



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	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.056	5.00	91.800	1350	517397.299	229088.435	1.575
2	0.027	5.00	91.500	1350	517383.528	229087.550	1.325
3	0.043	5.00	91.300	1350	517370.279	229088.561	1.175
4	0.043	5.00	91.000	1350	517342.327	229092.036	0.975
5	0.058	5.00	91.000	1350	517338.577	229074.457	1.040
6	0.000		91.000	1350	517341.168	229069.687	1.060
7			91.000	1350	517377.090	229065.956	1.060
8			91.000	1350	517385.103	229067.974	1.130
9			91.750	1200	517387.783	229084.737	1.961
10			91.800	1200	517399.752	229086.403	2.092
11			92.500	1200	517414.417	229093.006	2.899
12			92.300	1200	517445.879	229127.454	3.010
13			91.700	1200	517464.366	229144.007	2.575
14			91.400	1200	517477.845	229151.270	2.377
15			90.700	1200	517496.659	229159.352	1.814
16			90.650	1200	517503.692	229165.307	1.825
17			90.000	1200	517513.729	229180.523	1.297
18			90.000	1200	517526.189	229174.241	1.390
18_OUT			89.601	1200	517529.063	229165.889	1.050
19	0.025	5.00	92.350	1200	517433.478	229148.000	1.425
20	0.048	5.00	92.300	1200	517450.992	229129.139	1.525



Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
21			91.700	1200	517465.935	229142.915	1.425
22	0.048	5.00	91.390	1200	517476.597	229149.891	1.425
23	0.068	5.00	90.300	1200	517497.667	229146.222	1.050

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	13.799	0.600	90.225	90.175	0.050	276.0	375	5.21	50.0
1.001	2	3	13.288	0.600	90.175	90.125	0.050	265.8	375	5.41	50.0
1.002	3	4	28.167	0.600	90.125	90.025	0.100	281.7	375	5.85	50.0
1.003	4	5	17.975	0.600	90.025	89.960	0.065	276.5	375	6.13	50.0
1.004	5	6	5.428	0.600	89.960	89.940	0.020	271.4	375	6.21	50.0
1.005	6	7	36.115	0.600	89.940	89.940	0.000	0.0	375	6.81	50.0
1.006	7	8	8.263	0.600	89.940	89.870	0.070	118.0	375	6.89	50.0
1.007	8	9	16.976	0.600	89.870	89.789	0.081	209.6	150	7.30	50.0
1.008	9	10	12.084	0.600	89.789	89.708	0.081	150.0	150	7.55	50.0
1.009	10	11	16.083	0.600	89.708	89.601	0.107	150.0	150	7.88	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	1.085	119.9	7.6	1.200	0.950	0.056	0.0	63	0.614
1.001	1.106	122.2	11.2	0.950	0.800	0.083	0.0	77	0.700
1.002	1.074	118.7	17.1	0.800	0.600	0.126	0.0	96	0.771
1.003	1.084	119.8	22.9	0.600	0.665	0.169	0.0	110	0.841
1.004	1.095	120.9	30.8	0.665	0.685	0.227	0.0	129	0.920
1.005	1.000	110.4	30.8	0.685	0.685	0.227	0.0	0	∞
1.006	1.666	184.0	30.8	0.685	0.755	0.227	0.0	103	1.247
1.007	0.690	12.2	30.8	0.980	1.811	0.227	0.0	150	0.703
1.008	0.818	14.5	30.8	1.811	1.942	0.227	0.0	150	0.833
1.009	0.818	14.5	30.8	1.942	2.749	0.227	0.0	150	0.833



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)
1.010	11	12	46.653	0.600	89.601	89.290	0.311	150.0	150	8.83	50.0
1.011	12	13	24.815	0.600	89.290	89.125	0.165	150.0	150	9.33	50.0
1.012	13	14	15.311	0.600	89.125	89.023	0.102	150.0	150	9.64	50.0
1.013	14	15	20.476	0.600	89.023	88.886	0.137	150.0	150	10.06	50.0
1.014	15	16	9.215	0.600	88.886	88.825	0.061	150.0	150	10.25	49.6
1.015	16	17	18.228	0.600	88.825	88.703	0.122	150.0	150	10.62	48.7
1.016	17	18	13.954	0.600	88.703	88.610	0.093	150.0	150	10.91	48.0
1.017	18	18_OUT	8.833	0.600	88.610	88.551	0.059	150.0	150	11.09	47.6
2.000	19	20	25.739	0.600	90.925	90.775	0.150	171.6	225	5.43	50.0
2.001	20	21	20.324	0.600	90.775	90.275	0.500	40.6	225	5.60	50.0
2.002	21	22	12.741	0.600	90.275	89.965	0.310	41.1	225	5.70	50.0
2.003	22	23	21.387	0.600	89.965	89.250	0.715	29.9	225	5.85	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)
1.010	0.818	14.5	30.8	2.749	2.860	0.227	0.0	150	0.833
1.011	0.818	14.5	30.8	2.860	2.425	0.227	0.0	150	0.833
1.012	0.818	14.5	30.8	2.425	2.227	0.227	0.0	150	0.833
1.013	0.818	14.5	30.8	2.227	1.664	0.227	0.0	150	0.833
1.014	0.818	14.5	30.5	1.664	1.675	0.227	0.0	150	0.833
1.015	0.818	14.5	30.0	1.675	1.147	0.227	0.0	150	0.833
1.016	0.818	14.5	29.5	1.147	1.240	0.227	0.0	150	0.833
1.017	0.818	14.5	29.3	1.240	0.900	0.227	0.0	150	0.833
2.000	0.995	39.6	3.4	1.200	1.300	0.025	0.0	44	0.612
2.001	2.057	81.8	9.9	1.300	1.200	0.073	0.0	52	1.397
2.002	2.046	81.4	9.9	1.200	1.200	0.073	0.0	52	1.389
2.003	2.401	95.5	16.4	1.200	0.825	0.121	0.0	63	1.807



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	13.799	276.0	375	Circular	91.800	90.225	1.200	91.500	90.175	0.950
1.001	13.288	265.8	375	Circular	91.500	90.175	0.950	91.300	90.125	0.800
1.002	28.167	281.7	375	Circular	91.300	90.125	0.800	91.000	90.025	0.600
1.003	17.975	276.5	375	Circular	91.000	90.025	0.600	91.000	89.960	0.665
1.004	5.428	271.4	375	Circular	91.000	89.960	0.665	91.000	89.940	0.685
1.005	36.115	0.0	375	Circular	91.000	89.940	0.685	91.000	89.940	0.685
1.006	8.263	118.0	375	Circular	91.000	89.940	0.685	91.000	89.870	0.755
1.007	16.976	209.6	150	Circular	91.000	89.870	0.980	91.750	89.789	1.811
1.008	12.084	150.0	150	Circular	91.750	89.789	1.811	91.800	89.708	1.942
1.009	16.083	150.0	150	Circular	91.800	89.708	1.942	92.500	89.601	2.749
1.010	46.653	150.0	150	Circular	92.500	89.601	2.749	92.300	89.290	2.860
1.011	24.815	150.0	150	Circular	92.300	89.290	2.860	91.700	89.125	2.425
1.012	15.311	150.0	150	Circular	91.700	89.125	2.425	91.400	89.023	2.227
1.013	20.476	150.0	150	Circular	91.400	89.023	2.227	90.700	88.886	1.664
1.014	9.215	150.0	150	Circular	90.700	88.886	1.664	90.650	88.825	1.675

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	1350	Manhole	Adoptable	2	1350	Manhole	Adoptable
1.001	2	1350	Manhole	Adoptable	3	1350	Manhole	Adoptable
1.002	3	1350	Manhole	Adoptable	4	1350	Manhole	Adoptable
1.003	4	1350	Manhole	Adoptable	5	1350	Manhole	Adoptable
1.004	5	1350	Manhole	Adoptable	6	1350	Manhole	Adoptable
1.005	6	1350	Manhole	Adoptable	7	1350	Manhole	Adoptable
1.006	7	1350	Manhole	Adoptable	8	1350	Manhole	Adoptable
1.007	8	1350	Manhole	Adoptable	9	1200	Manhole	Adoptable
1.008	9	1200	Manhole	Adoptable	10	1200	Manhole	Adoptable
1.009	10	1200	Manhole	Adoptable	11	1200	Manhole	Adoptable
1.010	11	1200	Manhole	Adoptable	12	1200	Manhole	Adoptable
1.011	12	1200	Manhole	Adoptable	13	1200	Manhole	Adoptable
1.012	13	1200	Manhole	Adoptable	14	1200	Manhole	Adoptable
1.013	14	1200	Manhole	Adoptable	15	1200	Manhole	Adoptable
1.014	15	1200	Manhole	Adoptable	16	1200	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)
1.015	18.228	150.0	150	Circular	90.650	88.825	1.675	90.000	88.703	1.147
1.016	13.954	150.0	150	Circular	90.000	88.703	1.147	90.000	88.610	1.240
1.017	8.833	150.0	150	Circular	90.000	88.610	1.240	89.601	88.551	0.900
2.000	25.739	171.6	225	Circular	92.350	90.925	1.200	92.300	90.775	1.300
2.001	20.324	40.6	225	Circular	92.300	90.775	1.300	91.700	90.275	1.200
2.002	12.741	41.1	225	Circular	91.700	90.275	1.200	91.390	89.965	1.200
2.003	21.387	29.9	225	Circular	91.390	89.965	1.200	90.300	89.250	0.825

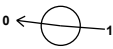
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.015	16	1200	Manhole	Adoptable	17	1200	Manhole	Adoptable
1.016	17	1200	Manhole	Adoptable	18	1200	Manhole	Adoptable
1.017	18	1200	Manhole	Adoptable	18_OUT	1200	Manhole	Adoptable
2.000	19	1200	Manhole	Adoptable	20	1200	Manhole	Adoptable
2.001	20	1200	Manhole	Adoptable	21	1200	Manhole	Adoptable
2.002	21	1200	Manhole	Adoptable	22	1200	Manhole	Adoptable
2.003	22	1200	Manhole	Adoptable	23	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
1	517397.299	229088.435	91.800	1.575	1350		0	1.000	90.225	375
2	517383.528	229087.550	91.500	1.325	1350		1	1.000	90.175	375
							0	1.001	90.175	375



Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
3	517370.279	229088.561	91.300	1.175	1350	 1	1.001	90.125	375
						0	1.002	90.125	375
4	517342.327	229092.036	91.000	0.975	1350	 1	1.002	90.025	375
						0	1.003	90.025	375
5	517338.577	229074.457	91.000	1.040	1350	 1	1.003	89.960	375
						0	1.004	89.960	375
6	517341.168	229069.687	91.000	1.060	1350	 1	1.004	89.940	375
						0	1.005	89.940	375
7	517377.090	229065.956	91.000	1.060	1350	 1	1.005	89.940	375
						0	1.006	89.940	375
8	517385.103	229067.974	91.000	1.130	1350	 1	1.006	89.870	375
						0	1.007	89.870	150
9	517387.783	229084.737	91.750	1.961	1200	 1	1.007	89.789	150
						0	1.008	89.789	150
10	517399.752	229086.403	91.800	2.092	1200	 1	1.008	89.708	150
						0	1.009	89.708	150



Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
11	517414.417	229093.006	92.500	2.899	1200	 1	1.009	89.601	150
						0	1.010	89.601	150
12	517445.879	229127.454	92.300	3.010	1200	 1	1.010	89.290	150
						0	1.011	89.290	150
13	517464.366	229144.007	91.700	2.575	1200	 1	1.011	89.125	150
						0	1.012	89.125	150
14	517477.845	229151.270	91.400	2.377	1200	 1	1.012	89.023	150
						0	1.013	89.023	150
15	517496.659	229159.352	90.700	1.814	1200	 1	1.013	88.886	150
						0	1.014	88.886	150
16	517503.692	229165.307	90.650	1.825	1200	 1	1.014	88.825	150
						0	1.015	88.825	150
17	517513.729	229180.523	90.000	1.297	1200	 1	1.015	88.703	150
						0	1.016	88.703	150
18	517526.189	229174.241	90.000	1.390	1200	 1	1.016	88.610	150
						0	1.017	88.610	150



Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
18_OUT	517529.063	229165.889	89.601	1.050	1200		1	1.017	88.551	150
19	517433.478	229148.000	92.350	1.425	1200		0	2.000	90.925	225
20	517450.992	229129.139	92.300	1.525	1200		1	2.000	90.775	225
							0	2.001	90.775	225
21	517465.935	229142.915	91.700	1.425	1200		1	2.001	90.275	225
							0	2.002	90.275	225
22	517476.597	229149.891	91.390	1.425	1200		1	2.002	89.965	225
							0	2.003	89.965	225
23	517497.667	229146.222	90.300	1.050	1200		1	2.003	89.250	225

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	100 year (l/s)	4.6	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	✓	Check Discharge Volume	✓
Summer CV	0.750	Drain Down Time (mins)	240	1 year (l/s)	1.6	100 year +40% 360 minute (m³)	382
Winter CV	0.840	Additional Storage (m³/ha)	20.0	30 year (l/s)	3.6		



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 %)
100	40	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Soil Index	4	Growth Factor 30 year	1.95	Q 1 year (l/s)	1.6
Greenfield Method	IH124	SPR	0.47	Growth Factor 100 year	2.48	Q 30 year (l/s)	3.6
Positively Drained Area (ha)	0.452	Region	5	Betterment (%)	0	Q 100 year (l/s)	4.6
SAAR (mm)	605	Growth Factor 1 year	0.85	QBar	1.8		

Pre-development Discharge Volume

Site Makeup	Greenfield	Soil Index	4	Return Period (years)	100	Betterment (%)	0
Greenfield Method	FSR/FEH	SPR	0.47	Climate Change (%)	40	PR	0.454
Positively Drained Area (ha)	0.452	CWI	91.111	Storm Duration (mins)	360	Runoff Volume (m ³)	182

Node 8 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	89.870	Product Number	CTL-SHE-0064-1800-1000-1800
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	1.8	Min Node Diameter (mm)	1200

Node 23 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.03960	Safety Factor	2.0	Invert Level (m)	89.250
Side Inf Coefficient (m/hr)	0.03960	Porosity	1.00	Time to half empty (mins)	1161



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	132.7	132.7	0.700	246.5	246.5	0.701	0.0	246.5

Node 7 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	89.940
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	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)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	47.8	0.0	0.500	193.0	0.0	0.750	282.0	0.0	0.751	0.0	0.0



Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	1	336	90.673	0.448	4.9	0.9601	0.0000	SURCHARGED
360 minute winter	2	336	90.673	0.498	7.7	0.9152	0.0000	SURCHARGED
360 minute winter	3	336	90.672	0.547	10.5	1.1831	0.0000	SURCHARGED
360 minute winter	4	360	90.671	0.646	13.1	1.4940	0.0000	SURCHARGED
360 minute winter	5	360	90.672	0.712	18.7	1.8144	0.0000	SURCHARGED
360 minute winter	6	344	90.670	0.730	18.4	1.0449	0.0000	SURCHARGED
360 minute winter	7	352	90.671	0.731	17.7	115.3797	0.0000	SURCHARGED
360 minute winter	8	352	90.671	0.801	6.3	1.1465	0.0000	SURCHARGED
15 minute winter	9	8	89.825	0.036	1.7	0.0408	0.0000	OK
15 minute winter	10	9	89.745	0.037	1.7	0.0414	0.0000	OK
15 minute winter	11	11	89.637	0.036	1.8	0.0411	0.0000	OK
15 minute winter	12	13	89.325	0.035	1.8	0.0400	0.0000	OK
15 minute winter	13	14	89.161	0.036	1.7	0.0402	0.0000	OK
15 minute summer	14	15	89.058	0.035	1.7	0.0401	0.0000	OK
15 minute summer	15	16	88.922	0.036	1.7	0.0407	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)
360 minute winter	1	1.000	2	5.4	0.422	0.045	1.5220	
360 minute winter	2	1.001	3	6.8	0.451	0.055	1.4656	
360 minute winter	3	1.002	4	9.4	0.415	0.079	3.1067	
360 minute winter	4	1.003	5	13.8	0.307	0.115	1.9826	
360 minute winter	5	1.004	6	18.4	0.254	0.152	0.5987	
360 minute winter	6	1.005	7	17.7	0.381	0.160	3.9834	
360 minute winter	7	1.006	8	6.3	0.299	0.034	0.9114	
360 minute winter	8	Hydro-Brake®	9	1.7				
15 minute winter	9	1.008	10	1.7	0.646	0.118	0.0391	
15 minute winter	10	1.009	11	1.8	0.680	0.122	0.0519	
15 minute winter	11	1.010	12	1.8	0.666	0.123	0.1468	
15 minute winter	12	1.011	13	1.7	0.587	0.119	0.0785	
15 minute winter	13	1.012	14	1.7	0.593	0.119	0.0484	
15 minute summer	14	1.013	15	1.7	0.585	0.119	0.0652	
15 minute summer	15	1.014	16	1.7	0.606	0.119	0.0298	



Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	16	16	88.861	0.036	1.7	0.0407	0.0000	OK
15 minute summer	17	17	88.739	0.036	1.7	0.0408	0.0000	OK
2160 minute summer	18	2220	88.646	0.036	1.7	0.0407	0.0000	OK
2160 minute summer	18_OUT	2220	88.586	0.035	1.7	0.0000	0.0000	OK
15 minute winter	19	10	91.024	0.099	16.0	0.1467	0.0000	OK
15 minute winter	20	10	90.903	0.128	46.4	0.2252	0.0000	OK
15 minute winter	21	10	90.407	0.132	45.9	0.1494	0.0000	OK
15 minute winter	22	10	90.130	0.165	76.1	0.2977	0.0000	OK
480 minute winter	23	472	89.893	0.643	12.9	120.4894	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 summer	16	1.015	17	1.7	0.636	0.120	0.0584	
15 minute summer	17	1.016	18	1.7	0.630	0.119	0.0447	
2160 minute summer	18	1.017	18_OUT	1.7	0.542	0.119	0.0279	186.8
15 minute winter	19	2.000	20	15.7	0.786	0.398	0.5163	
15 minute winter	20	2.001	21	45.9	1.930	0.561	0.4829	
15 minute winter	21	2.002	22	45.4	1.702	0.558	0.3530	
15 minute winter	22	2.003	23	75.8	2.726	0.794	0.7297	
480 minute winter	23	Infiltration		1.3				