summer	10	172	147.003	1.752	48.9	4.1896	0.0000	SURCHARGED
180 minute summer	11_PP	148	147.003	0.127	2.8	1.6700	0.0000	SURCHARGED
240 minute summer	Tank 1	172	147.002	2.052	47.1	130.6140	0.0000	SURCHARGED
15 minute summer	12_OUT	1	144.892	0.000	4.0	0.0000	0.0000	OK
360 minute summer	13	352	147.600	0.936	4.5	1.5915	0.0000	FLOOD RISK

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 summer	1	1.000	2	11.1	0.535	0.158	3.1198	
240 minute summer	2	1.001	10	10.6	0.245	0.149	1.1680	
240 minute summer	3	2.000	4	2.9	0.562	0.072	0.9394	
240 minute summer	4	2.001	5	-2.9	0.543	-0.073	0.4656	
180 minute summer	5	2.002	10	2.7	0.544	0.068	0.7966	
15 minute summer	6_PP	3.000	9	1.5	1.273	0.093	0.0151	
180 minute summer	7_PP	4.000	9	-3.4	1.217	-0.222	0.0927	
180 minute summer	8_PP	5.000	9	-2.5	2.004	-0.096	0.0331	
240 minute summer	9	3.001	10	11.7	0.710	0.164	0.7962	
240 minute summer	10	1.002	Tank 1	44.8	0.712	0.631	0.6153	
180 minute summer	11_PP	6.000	Tank 1	2.8	1.960	0.118	0.0379	
240 minute summer	Tank 1	Pump	12_OUT	4.0				97.4
360 minute summer	13	7.000	14	4.1	0.523	0.102	0.3439	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute summer	14	352	147.600	1.062	8.1	1.6783	0.0000	FLOOD RISK
360 minute summer	15	352	147.600	1.170	9.6	1.5563	0.0000	FLOOD RISK
360 minute summer	16	328	147.600	1.100	8.7	2.3347	0.0000	FLOOD RISK
480 minute summer	17_PP	416	147.600	0.994	3.7	12.8076	0.0000	FLOOD RISK
480 minute summer	18_PP	416	147.600	1.027	3.8	15.2497	0.0000	FLOOD RISK
480 minute summer	19	416	147.600	1.414	17.2	2.2555	0.0000	FLOOD RISK
360 minute summer	20_PP	328	147.600	1.133	15.1	36.7862	2.5710	FLOOD
360 minute summer	21	344	147.600	1.254	10.9	1.9878	0.0000	FLOOD RISK
480 minute summer	22_PP	416	147.600	0.956	1.1	4.5214	0.0000	FLOOD RISK
480 minute summer	Tank 2	416	147.600	1.512	21.1	85.2367	0.0000	FLOOD RISK
15 minute summer	23_OUT	1	146.060	0.000	1.7	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)
360 minute summer	14	7.001	15	7.7	0.420	0.108	1.8557	
360 minute summer	15	7.002	19	9.2	0.427	0.130	1.6073	
360 minute summer	16	8.000	19	8.2	0.483	0.084	1.5184	
480 minute summer	17_PP	9.000	19	-2.7	0.454	-0.116	0.1231	
480 minute summer	18_PP	10.000	19	-2.8	0.547	-0.102	0.0649	
480 minute summer	19	7.003	Tank 2	17.0	0.387	0.106	1.4607	
360 minute summer	20_PP	11.000	21	-10.5	0.409	-0.263	0.3072	
360 minute summer	21	11.001	Tank 2	-6.9	0.391	-0.097	0.5662	
480 minute summer	22_PP	12.000	Tank 2	-0.8	0.344	-0.101	0.0608	
480 minute summer	Tank 2	Orifice	23_OUT	2.3				76.1