Design Settings

Rainfall Methodology	FEH-13	Maximum Time of Concentration (mins)	30.00	Preferred Cover Depth (m)	1.200
Return Period (years)	2	Maximum Rainfall (mm/hr)	50.0	Include Intermediate Ground	✓
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00	Enforce best practice design rules	x
CV	0.750	Connection Type	Level Soffits		
Time of Entry (mins)	5.00	Minimum Backdrop Height (m)	0.200		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.034	5.00	137.483	1200	388304.725	411239.387	1.350
2	0.016	5.00	137.250	1200	388295.344	411225.106	1.350
3	0.023	5.00	137.361	1200	388289.127	411246.158	1.350
4	0.033	5.00	137.150	1200	388281.329	411234.318	1.417
5	0.044	5.00	137.500	1200	388271.073	411259.410	1.405
6	0.042	5.00	137.178	1200	388262.653	411246.593	1.667
7	0.039	5.00	138.472	1200	388246.726	411257.061	3.070
8			138.500	1200	388245.078	411254.565	3.115
9			138.500	1200	388240.800	411245.377	3.250
10			138.500	1200	388227.857	411243.035	4.824

Flow+ v10.1 Copyright © 1988-2021 Causeway Technologies Ltd

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	17.087	0.600	136.133	135.900	0.233	73.3	150	5.24	43.2
1.001	2	4	16.771	0.600	135.900	135.733	0.167	100.4	150	5.52	42.4
2.000	3	4	14.177	0.600	136.011	135.733	0.278	51.0	150	5.17	43.5
1.002	4	6	22.349	0.600	135.733	135.511	0.222	100.7	150	5.89	41.3
3.000	5	6	15.335	0.600	136.095	135.511	0.584	26.3	150	5.13	43.6
1.003	6	7	19.059	0.600	135.511	135.402	0.109	175.0	300	6.16	40.5
1.004	7	8	2.991	0.600	135.402	135.385	0.017	175.0	300	6.20	40.4
1.005	8	9	10.135	0.600	135.385	135.250	0.135	75.0	150	6.35	40.0
1.007	9	10	13.153	0.600	135.250	133.676	1.574	8.4	150	6.41	39.9

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.000	1.175	20.8	4.0	1.200	1.200	0.034	0.0
1.001	1.002	17.7	5.7	1.200	1.267	0.050	0.0
2.000	1.412	24.9	2.7	1.200	1.267	0.023	0.0
1.002	1.001	17.7	11.9	1.267	1.517	0.106	0.0
3.000	1.972	34.9	5.2	1.255	1.517	0.044	0.0
1.003	1.185	83.8	21.1	1.367	2.770	0.192	0.0
1.004	1.185	83.8	25.3	2.770	2.815	0.231	0.0
1.005	1.162	20.5	25.1	2.965	3.100	0.231	0.0
1.007	3.507	62.0	25.0	3.100	4.674	0.231	0.0

Flow+ v10.1 Copyright © 1988-2021 Causeway Technologies Ltd

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	17.087	73.3	150	Circular_Default Sewer Type	137.483	136.133	1.200	137.250	135.900	1.200
1.001	16.771	100.4	150	Circular_Default Sewer Type	137.250	135.900	1.200	137.150	135.733	1.267
2.000	14.177	51.0	150	Circular_Default Sewer Type	137.361	136.011	1.200	137.150	135.733	1.267
1.002	22.349	100.7	150	Circular_Default Sewer Type	137.150	135.733	1.267	137.178	135.511	1.517
3.000	15.335	26.3	150	Circular_Default Sewer Type	137.500	136.095	1.255	137.178	135.511	1.517
1.003	19.059	175.0	300	Circular_Default Sewer Type	137.178	135.511	1.367	138.472	135.402	2.770
1.004	2.991	175.0	300	Circular_Default Sewer Type	138.472	135.402	2.770	138.500	135.385	2.815
1.005	10.135	75.0	150	Circular_Default Sewer Type	138.500	135.385	2.965	138.500	135.250	3.100
1.007	13.153	8.4	150	Circular_Default Sewer Type	138.500	135.250	3.100	138.500	133.676	4.674

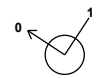
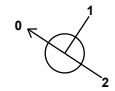
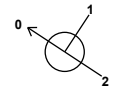
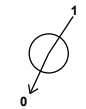
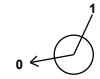
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	1200	Manhole	Adoptable	2	1200	Manhole	Adoptable
1.001	2	1200	Manhole	Adoptable	4	1200	Manhole	Adoptable
2.000	3	1200	Manhole	Adoptable	4	1200	Manhole	Adoptable
1.002	4	1200	Manhole	Adoptable	6	1200	Manhole	Adoptable
3.000	5	1200	Manhole	Adoptable	6	1200	Manhole	Adoptable
1.003	6	1200	Manhole	Adoptable	7	1200	Manhole	Adoptable
1.004	7	1200	Manhole	Adoptable	8	1200	Manhole	Adoptable
1.005	8	1200	Manhole	Adoptable	9	1200	Manhole	Adoptable
1.007	9	1200	Manhole	Adoptable	10	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
1	388304.725	411239.387	137.483	1.350	1200	 0	1.000	136.133	150

Flow+ v10.1 Copyright © 1988-2021 Causeway Technologies Ltd

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
2	388295.344	411225.106	137.250	1.350	1200	 1	1.000	135.900	150
						0	1.001	135.900	150
3	388289.127	411246.158	137.361	1.350	1200	 0	2.000	136.011	150
4	388281.329	411234.318	137.150	1.417	1200	 1	2.000	135.733	150
						2	1.001	135.733	150
						0	1.002	135.733	150
5	388271.073	411259.410	137.500	1.405	1200	 0	3.000	136.095	150
6	388262.653	411246.593	137.178	1.667	1200	 1	3.000	135.511	150
						2	1.002	135.511	150
						0	1.003	135.511	300
7	388246.726	411257.061	138.472	3.070	1200	 1	1.003	135.402	300
						0	1.004	135.402	300
8	388245.078	411254.565	138.500	3.115	1200	 1	1.004	135.385	300
						0	1.005	135.385	150
9	388240.800	411245.377	138.500	3.250	1200	 1	1.005	135.250	150
						0	1.007	135.250	150

Flow+ v10.1 Copyright © 1988-2021 Causeway Technologies Ltd

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
10	388227.857	411243.035	138.500	4.824	1200	1	1.007	133.676	150



Simulation Settings

Rainfall Methodology	FEH-13	Analysis Speed	Normal	Additional Storage (m³/ha)	20.0	30 year (l/s)	0.8
Summer CV	0.750	Skip Steady State	✓	Check Discharge Rate(s)	✓	100 year (l/s)	1.0
Winter CV	0.840	Drain Down Time (mins)	240	1 year (l/s)	0.4	Check Discharge Volume	x

Storm Durations

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

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	40	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	BFIHost	0.830	Growth Factor 100 year	2.08	Q 30 year (l/s)	0.8
Greenfield Method	FEH	Region	10	Betterment (%)	0	Q 100 year (l/s)	1.0
Positively Drained Area (ha)	0.231	QBar/QMed conversion factor	1.075	QMed	0.5		
SAAR (mm)	1100	Growth Factor 1 year	0.87	QBar	0.5		
Host	4	Growth Factor 30 year	1.70	Q 1 year (l/s)	0.4		

Node 8 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	135.385	Product Number	CTL-SHE-0097-5000-1600-5000
Design Depth (m)	1.600	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Flow+ v10.1 Copyright © 1988-2021 Causeway Technologies Ltd

Node 8 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	135.385
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	224

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	62.0	0.0	1.600	62.0	0.0	1.601	0.0	0.0

Flow+ v10.1 Copyright © 1988-2021 Causeway Technologies Ltd

Results for 2 year Critical Storm Duration. Lowest mass balance: 98.48%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	136.178	0.045	4.1	0.0730	0.0000	OK
15 minute winter	2	11	135.959	0.059	5.9	0.0804	0.0000	OK
15 minute winter	3	10	136.044	0.033	2.7	0.0488	0.0000	OK
15 minute winter	4	11	135.828	0.095	12.3	0.1513	0.0000	OK
15 minute winter	5	10	136.134	0.039	5.3	0.0691	0.0000	OK
15 minute winter	6	11	135.622	0.111	22.0	0.1815	0.0000	OK
120 minute winter	7	86	135.614	0.212	10.6	0.2933	0.0000	OK
120 minute winter	8	86	135.614	0.229	10.1	13.7242	0.0000	SURCHARGED
120 minute winter	9	86	135.278	0.028	4.4	0.0314	0.0000	OK
120 minute winter	10	86	133.703	0.027	4.4	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)
15 minute winter	1	1.000	2	4.0	0.748	0.193	0.0920	
15 minute winter	2	1.001	4	5.8	0.644	0.326	0.1519	
15 minute winter	3	2.000	4	2.7	0.392	0.107	0.1033	
15 minute winter	4	1.002	6	12.2	0.950	0.691	0.2872	
15 minute winter	5	3.000	6	5.2	0.605	0.150	0.1343	
15 minute winter	6	1.003	7	22.1	0.888	0.264	0.4798	
120 minute winter	7	1.004	8	10.1	0.833	0.121	0.1657	
120 minute winter	8	Hydro-Brake®	9	4.4				
120 minute winter	9	1.007	10	4.4	2.005	0.071	0.0290	30.3

Flow+ v10.1 Copyright © 1988-2021 Causeway Technologies Ltd

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 98.48%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	12	137.403	1.270	20.0	2.0764	0.0000	FLOOD RISK
30 minute winter	2	20	137.250	1.350	20.1	1.8468	0.8961	FLOOD
15 minute winter	3	12	137.192	1.181	13.5	1.7389	0.0000	FLOOD RISK
30 minute winter	4	21	137.150	1.417	36.4	2.2629	0.0003	FLOOD
180 minute winter	5	172	136.971	0.876	6.7	1.5388	0.0000	SURCHARGED
180 minute winter	6	172	136.970	1.459	25.7	2.3857	0.0000	FLOOD RISK
180 minute winter	7	172	136.970	1.568	30.9	2.1713	0.0000	SURCHARGED
180 minute winter	8	172	136.970	1.585	30.3	95.1193	0.0000	SURCHARGED
180 minute winter	9	172	135.280	0.029	5.0	0.0334	0.0000	OK
180 minute winter	10	172	133.705	0.029	5.0	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	14.9	0.890	0.718	0.3008	
30 minute winter	2	1.001	4	14.6	0.827	0.822	0.2953	
15 minute winter	3	2.000	4	9.3	0.528	0.373	0.2496	
30 minute winter	4	1.002	6	33.2	1.884	1.875	0.3935	
180 minute winter	5	3.000	6	6.5	0.495	0.186	0.2700	
180 minute winter	6	1.003	7	24.9	0.589	0.298	1.3421	
180 minute winter	7	1.004	8	30.3	1.044	0.362	0.2106	
180 minute winter	8	Hydro-Brake®	9	5.0				
180 minute winter	9	1.007	10	5.0	2.077	0.080	0.0316	104.1

Flow+ v10.1 Copyright © 1988-2021 Causeway Technologies Ltd