

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)	17.000	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	x

D AND CG Manhole Type

Max Width (mm)	Diameter (mm)	Max Width (mm)	Diameter (mm)	Max Width (mm)	Diameter (mm)
299	1200	599	1500	1199	2100
449	1350	899	1800	1800	2700

>1800 Link+900 mm

SW CIRCULAR Link Type

Shape	Circular	Auto Increment (mm)	75
Barrels	1	Follow Ground	x

Available Diameters (mm)

225	375	525	750	900	1200	1500
300	450	600	825	1050	1350	1800

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
50	0.135	5.00	45.966	2700	386062.047	397067.350	2.685
51	0.099	5.00	46.511	2400	386077.024	397090.643	3.069
52	0.078	5.00	46.333	2700	386079.268	397068.873	3.096
54	0.157	5.00	46.306	2700	386140.409	397075.875	3.225
HB5	0.079	5.00	46.077	3000	386142.576	397058.256	3.041
105			45.973	1200	386146.558	397053.237	2.976

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	17.288	0.600	43.281	43.237	0.044	392.9	1200	5.15	50.0
2.000	51	52	21.885	0.600	43.442	43.387	0.055	397.9	1050	5.21	50.0
1.001	52	54	61.541	0.600	43.237	43.081	0.156	394.5	1200	5.76	50.0
1.002	54	HB5	17.752	0.600	43.081	43.036	0.045	394.5	1200	5.92	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)
1.000	1.881	2127.3	18.3	1.485	1.896	0.135	0.0	76	0.601
2.000	1.721	1490.3	13.4	2.019	1.896	0.099	0.0	69	0.558
1.001	1.877	2122.9	42.3	1.896	2.025	0.312	0.0	115	0.771
1.002	1.877	2122.9	63.6	2.025	1.841	0.469	0.0	139	0.868

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)
1.003	HB5	105	6.407	0.600	43.036	42.997	0.039	165.0	225	6.02	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)
1.003	1.015	40.4	74.3	2.816	2.751	0.548	0.0	225	1.034

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	17.288	392.9	1200	SW CIRCULAR	45.966	43.281	1.485	46.333	43.237	1.896
2.000	21.885	397.9	1050	SW CIRCULAR	46.511	43.442	2.019	46.333	43.387	1.896
1.001	61.541	394.5	1200	SW CIRCULAR	46.333	43.237	1.896	46.306	43.081	2.025
1.002	17.752	394.5	1200	SW CIRCULAR	46.306	43.081	2.025	46.077	43.036	1.841
1.003	6.407	165.0	225	SW CIRCULAR	46.077	43.036	2.816	45.973	42.997	2.751

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	50	2700	Manhole	D AND CG	52	2700	Manhole	D AND CG
2.000	51	2400	Manhole	D AND CG	52	2700	Manhole	D AND CG
1.001	52	2700	Manhole	D AND CG	54	2700	Manhole	D AND CG
1.002	54	2700	Manhole	D AND CG	HB5	3000	Manhole	D AND CG
1.003	HB5	3000	Manhole	D AND CG	105	1200	Manhole	D AND CG

Simulation Settings

Rainfall Methodology	FSR	Drain Down Time (mins)	240
FSR Region	England and Wales	Additional Storage (m³/ha)	20.0
M5-60 (mm)	17.000	Check Discharge Rate(s)	✓
Ratio-R	0.400	1 year (l/s)	5.2
Summer CV	0.750	30 year (l/s)	11.5
Winter CV	0.840	100 year (l/s)	15.1
Analysis Speed	Detailed	Check Discharge Volume	x
Skip Steady State	✓		

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 %)
1	0	0	0
30	0	0	0
100	45	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Region	1
Greenfield Method	IH124	Growth Factor 1 year	0.85
Positively Drained Area (ha)		Growth Factor 30 year	1.95
SAAR (mm)		Growth Factor 100 year	2.48
Soil Index	1	Betterment (%)	0
SPR	0.10	QBar	

Pre-development Discharge Rate

Q 1 year (l/s)	Q 100 year (l/s)
Q 30 year (l/s)	

Node HB5 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	43.036	Product Number	CTL-SHE-0108-5000-0850-5000
Design Depth (m)	0.850	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node HB5 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	43.600	Product Number	CTL-SHE-0100-5000-1400-5000
Design Depth (m)	1.400	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	92.521	26.180	30 year 120 minute winter	39.827	15.842
1 year 15 minute winter	64.927	26.180	30 year 180 minute summer	45.598	11.734
1 year 30 minute summer	60.022	16.984	30 year 180 minute winter	29.640	11.734
1 year 30 minute winter	42.121	16.984	30 year 240 minute summer	35.759	9.450
1 year 60 minute summer	40.398	10.676	30 year 240 minute winter	23.758	9.450
1 year 60 minute winter	26.839	10.676	30 year 360 minute summer	26.939	6.932
1 year 120 minute summer	24.980	6.602	30 year 360 minute winter	17.511	6.932
1 year 120 minute winter	16.596	6.602	30 year 480 minute summer	20.981	5.545
1 year 180 minute summer	19.271	4.959	30 year 480 minute winter	13.940	5.545
1 year 180 minute winter	12.527	4.959	30 year 600 minute summer	17.039	4.661
1 year 240 minute summer	15.301	4.043	30 year 600 minute winter	11.642	4.661
1 year 240 minute winter	10.165	4.043	30 year 720 minute summer	15.093	4.045
1 year 360 minute summer	11.775	3.030	30 year 720 minute winter	10.143	4.045
1 year 360 minute winter	7.654	3.030	30 year 960 minute summer	12.278	3.233
1 year 480 minute summer	9.342	2.469	30 year 960 minute winter	8.133	3.233
1 year 480 minute winter	6.207	2.469	30 year 1440 minute summer	8.788	2.355
1 year 600 minute summer	7.682	2.101	30 year 1440 minute winter	5.906	2.355
1 year 600 minute winter	5.249	2.101	100 year +45% CC 15 minute summer	423.061	119.712
1 year 720 minute summer	6.859	1.838	100 year +45% CC 15 minute winter	296.885	119.712
1 year 720 minute winter	4.609	1.838	100 year +45% CC 30 minute summer	278.374	78.770
1 year 960 minute summer	5.653	1.489	100 year +45% CC 30 minute winter	195.350	78.770
1 year 960 minute winter	3.745	1.489	100 year +45% CC 60 minute summer	187.417	49.529
1 year 1440 minute summer	4.127	1.106	100 year +45% CC 60 minute winter	124.515	49.529
1 year 1440 minute winter	2.773	1.106	100 year +45% CC 120 minute summer	114.312	30.209
30 year 15 minute summer	226.195	64.005	100 year +45% CC 120 minute winter	75.946	30.209
30 year 15 minute winter	158.733	64.005	100 year +45% CC 180 minute summer	86.951	22.375
30 year 30 minute summer	147.452	41.724	100 year +45% CC 180 minute winter	56.520	22.375
30 year 30 minute winter	103.475	41.724	100 year +45% CC 240 minute summer	68.114	18.001
30 year 60 minute summer	98.615	26.061	100 year +45% CC 240 minute winter	45.253	18.001
30 year 60 minute winter	65.517	26.061	100 year +45% CC 360 minute summer	51.133	13.158
30 year 120 minute summer	59.946	15.842	100 year +45% CC 360 minute winter	33.238	13.158



Robert E Fry & Associates
45 Bridgeman Terrace
Wigan
WN1 1TT

File: SW5 REVD.PFD
Network: Storm Network 5
RF
13.07.23

Page 4
BENNETT STREET
MANCHESTER
SW NETWORK 5 - REV D

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +45% CC 480 minute summer	39.658	10.480	100 year +45% CC 720 minute winter	19.063	7.602
100 year +45% CC 480 minute winter	26.348	10.480	100 year +45% CC 960 minute summer	22.984	6.052
100 year +45% CC 600 minute summer	32.099	8.780	100 year +45% CC 960 minute winter	15.225	6.052
100 year +45% CC 600 minute winter	21.932	8.780	100 year +45% CC 1440 minute summer	16.353	4.383
100 year +45% CC 720 minute summer	28.365	7.602	100 year +45% CC 1440 minute winter	10.990	4.383

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.15%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	50	60	43.496	0.215	8.4	1.4472	0.0000	OK
15 minute winter	51	11	43.508	0.066	11.8	0.3413	0.0000	OK
60 minute winter	52	59	43.494	0.257	21.2	1.5986	0.0000	OK
60 minute winter	54	58	43.494	0.413	23.7	2.7667	0.0000	OK
60 minute winter	HB5	58	43.494	0.458	11.8	3.4777	0.0000	SURCHARGED
15 minute summer	105	1	42.997	0.000	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)
60 minute winter	50	1.000	52	10.4	0.341	0.005	2.6991	
15 minute winter	51	2.000	52	11.4	0.576	0.008	0.4337	
60 minute winter	52	1.001	54	15.1	0.322	0.007	15.9628	
60 minute winter	54	1.002	HB5	7.5	0.238	0.004	6.5577	
60 minute winter	HB5	Hydro-Brake®	105	5.0				49.2
60 minute winter	HB5	Hydro-Brake®	105	0.0				0.0

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.15%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	50	102	43.892	0.611	12.4	4.1146	0.0000	OK
120 minute winter	51	96	43.893	0.451	9.1	2.3330	0.0000	OK
120 minute winter	52	102	43.892	0.655	22.4	4.0792	0.0000	OK
120 minute winter	54	98	43.892	0.811	19.9	5.4341	0.0000	OK
120 minute winter	HB5	98	43.893	0.857	13.9	6.5007	0.0000	SURCHARGED
15 minute summer	105	1	42.997	0.000	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)
120 minute winter	50	1.000	52	8.3	0.287	0.004	10.4242	
120 minute winter	51	2.000	52	7.6	0.503	0.005	8.3637	
120 minute winter	52	1.001	54	8.2	0.338	0.004	44.2950	
120 minute winter	54	1.002	HB5	9.8	0.233	0.005	14.8398	
120 minute winter	HB5	Hydro-Brake®	105	5.0				97.8
120 minute winter	HB5	Hydro-Brake®	105	4.9				34.1

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.15%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	50	144	45.866	2.585	17.6	17.4002	0.0000	FLOOD RISK
180 minute winter	51	144	45.865	2.423	12.9	12.5246	0.0000	SURCHARGED
180 minute winter	52	144	45.866	2.629	28.8	16.3742	0.0000	SURCHARGED
180 minute winter	54	144	45.866	2.785	25.1	18.6548	0.0000	SURCHARGED
180 minute winter	HB5	144	45.866	2.830	21.9	21.4722	0.0000	FLOOD RISK
15 minute summer	105	1	42.997	0.000	5.3	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)
180 minute winter	50	1.000	52	11.8	0.262	0.006	19.4785	
180 minute winter	51	2.000	52	8.5	0.502	0.006	18.8788	
180 minute winter	52	1.001	54	9.3	0.331	0.004	69.3388	
180 minute winter	54	1.002	HB5	15.2	0.241	0.007	20.0013	
180 minute winter	HB5	Hydro-Brake®	105	8.8				147.0
180 minute winter	HB5	Hydro-Brake®	105	6.3				101.2