

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	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)	18.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.363	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

1 STANDARD 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	1350

1 STANDARD 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)	Node Type	Manhole Type	Diameter (mm)	Width (mm)	Easting (m)	Northing (m)	Depth (m)
SW1	0.016	5.00	39.150	Manhole	1 STANDARD	450		384864.820	396994.275	0.550
SW2	0.016	5.00	39.150	Manhole	1 STANDARD	450		384868.787	396990.433	1.750
SW3	0.008	5.00	39.170	Manhole	1 STANDARD	450		384856.680	396970.870	1.470
SW4			39.160	Manhole	1 STANDARD	450		384860.105	396974.409	1.509
SW5	0.064	5.00	39.170	Manhole	1 STANDARD	450		384866.793	396970.481	1.674
SW6	0.005	5.00	39.150	Manhole	1 STANDARD	600		384877.730	396981.781	1.971
SW7	0.014	5.00	39.200	Manhole	1 STANDARD	1200		384881.064	396985.226	2.045
ATANK	0.028	5.00	39.050	Manhole	1 STANDARD	1200		384891.908	396974.899	1.970
OU	0.006	5.00	38.840	Manhole	1 STANDARD	350	350	384909.059	396961.282	1.000
SW9	0.004	5.00	38.980	Manhole	1 STANDARD	600		384898.752	396971.243	1.284
SW10	0.024	5.00	38.950	Manhole	1 STANDARD	1500		384897.376	396969.819	1.907
SW11			38.930	Manhole	1 STANDARD	1200		384899.005	396967.522	2.230
CW1			38.900	Manhole	1 STANDARD	1200		384900.324	396965.677	2.427
14_OUT			39.000	Manhole	1 STANDARD			384904.211	396959.009	2.740

Links

US Node	DS Node	Length (m)	ks (mm) / n	Velocity Equation	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	Link Type	T of C (mins)	Rain (mm/hr)
SW1	SW2	5.523	0.600	Colebrook-White	38.600	38.563	0.037	150.0	150	1 STANDARD	5.11	45.6
SW2	SW6	12.443	0.600	Colebrook-White	37.400	37.330	0.070	177.8	150	1 STANDARD	5.39	45.5
SW3	SW4	4.925	0.600	Colebrook-White	37.700	37.651	0.049	100.5	150	1 STANDARD	5.08	45.7
SW4	SW5	7.756	0.600	Colebrook-White	37.651	37.496	0.155	50.0	150	1 STANDARD	5.17	45.3
SW5	SW6	15.726	0.600	Colebrook-White	37.505	37.348	0.157	100.0	150	1 STANDARD	5.43	45.4
SW6	SW7	4.794	0.600	Colebrook-White	37.179	37.155	0.024	199.8	300	1 STANDARD	5.51	45.1
SW7	ATANK	14.975	0.600	Colebrook-White	37.155	37.080	0.075	200.0	300	1 STANDARD	5.73	44.3
ATANK	SW10	7.464	0.600	Colebrook-White	37.080	37.043	0.037	200.0	300	1 STANDARD	5.84	43.9
OU	SW9	14.334	0.600	Colebrook-White	37.840	37.696	0.144	99.5	150	1 STANDARD	5.24	45.1
SW9	SW10	1.980	0.600	Colebrook-White	37.696	37.676	0.020	100.0	150	1 STANDARD	5.27	45.0
SW10	SW11	2.816	0.600	Colebrook-White	37.043	36.761	0.282	10.0	150	1 STANDARD	5.86	43.9
SW11	CW1	2.268	0.600	Colebrook-White	36.700	36.473	0.227	10.0	150	1 STANDARD	5.87	43.8
CW1	14_OUT	7.718	0.600	Colebrook-White	36.473	36.260	0.213	36.2	150	1 STANDARD	5.95	43.6

Name	US Node	DS Node	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Minimum Depth (m)	Maximum Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.000	SW1	SW2	0.818	14.5	2.0	0.400	0.437	0.400	0.437	0.016	0.0
1.001	SW2	SW6	0.750	13.3	3.9	1.600	1.670	1.600	1.670	0.032	0.0
2.000	SW3	SW4	1.002	17.7	1.0	1.320	1.359	1.320	1.359	0.008	0.0
2.001	SW4	SW5	1.426	25.2	1.0	1.359	1.524	1.359	1.524	0.008	0.0
2.002	SW5	SW6	1.005	17.8	8.9	1.515	1.652	1.515	1.652	0.072	0.0
1.002	SW6	SW7	1.109	78.4	13.3	1.671	1.745	1.671	1.745	0.109	0.0
1.003	SW7	ATANK	1.108	78.3	14.8	1.745	1.670	1.670	1.745	0.123	0.0
1.004	ATANK	SW10	1.108	78.3	18.0	1.670	1.607	1.607	1.670	0.151	0.0
3.000	OU	SW9	1.007	17.8	0.7	0.850	1.134	0.850	1.134	0.006	0.0
3.001	SW9	SW10	1.005	17.8	1.2	1.134	1.124	1.124	1.134	0.010	0.0
1.005	SW10	SW11	3.204	56.6	22.0	1.757	2.019	1.757	2.019	0.185	0.0
1.006	SW11	CW1	3.204	56.6	22.0	2.080	2.277	2.080	2.277	0.185	0.0
1.007	CW1	14_OUT	1.677	29.6	21.9	2.277	2.590	2.277	2.590	0.185	0.0

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	5.523	150.0	150	1 STANDARD	39.150	38.600	0.400	39.150	38.563	0.437
1.001	12.443	177.8	150	1 STANDARD	39.150	37.400	1.600	39.150	37.330	1.670
2.000	4.925	100.5	150	1 STANDARD	39.170	37.700	1.320	39.160	37.651	1.359
2.001	7.756	50.0	150	1 STANDARD	39.160	37.651	1.359	39.170	37.496	1.524
2.002	15.726	100.0	150	1 STANDARD	39.170	37.505	1.515	39.150	37.348	1.652
1.002	4.794	199.8	300	1 STANDARD	39.150	37.179	1.671	39.200	37.155	1.745
1.003	14.975	200.0	300	1 STANDARD	39.200	37.155	1.745	39.050	37.080	1.670

Link	US Node	Dia (mm)	Width (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	SW1	450		Manhole	1 STANDARD	SW2	450	Manhole	1 STANDARD
1.001	SW2	450		Manhole	1 STANDARD	SW6	600	Manhole	1 STANDARD
2.000	SW3	450		Manhole	1 STANDARD	SW4	450	Manhole	1 STANDARD
2.001	SW4	450		Manhole	1 STANDARD	SW5	450	Manhole	1 STANDARD
2.002	SW5	450		Manhole	1 STANDARD	SW6	600	Manhole	1 STANDARD
1.002	SW6	600		Manhole	1 STANDARD	SW7	1200	Manhole	1 STANDARD
1.003	SW7	1200		Manhole	1 STANDARD	ATANK	1200	Manhole	1 STANDARD

Pipeline Schedule

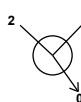
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.004	7.464	200.0	300	1 STANDARD	39.050	37.080	1.670	38.950	37.043	1.607
3.000	14.334	99.5	150	1 STANDARD	38.840	37.840	0.850	38.980	37.696	1.134
3.001	1.980	100.0	150	1 STANDARD	38.980	37.696	1.134	38.950	37.676	1.124
1.005	2.816	10.0	150	1 STANDARD	38.950	37.043	1.757	38.930	36.761	2.019
1.006	2.268	10.0	150	1 STANDARD	38.930	36.700	2.080	38.900	36.473	2.277
1.007	7.718	36.2	150	1 STANDARD	38.900	36.473	2.277	39.000	36.260	2.590

Link	US Node	Dia (mm)	Width (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.004	ATANK	1200		Manhole	1 STANDARD	SW10	1500	Manhole	1 STANDARD
3.000	OU	350	350	Manhole	1 STANDARD	SW9	600	Manhole	1 STANDARD
3.001	SW9	600		Manhole	1 STANDARD	SW10	1500	Manhole	1 STANDARD
1.005	SW10	1500		Manhole	1 STANDARD	SW11	1200	Manhole	1 STANDARD
1.006	SW11	1200		Manhole	1 STANDARD	CW1	1200	Manhole	1 STANDARD
1.007	CW1	1200		Manhole	1 STANDARD	14_OUT		Manhole	1 STANDARD

Manhole Schedule

Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Width (mm)	Node Type	MH Type	Connections	Link	IL (m)	Dia (mm)	Link Type	
384864.820	396994.275	39.150	0.550	450		Manhole	1 STANDARD		0	1.000	38.600	150	1 STANDARD
384868.787	396990.433	39.150	1.750	450		Manhole	1 STANDARD		1	1.000	38.563	150	1 STANDARD
384856.680	396970.870	39.170	1.470	450		Manhole	1 STANDARD		0	1.001	37.400	150	1 STANDARD
384860.105	396974.409	39.160	1.509	450		Manhole	1 STANDARD		1	2.000	37.700	150	1 STANDARD
384866.793	396970.481	39.170	1.674	450		Manhole	1 STANDARD		0	2.000	37.651	150	1 STANDARD
384866.793	396970.481	39.170	1.674	450		Manhole	1 STANDARD		1	2.001	37.651	150	1 STANDARD
384866.793	396970.481	39.170	1.674	450		Manhole	1 STANDARD		0	2.001	37.496	150	1 STANDARD
384877.730	396981.781	39.150	1.971	600		Manhole	1 STANDARD		1	2.001	37.505	150	1 STANDARD
384877.730	396981.781	39.150	1.971	600		Manhole	1 STANDARD		2	2.002	37.505	150	1 STANDARD
384877.730	396981.781	39.150	1.971	600		Manhole	1 STANDARD		1	1.001	37.330	150	1 STANDARD
384877.730	396981.781	39.150	1.971	600		Manhole	1 STANDARD		0	1.002	37.348	150	1 STANDARD
384881.064	396985.226	39.200	2.045	1200		Manhole	1 STANDARD		1	1.002	37.179	300	1 STANDARD
384881.064	396985.226	39.200	2.045	1200		Manhole	1 STANDARD		0	1.002	37.155	300	1 STANDARD
384891.908	396974.899	39.050	1.970	1200		Manhole	1 STANDARD		1	1.003	37.155	300	1 STANDARD
384891.908	396974.899	39.050	1.970	1200		Manhole	1 STANDARD		0	1.003	37.080	300	1 STANDARD
384891.908	396974.899	39.050	1.970	1200		Manhole	1 STANDARD		1	1.004	37.080	300	1 STANDARD

Manhole Schedule

	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Width (mm)	Node Type	MH Type	Connections	Link	IL (m)	Dia (mm)	Link Type	
	384909.059	396961.282	38.840	1.000	350	350	Manhole	1 STANDARD		0	3.000	37.840	150	1 STANDARD
	384898.752	396971.243	38.980	1.284	600		Manhole	1 STANDARD		1	3.000	37.696	150	1 STANDARD
	384897.376	396969.819	38.950	1.907	1500		Manhole	1 STANDARD		1 2	3.001 1.004	37.676 37.043	150 300	1 STANDARD 1 STANDARD
	384899.005	396967.522	38.930	2.230	1200		Manhole	1 STANDARD		1	1.005	36.761	150	1 STANDARD
	384900.324	396965.677	38.900	2.427	1200		Manhole	1 STANDARD		1	1.006	36.473	150	1 STANDARD
T	384904.211	396959.009	39.000	2.740			Manhole	1 STANDARD		1	1.007	36.260	150	1 STANDARD

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	18.000	Drain Down Time (mins)	60
Ratio-R	0.363	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	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 %)
100	20	0	0

Node 14_OUT Surcharged Outfall

Overrides Design Area	x	Depression Storage Area (m²)	0	Evapo-transpiration (mm/day)	0
Overrides Design Additional Inflow	x	Depression Storage Depth (mm)	0		

Applies to All storms

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
0	1.375	255	1.375	510	0.000	765	0.000	1020	0.000	1275	0.000
15	1.375	270	1.375	525	0.000	780	0.000	1035	0.000	1290	0.000
30	1.375	285	1.375	540	0.000	795	0.000	1050	0.000	1305	0.000
45	1.375	300	1.375	555	0.000	810	0.000	1065	0.000	1320	0.000
60	1.375	315	1.375	570	0.000	825	0.000	1080	0.000	1335	0.000
75	1.375	330	1.375	585	0.000	840	0.000	1095	0.000	1350	0.000
90	1.375	345	1.375	600	0.000	855	0.000	1110	0.000	1365	0.000
105	1.375	360	1.375	615	0.000	870	0.000	1125	0.000	1380	0.000
120	1.375	375	0.000	630	0.000	885	0.000	1140	0.000	1395	0.000
135	1.375	390	0.000	645	0.000	900	0.000	1155	0.000	1410	0.000
150	1.375	405	0.000	660	0.000	915	0.000	1170	0.000	1425	0.000
165	1.375	420	0.000	675	0.000	930	0.000	1185	0.000	1440	0.000
180	1.375	435	0.000	690	0.000	945	0.000	1200	0.000		
195	1.375	450	0.000	705	0.000	960	0.000	1215	0.000		
210	1.375	465	0.000	720	0.000	975	0.000	1230	0.000		
225	1.375	480	0.000	735	0.000	990	0.000	1245	0.000		
240	1.375	495	0.000	750	0.000	1005	0.000	1260	0.000		

Node SW10 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	37.046	Product Number	CTL-SHE-0101-5000-1300-5000
Design Depth (m)	1.300	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node ATANK Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	37.081
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	40.0	24.0	1.200	40.0	46.4	1.210	0.0	46.4

Other (defaults)

Entry Loss (manhole)	0.250	Entry Loss (junction)	0.000	Apply Recommended Losses	x
Exit Loss (manhole)	0.250	Exit Loss (junction)	0.000	Flood Risk (m)	0.300

Approval Settings

Node Size	✓	Minimum Backdrop Height (m)	0.200
Node Losses	✓	Maximum Backdrop Height (m)	1.500
Link Size	✓	Full Bore Velocity	✓
Minimum Diameter (mm)	150	Minimum Full Bore Velocity (m/s)	1.000
Link Length	✓	Maximum Full Bore Velocity (m/s)	3.000
Maximum Length (m)	100.000	Proportional Velocity	✓
Coordinates	✓	Return Period (years)	1
Accuracy (m)	1.000	Minimum Proportional Velocity (m/s)	0.750
Crossings	✓	Maximum Proportional Velocity (m/s)	3.000
Cover Depth	✓	Surcharged Depth	✓
Minimum Cover Depth (m)	1.200	Return Period (years)	1
Maximum Cover Depth (m)	3.000	Maximum Surcharged Depth (m)	0.100
Backdrops	✓	Flooding	✓

Approval Settings

Return Period (years)	30	Discharge Rates	✓
Time to Half Empty	x	Discharge Volume	x

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +20% CC 15 minute summer	360.342	101.964	100 year +20% CC 360 minute summer	46.088	11.860
100 year +20% CC 15 minute winter	252.871	101.964	100 year +20% CC 360 minute winter	29.958	11.860
100 year +20% CC 30 minute summer	240.915	68.171	100 year +20% CC 480 minute summer	36.005	9.515
100 year +20% CC 30 minute winter	169.063	68.171	100 year +20% CC 480 minute winter	23.921	9.515
100 year +20% CC 60 minute summer	164.805	43.553	100 year +20% CC 600 minute summer	29.299	8.014
100 year +20% CC 60 minute winter	109.492	43.553	100 year +20% CC 600 minute winter	20.019	8.014
100 year +20% CC 120 minute summer	101.919	26.934	100 year +20% CC 720 minute summer	25.975	6.962
100 year +20% CC 120 minute winter	67.713	26.934	100 year +20% CC 720 minute winter	17.457	6.962
100 year +20% CC 180 minute summer	77.993	20.070	100 year +20% CC 960 minute summer	21.153	5.570
100 year +20% CC 180 minute winter	50.697	20.070	100 year +20% CC 960 minute winter	14.012	5.570
100 year +20% CC 240 minute summer	61.271	16.192	100 year +20% CC 1440 minute summer	15.152	4.061
100 year +20% CC 240 minute winter	40.707	16.192	100 year +20% CC 1440 minute winter	10.183	4.061

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 96.55%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	SW1	180	38.812	0.212	1.5	0.1568	0.0000	SURCHARGED
240 minute winter	SW2	180	38.812	1.412	3.0	0.4828	0.0000	SURCHARGED
240 minute winter	SW3	180	38.813	1.113	0.8	0.2984	0.0000	SURCHARGED
240 minute winter	SW4	180	38.813	1.162	1.1	0.1848	0.0000	SURCHARGED
240 minute winter	SW5	180	38.813	1.317	6.4	1.2172	0.0000	SURCHARGED
240 minute winter	SW6	180	38.811	1.632	9.3	0.5433	0.0000	SURCHARGED
240 minute winter	SW7	180	38.812	1.657	11.1	2.1005	0.0000	SURCHARGED
240 minute winter	ATANK	180	38.811	1.731	12.7	48.2580	0.0000	FLOOD RISK
240 minute winter	OU	180	38.811	0.971	0.8	0.2360	0.0000	FLOOD RISK
240 minute winter	SW9	180	38.811	1.115	0.9	0.3846	0.0000	FLOOD RISK
240 minute winter	SW10	180	38.811	1.768	6.1	3.5693	0.0000	FLOOD RISK
15 minute winter	SW11	17	37.651	0.951	5.0	1.0759	0.0000	SURCHARGED
15 minute winter	CW1	17	37.647	1.174	5.1	1.3276	0.0000	SURCHARGED
15 minute summer	14_OUT	1	37.635	1.375	3.1	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)
240 minute winter	SW1	1.000	SW2	1.5	0.518	0.104	0.0972	
240 minute winter	SW2	1.001	SW6	2.7	0.464	0.205	0.2191	
240 minute winter	SW3	2.000	SW4	0.6	0.506	0.034	0.0867	
240 minute winter	SW4	2.001	SW5	-1.1	0.148	-0.043	0.1365	
240 minute winter	SW5	2.002	SW6	6.1	0.753	0.345	0.2769	
240 minute winter	SW6	1.002	SW7	9.8	0.440	0.126	0.3376	
240 minute winter	SW7	1.003	ATANK	10.0	0.642	0.128	1.0545	
240 minute winter	ATANK	1.004	SW10	4.9	0.117	0.062	0.5256	
240 minute winter	OU	3.000	SW9	0.5	0.357	0.030	0.2523	
240 minute winter	SW9	3.001	SW10	1.0	0.483	0.055	0.0349	
240 minute winter	SW10	1.005	SW11	5.0	1.274	0.088	0.0496	
15 minute winter	SW11	1.006	CW1	5.1	1.048	0.090	0.0399	
15 minute winter	CW1	1.007	14_OUT	5.5	0.312	0.186	0.1359	8.0