

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	0.300	Preferred Cover Depth (m)	1.200
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

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

Circular REFA FEASIBILITY Link Type

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

Available Diameters (mm)

100 | 150

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.008	5.00	87.634	1350	370723.630	434546.176	1.587
2	0.035	5.00	87.171	1500	370734.549	434550.626	1.517
3	0.069	5.00	86.547	2400	370739.091	434565.202	2.804
HB	0.090	5.00	86.132	2700	370738.355	434577.791	2.425
PUMP			85.999	1800	370742.551	434579.656	2.323

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	11.791	0.600	86.047	85.654	0.393	30.0	225	5.08	50.0
1.001	2	3	15.267	0.600	85.654	84.718	0.936	16.3	225	5.16	50.0
1.002	3	HB	12.610	0.600	83.743	83.707	0.036	350.3	225	5.46	50.0
1.003	HB	PUMP	4.592	0.600	83.707	83.676	0.031	148.1	150	5.56	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	2.397	95.3	1.4	1.362	1.292	0.008	0.0	19	0.868
1.001	3.256	129.4	7.8	1.292	1.604	0.043	0.0	37	1.815
1.002	0.693	27.5	20.2	2.579	2.200	0.112	0.0	144	0.756
1.003	0.823	14.5	36.5	2.275	2.173	0.202	0.0	150	0.839

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	11.791	30.0	225	Circular_REFA FEASIBILITY	87.634	86.047	1.362	87.171	85.654	1.292
1.001	15.267	16.3	225	Circular_REFA FEASIBILITY	87.171	85.654	1.292	86.547	84.718	1.604
1.002	12.610	350.3	225	Circular_REFA FEASIBILITY	86.547	83.743	2.579	86.132	83.707	2.200
1.003	4.592	148.1	150	Circular_REFA FEASIBILITY	86.132	83.707	2.275	85.999	83.676	2.173

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	1350	Manhole	Adoptable	2	1500	Manhole	Adoptable
1.001	2	1500	Manhole	Adoptable	3	2400	Manhole	Adoptable
1.002	3	2400	Manhole	Adoptable	HB	2700	Manhole	Adoptable
1.003	HB	2700	Manhole	Adoptable	PUMP	1800	Manhole	Adoptable

Simulation Settings

Rainfall Methodology	FSR	Drain Down Time (mins)	240
FSR Region	England and Wales	Additional Storage (m ³ /ha)	20.0
M5-60 (mm)	20.000	Check Discharge Rate(s)	✓
Ratio-R	0.300	2 year (l/s)	5.0
Summer CV	1.000	30 year (l/s)	5.0
Winter CV	1.000	100 year (l/s)	5.0
Analysis Speed	Normal	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 %)
2	0	0	0
30	40	0	0
100	50	0	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		

Node HB Online Hydro-Brake® Control

Flap Valve	x	Objective (HE)	Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	83.707	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

Node HB Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	83.707
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	104.0	0.0	1.200	104.0	0.0	1.201	0.0	0.0

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 15 minute summer	128.797	36.445	30 year +40% CC 360 minute summer	49.250	12.674
2 year 15 minute winter	90.384	36.445	30 year +40% CC 360 minute winter	32.014	12.674
2 year 30 minute summer	87.307	24.705	30 year +40% CC 480 minute summer	39.088	10.330
2 year 30 minute winter	61.268	24.705	30 year +40% CC 480 minute winter	25.969	10.330
2 year 60 minute summer	61.301	16.200	30 year +40% CC 600 minute summer	32.201	8.808
2 year 60 minute winter	40.727	16.200	30 year +40% CC 600 minute winter	22.002	8.808
2 year 120 minute summer	39.487	10.435	30 year +40% CC 720 minute summer	28.837	7.729
2 year 120 minute winter	26.234	10.435	30 year +40% CC 720 minute winter	19.380	7.729
2 year 180 minute summer	31.221	8.034	30 year +40% CC 960 minute summer	23.860	6.283
2 year 180 minute winter	20.295	8.034	30 year +40% CC 960 minute winter	15.805	6.283
2 year 240 minute summer	25.171	6.652	30 year +40% CC 1440 minute summer	17.478	4.684
2 year 240 minute winter	16.723	6.652	30 year +40% CC 1440 minute winter	11.747	4.684
2 year 360 minute summer	19.759	5.085	100 year +50% CC 15 minute summer	473.020	133.848
2 year 360 minute winter	12.844	5.085	100 year +50% CC 15 minute winter	331.944	133.848
2 year 480 minute summer	15.896	4.201	100 year +50% CC 30 minute summer	326.207	92.305
2 year 480 minute winter	10.561	4.201	100 year +50% CC 30 minute winter	228.917	92.305
2 year 600 minute summer	13.242	3.622	100 year +50% CC 60 minute summer	229.932	60.764
2 year 600 minute winter	9.048	3.622	100 year +50% CC 60 minute winter	152.761	60.764
2 year 720 minute summer	11.973	3.209	100 year +50% CC 120 minute summer	145.490	38.449
2 year 720 minute winter	8.047	3.209	100 year +50% CC 120 minute winter	96.660	38.449
2 year 960 minute summer	10.067	2.651	100 year +50% CC 180 minute summer	112.088	28.844
2 year 960 minute winter	6.669	2.651	100 year +50% CC 180 minute winter	72.860	28.844
2 year 1440 minute summer	7.548	2.023	100 year +50% CC 240 minute summer	88.689	23.438
2 year 1440 minute winter	5.073	2.023	100 year +50% CC 240 minute winter	58.923	23.438
30 year +40% CC 15 minute summer	341.346	96.589	100 year +50% CC 360 minute summer	67.904	17.474
30 year +40% CC 15 minute winter	239.541	96.589	100 year +50% CC 360 minute winter	44.139	17.474
30 year +40% CC 30 minute summer	232.942	65.915	100 year +50% CC 480 minute summer	53.578	14.159
30 year +40% CC 30 minute winter	163.468	65.915	100 year +50% CC 480 minute winter	35.596	14.159
30 year +40% CC 60 minute summer	163.225	43.136	100 year +50% CC 600 minute summer	43.925	12.014
30 year +40% CC 60 minute winter	108.443	43.136	100 year +50% CC 600 minute winter	30.012	12.014
30 year +40% CC 120 minute summer	103.463	27.342	100 year +50% CC 720 minute summer	39.172	10.498
30 year +40% CC 120 minute winter	68.738	27.342	100 year +50% CC 720 minute winter	26.326	10.498
30 year +40% CC 180 minute summer	80.238	20.648	100 year +50% CC 960 minute summer	32.187	8.476
30 year +40% CC 180 minute winter	52.157	20.648	100 year +50% CC 960 minute winter	21.321	8.476
30 year +40% CC 240 minute summer	63.838	16.870	100 year +50% CC 1440 minute summer	23.330	6.253
30 year +40% CC 240 minute winter	42.412	16.870	100 year +50% CC 1440 minute winter	15.679	6.253

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.84%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute summer	1	10	86.068	0.021	1.7	0.0319	0.0000	OK
15 minute summer	2	10	85.695	0.041	9.1	0.0919	0.0000	OK
180 minute summer	3	120	83.943	0.200	9.0	1.0054	0.0000	OK
180 minute summer	HB	120	83.943	0.236	15.7	24.8539	0.0000	SURCHARGED
15 minute summer	PUMP	1	83.676	0.000	4.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute summer	1	1.000	2	1.7	0.510	0.018	0.0400	
15 minute summer	2	1.001	3	9.0	1.845	0.069	0.0742	
180 minute summer	3	1.002	HB	8.4	0.586	0.304	0.4864	
180 minute summer	HB	Hydro-Brake®	PUMP	4.7				47.4

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 99.84%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute summer	1	10	86.080	0.033	4.5	0.0507	0.0000	OK
15 minute summer	2	10	85.723	0.069	24.0	0.1529	0.0000	OK
240 minute summer	3	192	84.494	0.751	19.8	3.7678	0.0000	SURCHARGED
240 minute summer	HB	192	84.494	0.787	34.3	82.8159	0.0000	SURCHARGED
15 minute summer	PUMP	1	83.676	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 (m ³)	Discharge Vol (m ³)
15 minute summer	1	1.000	2	4.5	0.667	0.047	0.0816	
15 minute summer	2	1.001	3	23.8	2.413	0.184	0.1505	
240 minute summer	3	1.002	HB	18.3	0.723	0.665	0.5015	
240 minute summer	HB	Hydro-Brake®	PUMP	5.0				119.4

Results for 100 year +50% CC Critical Storm Duration. Lowest mass balance: 99.84%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute summer	1	10	86.086	0.039	6.2	0.0593	0.0000	OK
15 minute summer	2	10	85.736	0.082	33.1	0.1830	0.0000	OK
240 minute winter	3	228	85.050	1.307	18.3	6.5537	0.0000	SURCHARGED
240 minute winter	HB	228	85.049	1.342	31.7	127.2898	0.0000	SURCHARGED
15 minute summer	PUMP	1	83.676	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 (m ³)	Discharge Vol (m ³)
15 minute summer	1	1.000	2	6.2	0.720	0.065	0.1039	
15 minute summer	2	1.001	3	32.9	2.625	0.254	0.1915	
240 minute winter	3	1.002	HB	17.0	0.741	0.618	0.5015	
240 minute winter	HB	Hydro-Brake®	PUMP	5.0				118.1