

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	1	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Adoptable Manhole Type

Max Width (mm)	Diameter (mm)	Max Width (mm)	Diameter (mm)
374	1200	749	1500
499	1350	900	1800

>900 Link+900 mm

Max Depth (m)	Diameter (mm)	Max Depth (m)	Diameter (mm)
1.500	1050	99.999	1200

Nodes

Name	Area (ha)	T of E (mins)	Add Inflow (l/s)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
37	0.199	5.00		23.309	1200	530812.494	120523.807	1.909
47	0.073	5.00		22.654	1200	530758.919	120451.531	1.425
38	0.074	5.00		22.327	1350	530786.741	120488.890	1.789
39	0.095	5.00		22.194	1350	530790.590	120486.261	1.703
40	0.070	5.00		21.039	1350	530823.296	120463.290	1.839
48	0.030	5.00		22.369	1200	530757.242	120412.818	1.425
41	0.093	5.00		21.350	2100	530776.969	120399.414	2.550
HW7	0.000			20.660	1350	530783.955	120394.924	2.060
HW8	0.000	5.00		19.400	1200	530796.735	120402.996	0.800
42	0.000			21.350	1200	530798.733	120421.115	2.831
43	0.000			21.063	1200	530828.724	120461.380	2.767
44	0.000		8.3	22.253	1200	530862.478	120500.213	4.186
45	0.000			20.570	1200	530891.023	120518.330	2.653
46	0.000			19.550	1200	530913.373	120508.100	1.742
HW9	0.000			19.800	1200	530914.757	120498.487	2.035

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	37	38	43.387	0.600	21.400	20.688	0.712	60.9	300	5.36	34.8
2.000	47	38	46.581	0.600	21.229	20.763	0.466	100.0	225	5.59	34.2
1.001	38	39	4.661	0.600	20.538	20.491	0.047	100.0	450	5.63	34.1
1.002	39	40	39.967	0.600	20.491	19.200	1.291	31.0	450	5.81	33.6
1.003	40	41	78.907	0.600	19.200	18.800	0.400	197.3	450	6.72	31.5
3.000	48	41	23.850	0.600	20.944	19.025	1.919	12.4	225	5.11	35.4
1.004	41	HW7	8.304	0.600	18.800	18.600	0.200	41.5	450	6.77	31.4
1.005	HW8	42	18.229	0.600	18.600	18.519	0.081	225.0	225	5.35	34.8
1.006	42	43	50.207	0.600	18.519	18.296	0.223	225.0	225	6.32	32.4
1.007	43	44	51.452	0.600	18.296	18.067	0.229	225.0	225	7.30	30.3
1.008	44	45	33.809	0.600	18.067	17.917	0.150	225.0	225	7.95	29.0
1.010	45	46	24.580	0.600	17.917	17.808	0.109	225.0	225	8.43	28.1
1.011	46	HW9	9.712	0.600	17.808	17.765	0.043	225.0	225	8.61	27.8

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)
1.000	2.017	142.6	18.8	1.609	1.339	0.199	0.0	73	1.410
2.000	1.307	52.0	6.8	1.200	1.339	0.073	0.0	55	0.911
1.001	2.033	323.3	32.0	1.339	1.253	0.346	0.0	94	1.313
1.002	3.664	582.7	40.2	1.253	1.389	0.441	0.0	79	2.133
1.003	1.444	229.6	43.6	1.389	2.100	0.511	0.0	132	1.122
3.000	3.731	148.4	2.9	1.200	2.100	0.030	0.0	22	1.475
1.004	3.162	502.8	54.0	2.100	1.610	0.634	0.0	99	2.098
1.005	0.867	34.5	0.0	0.575	2.606	0.000	0.0	0	0.000
1.006	0.867	34.5	0.0	2.606	2.542	0.000	0.0	0	0.000
1.007	0.867	34.5	0.0	2.542	3.961	0.000	0.0	0	0.000
1.008	0.867	34.5	8.3	3.961	2.428	0.000	8.3	75	0.717
1.010	0.867	34.5	8.3	2.428	1.517	0.000	8.3	75	0.717
1.011	0.867	34.5	8.3	1.517	1.810	0.000	8.3	75	0.717

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	43.387	60.9	300	Circular_Default Sewer Type	23.309	21.400	1.609	22.327	20.688	1.339
2.000	46.581	100.0	225	Circular_Default Sewer Type	22.654	21.229	1.200	22.327	20.763	1.339
1.001	4.661	100.0	450	Circular_Default Sewer Type	22.327	20.538	1.339	22.194	20.491	1.253
1.002	39.967	31.0	450	Circular_Default Sewer Type	22.194	20.491	1.253	21.039	19.200	1.389
1.003	78.907	197.3	450	Circular_Default Sewer Type	21.039	19.200	1.389	21.350	18.800	2.100
3.000	23.850	12.4	225	Circular_Default Sewer Type	22.369	20.944	1.200	21.350	19.025	2.100
1.004	8.304	41.5	450	Circular_Default Sewer Type	21.350	18.800	2.100	20.660	18.600	1.610

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	37	1200	Manhole	Adoptable	38	1350	Manhole	Adoptable
2.000	47	1200	Manhole	Adoptable	38	1350	Manhole	Adoptable
1.001	38	1350	Manhole	Adoptable	39	1350	Manhole	Adoptable
1.002	39	1350	Manhole	Adoptable	40	1350	Manhole	Adoptable
1.003	40	1350	Manhole	Adoptable	41	2100	Manhole	Adoptable
3.000	48	1200	Manhole	Adoptable	41	2100	Manhole	Adoptable
1.004	41	2100	Manhole	Adoptable	HW7	1350	Manhole	Adoptable

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)
1.005	18.229	225.0	225	Circular_Default Sewer Type	19.400	18.600	0.575	21.350	18.519	2.606
1.006	50.207	225.0	225	Circular_Default Sewer Type	21.350	18.519	2.606	21.063	18.296	2.542
1.007	51.452	225.0	225	Circular_Default Sewer Type	21.063	18.296	2.542	22.253	18.067	3.961
1.008	33.809	225.0	225	Circular_Default Sewer Type	22.253	18.067	3.961	20.570	17.917	2.428
1.010	24.580	225.0	225	Circular_Default Sewer Type	20.570	17.917	2.428	19.550	17.808	1.517
1.011	9.712	225.0	225	Circular_Default Sewer Type	19.550	17.808	1.517	19.800	17.765	1.810

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.005	HW8	1200	Manhole	Adoptable	42	1200	Manhole	Adoptable
1.006	42	1200	Manhole	Adoptable	43	1200	Manhole	Adoptable
1.007	43	1200	Manhole	Adoptable	44	1200	Manhole	Adoptable
1.008	44	1200	Manhole	Adoptable	45	1200	Manhole	Adoptable
1.010	45	1200	Manhole	Adoptable	46	1200	Manhole	Adoptable
1.011	46	1200	Manhole	Adoptable	HW9	1200	Manhole	Adoptable

Simulation Settings

Rainfall Methodology	FEH-13	Analysis Speed	Detailed	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	✓	Check Discharge Rate(s)	✓
Summer CV	0.750	Drain Down Time (mins)	240	Check Discharge Volume	✓
Winter CV	0.840	Additional Storage (m³/ha)	20.0	100 year 360 minute (m³)	

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 %)
1	0	0	0
30	0	2	0
100	40	2	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 42 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	18.519	Product Number	CTL-SHE-0087-3200-0850-3200
Design Depth (m)	0.850	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	3.2	Min Node Diameter (mm)	1200

Node 41 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	18.800	Product Number	CTL-SHE-0085-4300-2000-4300
Design Depth (m)	2.000	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	4.3	Min Node Diameter (mm)	1200

Node HW8 Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Main Channel Length (m)	15.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	18.600	Main Channel Slope (1:X)	99999.0
Safety Factor	2.0	Time to half empty (mins)	1380	Main Channel n	0.001

Inlets

HW7

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	39.0	0.0	0.700	129.0	0.0

Node 41 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	18.800	Slope (1:X)	999.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	1.000
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.30	Length (m)	87.000		

Node 41 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	18.800
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	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	249.6	0.0	1.500	249.6	0.0	1.501	0.0	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 98.94%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	37	10	21.473	0.073	18.4	0.2336	0.0000	OK
15 minute winter	47	11	21.283	0.054	6.7	0.1159	0.0000	OK
15 minute winter	38	10	20.642	0.104	30.8	0.2358	0.0000	OK
15 minute winter	39	11	20.569	0.078	39.3	0.1990	0.0000	OK
15 minute winter	40	11	19.357	0.157	45.3	0.3451	0.0000	OK
15 minute winter	48	10	20.965	0.021	2.8	0.0333	0.0000	OK
480 minute winter	41	352	19.008	0.208	10.9	70.7342	0.0000	OK
600 minute winter	HW7	600	18.681	0.081	3.2	0.1159	0.0000	OK
600 minute winter	HW8	600	18.681	0.081	3.1	0.0916	0.0000	OK
600 minute winter	42	600	18.680	0.161	3.1	0.1822	0.0000	OK
600 minute winter	43	600	18.341	0.045	3.1	0.0511	0.0000	OK
600 minute winter	44	615	18.158	0.091	11.4	0.1025	0.0000	OK
600 minute winter	45	615	18.008	0.091	11.4	0.1035	0.0000	OK
600 minute winter	46	615	17.903	0.095	11.4	0.1071	0.0000	OK
600 minute winter	HW9	615	17.852	0.087	11.4	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	37	1.000	38	17.8	1.380	0.124	0.5603	
15 minute winter	47	2.000	38	6.4	0.893	0.124	0.3354	
15 minute winter	38	1.001	39	30.7	1.338	0.095	0.1075	
15 minute winter	39	1.002	40	39.3	1.198	0.067	1.3528	
15 minute winter	40	1.003	41	46.4	1.795	0.202	2.2288	
15 minute winter	48	3.000	41	2.7	1.442	0.018	0.0453	
480 minute winter	41	Hydro-Brake®	HW7	3.2				
480 minute winter	HW7	Flow through pond	HW8	3.1	0.024	0.000	3.5722	
600 minute winter	HW8	1.005	42	3.1	0.263	0.090	0.3944	
600 minute winter	42	Hydro-Brake®	43	3.1				
600 minute winter	43	1.007	44	3.1	0.307	0.090	0.5305	
600 minute winter	44	1.008	45	11.4	0.757	0.330	0.5087	
600 minute winter	45	1.010	46	11.4	0.735	0.330	0.3810	
600 minute winter	46	1.011	HW9	11.4	0.757	0.330	0.1462	524.3

Results for 30 year +2% A Critical Storm Duration. Lowest mass balance: 98.94%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	37	10	21.560	0.160	75.5	0.5217	0.0000	OK
15 minute winter	47	10	21.346	0.117	27.7	0.2556	0.0000	OK
15 minute winter	38	10	20.767	0.229	128.6	0.5209	0.0000	OK
15 minute winter	39	10	20.651	0.160	164.2	0.4118	0.0000	OK
15 minute winter	40	10	19.533	0.333	189.7	0.7346	0.0000	OK
15 minute winter	48	10	20.987	0.043	11.4	0.0667	0.0000	OK
480 minute winter	41	472	19.449	0.649	28.0	232.4815	0.0000	SURCHARGED
2160 minute winter	HW7	2340	18.897	0.297	3.4	0.4248	0.0000	OK
2160 minute winter	HW8	2340	18.897	0.297	3.3	0.3357	0.0000	SURCHARGED
2160 minute winter	42	2340	18.896	0.377	3.2	0.4264	0.0000	SURCHARGED
960 minute summer	43	1110	18.342	0.046	3.2	0.0520	0.0000	OK
960 minute summer	44	1110	18.158	0.091	11.5	0.1031	0.0000	OK
960 minute summer	45	1110	18.009	0.092	11.5	0.1040	0.0000	OK
960 minute summer	46	1110	17.903	0.095	11.5	0.1077	0.0000	OK
960 minute summer	HW9	1110	17.853	0.088	11.5	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	37	1.000	38	73.9	2.003	0.518	1.6036	
15 minute winter	47	2.000	38	26.8	1.311	0.516	0.9532	
15 minute winter	38	1.001	39	128.1	1.952	0.396	0.3067	
15 minute winter	39	1.002	40	163.1	1.835	0.280	3.5223	
15 minute winter	40	1.003	41	192.9	2.284	0.840	7.0843	
15 minute winter	48	3.000	41	11.3	2.187	0.076	0.1293	
30 minute winter	41	Hydro-Brake®	HW7	3.4				
15 minute winter	HW7	Flow through pond	HW8	4.4	0.133	0.000	4.3678	
60 minute summer	HW8	1.005	42	3.2	0.286	0.093	0.5638	
960 minute summer	42	Hydro-Brake®	43	3.2				
960 minute summer	43	1.007	44	3.2	0.314	0.093	0.5368	
960 minute summer	44	1.008	45	11.5	0.759	0.334	0.5123	
960 minute summer	45	1.010	46	11.5	0.737	0.334	0.3837	
960 minute summer	46	1.011	HW9	11.5	0.759	0.334	0.1472	774.0

Results for 100 year +40% CC +2% A Critical Storm Duration. Lowest mass balance: 98.94%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	37	10	21.646	0.246	134.4	0.8020	0.0000	OK
15 minute winter	47	10	21.406	0.177	49.3	0.3849	0.0000	OK
15 minute winter	38	11	20.873	0.335	228.2	0.7612	0.0000	OK
15 minute winter	39	11	20.749	0.258	291.2	0.6620	0.0000	OK
960 minute winter	40	930	20.257	1.057	23.3	2.3332	0.0000	SURCHARGED
15 minute winter	48	10	21.001	0.057	20.3	0.0896	0.0000	OK
960 minute winter	41	930	20.257	1.457	27.3	471.3675	0.0000	SURCHARGED
8640 minute winter	HW7	6600	19.237	0.637	3.4	0.9111	0.0000	OK
8640 minute winter	HW8	6600	19.237	0.637	3.3	0.7201	0.0000	FLOOD RISK
8640 minute winter	42	6600	19.236	0.717	3.2	0.8109	0.0000	SURCHARGED
480 minute winter	43	600	18.342	0.046	3.2	0.0520	0.0000	OK
480 minute winter	44	600	18.158	0.091	11.5	0.1031	0.0000	OK
480 minute winter	45	600	18.009	0.092	11.5	0.1040	0.0000	OK
480 minute winter	46	600	17.903	0.095	11.5	0.1077	0.0000	OK
480 minute winter	HW9	600	17.853	0.088	11.5	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	37	1.000	38	131.0	2.232	0.919	2.5597	
15 minute winter	47	2.000	38	47.7	1.466	0.918	1.5159	
15 minute winter	38	1.001	39	227.0	2.203	0.702	0.5133	
15 minute winter	39	1.002	40	286.6	2.043	0.492	5.0418	
15 minute winter	40	1.003	41	323.7	2.336	1.410	11.9762	
15 minute winter	48	3.000	41	20.1	2.576	0.136	0.5125	
960 minute winter	41	Hydro-Brake®	HW7	3.7				
15 minute winter	HW7	Flow through pond	HW8	4.5	0.142	0.000	5.4986	
15 minute summer	HW8	1.005	42	3.2	0.345	0.094	0.5410	
480 minute winter	42	Hydro-Brake®	43	3.2				
480 minute winter	43	1.007	44	3.2	0.314	0.093	0.5368	
480 minute winter	44	1.008	45	11.5	0.759	0.334	0.5123	
480 minute winter	45	1.010	46	11.5	0.737	0.334	0.3837	
480 minute winter	46	1.011	HW9	11.5	0.759	0.334	0.1472	475.9