

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

Circular Link Type

Shape Circular | Barrels 1 | Auto Increment (mm) 75 | 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)
S1	0.035	5.00	126.521	1350	298393.342	518529.398	1.350
S2	0.069	5.00	125.657	1350	298389.266	518517.363	1.350
S3	0.005	5.00	124.342	1200	298382.023	518499.374	1.742
S4			116.732	1200	298315.515	518507.131	2.232
S5	0.085	5.00	116.835	1350	298322.815	518559.886	1.350
S6	0.055	5.00	116.036	1350	298315.053	518539.192	2.036
S7 HB	0.054	5.00	115.096	1500	298305.462	518514.417	1.918
S8	0.004	5.00	114.836	1350	298301.839	518511.615	1.736
S9			112.204	1200	298277.208	518531.750	2.237
S10	0.067	5.00	109.930	1350	298265.179	518613.215	1.350
S11	0.053	5.00	108.781	1200	298253.137	518593.629	1.681
S12	0.100	5.00	108.392	1350	298253.047	518584.514	2.342
S13 HB			107.067	1200	298241.480	518561.721	1.817
S14	0.006	5.00	106.851	1350	298238.882	518558.726	1.650
S16 DD			104.241	1500	298209.815	518578.456	1.341
S17 OUTFALL			103.100	1200	298209.155	518587.443	0.300
S15 HB			106.109	1500	298228.002	518565.656	1.919

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	12.762	14.8	150	Circular	126.521	125.171	1.200	125.657	124.307	1.200
1.001	19.355	11.3	150	Circular	125.657	124.307	1.200	124.342	122.600	1.592
1.002	67.480	10.2	150	Circular	124.342	122.600	1.592	116.732	115.982	0.600
1.003	12.416	9.8	150	Circular	116.732	114.500	2.082	115.096	113.228	1.718
2.000	22.102	16.6	150	Circular	116.835	115.485	1.200	116.036	114.150	1.736
2.001	26.566	34.4	300	Circular	116.036	114.000	1.736	115.096	113.228	1.568
1.004	4.568	58.6	150	Circular	115.096	113.178	1.768	114.836	113.100	1.586
1.005	31.756	10.1	150	Circular	114.836	113.100	1.586	112.204	109.967	2.087

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S1	1350	Manhole	Adoptable	S2	1350	Manhole	Adoptable
1.001	S2	1350	Manhole	Adoptable	S3	1200	Manhole	Adoptable
1.002	S3	1200	Manhole	Adoptable	S4	1200	Manhole	Adoptable
1.003	S4	1200	Manhole	Adoptable	S7 HB	1500	Manhole	Adoptable
2.000	S5	1350	Manhole	Adoptable	S6	1350	Manhole	Adoptable
2.001	S6	1350	Manhole	Adoptable	S7 HB	1500	Manhole	Adoptable
1.004	S7 HB	1500	Manhole	Adoptable	S8	1350	Manhole	Adoptable
1.005	S8	1350	Manhole	Adoptable	S9	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)
1.006	46.868	10.0	150	Circular	112.204	109.967	2.087	106.851	105.276	1.425
3.000	22.992	15.5	150	Circular	109.930	108.580	1.200	108.781	107.100	1.531
3.001	9.115	10.1	150	Circular	108.781	107.100	1.531	108.392	106.200	2.042
3.002	25.560	34.1	300	Circular	108.392	106.050	2.042	107.067	105.300	1.467
3.003	3.966	80.9	225	Circular	107.067	105.250	1.592	106.851	105.201	1.425
1.007	12.900	12.8	225	Circular	106.851	105.201	1.425	106.109	104.190	1.694
1.009	8.857	88.6	225	Circular	104.241	102.900	1.116	103.100	102.800	0.075
1.008	22.240	17.2	225	Circular	106.109	104.190	1.694	104.241	102.900	1.116

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.006	S9	1200	Manhole	Adoptable	S14	1350	Manhole	Adoptable
3.000	S10	1350	Manhole	Adoptable	S11	1200	Manhole	Adoptable
3.001	S11	1200	Manhole	Adoptable	S12	1350	Manhole	Adoptable
3.002	S12	1350	Manhole	Adoptable	S13 HB	1200	Manhole	Adoptable
3.003	S13 HB	1200	Manhole	Adoptable	S14	1350	Manhole	Adoptable
1.007	S14	1350	Manhole	Adoptable	S15 HB	1500	Manhole	Adoptable
1.009	S16 DD	1500	Manhole	Adoptable	S17 OUTFALL	1200	Manhole	Adoptable
1.008	S15 HB	1500	Manhole	Adoptable	S16 DD	1500	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1	298393.342	518529.398	126.521	1.350	1350				
S2	298389.266	518517.363	125.657	1.350	1350		0	1.000	125.171
S3	298382.023	518499.374	124.342	1.742	1200		1	1.001	124.307
S4	298315.515	518507.131	116.732	2.232	1200		0	1.001	122.600
S5	298322.815	518559.886	116.835	1.350	1350		1	1.002	122.600
S6	298315.053	518539.192	116.036	2.036	1350		0	1.002	115.982
S7 HB	298305.462	518514.417	115.096	1.918	1500		0	1.003	114.500
S8	298301.839	518511.615	114.836	1.736	1350		1	2.000	115.485
S9	298277.208	518531.750	112.204	2.237	1200		1	2.000	114.150
							0	2.001	114.000
							1	2.001	113.228
							2	1.003	113.228
							0	1.004	113.178
							1	1.004	113.100
							0	1.005	113.100
							1	1.005	109.967
							0	1.006	109.967

BH BECKWITH & HANLON	Beckwith & Hanlon Consulting Engineers Limited F22 Willow Court, Marquis Court, Team Valley Trading Est., Gateshead, NE11 0RU	File: 23-026 Harras Road SW.pfd Network: Surface Water Julie Middleton 09/04/2024	Page 3																																																																																																																																																																															
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Node S13 HB Online Hydro-Brake® Control <table><tr><td>Flap Valve</td><td>x</td><td>Objective</td><td>(HE) Minimise upstream storage</td></tr><tr><td>Replaces Downstream Link</td><td>✓</td><td>Sump Available</td><td>x</td></tr><tr><td>Invert Level (m)</td><td>105.300</td><td>Product Number</td><td>CTL-CHE-0087-4000-1200-4000</td></tr><tr><td>Design Depth (m)</td><td>1.200</td><td>Min Outlet Diameter (m)</td><td>0.100</td></tr><tr><td>Design Flow (l/s)</td><td>4.0</td><td>Min Node Diameter (mm)</td><td>1200</td></tr></table>								Flap Valve	x	Objective	(HE) Minimise upstream storage	Replaces Downstream Link	✓	Sump Available	x	Invert Level (m)	105.300	Product Number	CTL-CHE-0087-4000-1200-4000	Design Depth (m)	1.200	Min Outlet Diameter (m)	0.100	Design Flow (l/s)	4.0	Min Node Diameter (mm)	1200																																																																																																																																																							
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Node S7 HB Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	113.178	Product Number	CTL-SHE-0119-6800-1200-6800
Design Depth (m)	1.200	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	6.8	Min Node Diameter (mm)	1200

Node S15 HB Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	104.190	Product Number	CTL-SHE-0142-1180-2000-1180
Design Depth (m)	2.000	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	11.8	Min Node Diameter (mm)	1500

Node S13 HB Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	105.300
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	384

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	150.0	0.0	1.200	150.0	0.0	1.201	0.0	0.0

Node S7 HB Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	113.178
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	324

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	160.0	0.0	1.200	160.0	0.0	1.201	0.0	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.29%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	10	125.204	0.033	4.8	0.0465	0.0000	OK
15 minute summer	S2	10	124.362	0.055	14.3	0.0784	0.0000	OK
15 minute summer	S3	11	122.653	0.053	14.9	0.0599	0.0000	OK
15 minute summer	S4	11	114.554	0.054	14.7	0.0616	0.0000	OK
15 minute summer	S5	10	115.539	0.054	11.7	0.0775	0.0000	OK
15 minute summer	S6	10	114.066	0.066	19.2	0.0939	0.0000	OK
180 minute summer	S7 HB	116	113.342	0.164	16.6	25.2853	0.0000	SURCHARGED
180 minute summer	S8	116	113.134	0.034	6.3	0.0491	0.0000	OK
180 minute summer	S9	116	110.001	0.034	6.3	0.0385	0.0000	OK
15 minute summer	S10	10	108.626	0.046	9.2	0.0655	0.0000	OK
15 minute summer	S11	10	107.159	0.059	16.4	0.0672	0.0000	OK
15 minute summer	S12	10	106.133	0.083	30.1	0.1187	0.0000	OK
240 minute summer	S13 HB	156	105.457	0.207	10.5	22.6437	0.0000	OK
240 minute summer	S14	152	105.240	0.039	9.5	0.0555	0.0000	OK
240 minute summer	S16 DD	156	102.967	0.067	9.5	0.1188	0.0000	OK
240 minute summer	S17 OUTFALL	156	102.863	0.063	9.5	0.0000	0.0000	OK
240 minute summer	S15 HB	156	104.370	0.180	9.5	0.3174	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	S1	1.000	S2	4.8	1.123	0.103	0.0550	
15 minute summer	S2	1.001	S3	14.2	2.502	0.267	0.1099	
15 minute summer	S3	1.002	S4	14.7	2.663	0.262	0.3724	
15 minute summer	S4	1.003	S7 HB	14.7	2.639	0.257	0.0694	
15 minute summer	S5	2.000	S6	11.6	2.065	0.264	0.1242	
15 minute summer	S6	2.001	S7 HB	19.0	1.708	0.100	0.2953	
180 minute summer	S7 HB	Hydro-Brake®	S8	6.2				
180 minute summer	S8	1.005	S9	6.3	2.084	0.112	0.0957	
180 minute summer	S9	1.006	S14	6.3	2.107	0.111	0.1397	
15 minute summer	S10	3.000	S11	9.1	1.664	0.202	0.1268	
15 minute summer	S11	3.001	S12	16.3	2.639	0.291	0.0565	
15 minute summer	S12	3.002	S13 HB	29.9	1.940	0.156	0.3936	
240 minute summer	S13 HB	Hydro-Brake®	S14	3.1				
240 minute summer	S14	1.007	S15 HB	9.5	0.573	0.065	0.2485	
240 minute summer	S16 DD	1.009	S17 OUTFALL	9.5	1.002	0.172	0.0840	95.9
240 minute summer	S15 HB	Hydro-Brake®	S16 DD	9.5				

Results for 30 year +45% CC +10% A Critical Storm Duration. Lowest mass balance: 99.29%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	10	125.237	0.066	18.7	0.0946	0.0000	OK
15 minute summer	S2	11	124.689	0.382	55.5	0.5473	0.0000	SURCHARGED
15 minute winter	S3	11	122.721	0.121	53.8	0.1365	0.0000	OK
30 minute summer	S4	19	114.840	0.340	55.6	0.3845	0.0000	SURCHARGED
15 minute summer	S5	11	115.697	0.212	45.4	0.3036	0.0000	SURCHARGED
15 minute summer	S6	10	114.136	0.136	73.7	0.1947	0.0000	OK
240 minute summer	S7 HB	208	114.033	0.855	52.5	131.5305	0.0000	SURCHARGED
30 minute summer	S8	18	113.141	0.041	8.8	0.0581	0.0000	OK
30 minute summer	S9	18	110.007	0.040	8.8	0.0455	0.0000	OK
15 minute summer	S10	11	108.694	0.114	35.8	0.1631	0.0000	OK
15 minute summer	S11	11	107.737	0.637	63.3	0.7202	0.0000	SURCHARGED
15 minute summer	S12	10	106.228	0.178	111.4	0.2546	0.0000	OK
480 minute summer	S13 HB	368	106.084	0.833	23.6	112.6580	0.0000	SURCHARGED
15 minute summer	S14	11	105.250	0.049	15.3	0.0699	0.0000	OK
30 minute summer	S16 DD	21	102.976	0.076	11.8	0.1336	0.0000	OK
30 minute summer	S17 OUTFALL	21	102.870	0.070	11.8	0.0000	0.0000	OK
30 minute summer	S15 HB	21	104.720	0.530	15.2	0.9362	0.0000	SURCHARGED

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	S1	1.000	S2	18.6	1.411	0.400	0.1600	
15 minute summer	S2	1.001	S3	50.8	3.250	0.956	0.3166	
15 minute winter	S3	1.002	S4	53.3	3.564	0.950	1.0090	
30 minute summer	S4	1.003	S7 HB	51.1	2.979	0.892	0.2186	
15 minute summer	S5	2.000	S6	44.3	2.691	1.008	0.3841	
15 minute summer	S6	2.001	S7 HB	74.4	2.380	0.391	1.1839	
240 minute summer	S7 HB	Hydro-Brake®	S8	6.8				
30 minute summer	S8	1.005	S9	8.8	2.291	0.156	0.1213	
30 minute summer	S9	1.006	S14	8.7	2.312	0.154	0.1764	
15 minute summer	S10	3.000	S11	35.0	2.080	0.771	0.3675	
15 minute summer	S11	3.001	S12	60.5	3.435	1.075	0.1604	
15 minute summer	S12	3.002	S13 HB	112.1	2.676	0.587	1.2497	
480 minute summer	S13 HB	Hydro-Brake®	S14	3.6				
15 minute summer	S14	1.007	S15 HB	15.2	0.880	0.104	0.2974	
30 minute summer	S16 DD	1.009	S17 OUTFALL	11.8	1.058	0.213	0.0984	168.0
30 minute summer	S15 HB	Hydro-Brake®	S16 DD	11.8				

Results for 100 year +50% CC +10% A Critical Storm Duration. Lowest mass balance: 99.29%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	12	125.786	0.615	24.8	0.8803	0.0000	SURCHARGED
15 minute summer	S2	12	125.585	1.278	68.7	1.8292	0.0000	FLOOD RISK
15 minute summer	S3	13	123.135	0.534	62.9	0.6045	0.0000	SURCHARGED
60 minute summer	S4	35	115.218	0.718	55.3	0.8124	0.0000	SURCHARGED
15 minute summer	S5	11	116.643	1.158	60.3	1.6577	0.0000	FLOOD RISK
240 minute winter	S6	220	115.033	1.033	21.9	1.4787	0.0000	SURCHARGED
240 minute winter	S7 HB	220	115.033	1.855	47.5	185.7536	0.0000	FLOOD RISK
30 minute summer	S8	18	113.142	0.042	9.5	0.0606	0.0000	OK
30 minute summer	S9	18	110.009	0.042	9.5	0.0476	0.0000	OK
15 minute summer	S10	12	109.751	1.171	47.6	1.6759	0.0000	FLOOD RISK
15 minute summer	S11	11	108.358	1.258	75.0	1.4226	0.0000	SURCHARGED
360 minute winter	S12	344	106.407	0.357	25.8	0.5105	0.0000	SURCHARGED
360 minute winter	S13 HB	344	106.406	1.156	25.8	159.0453	0.0000	SURCHARGED
240 minute winter	S14	256	105.589	0.388	12.4	0.5547	0.0000	SURCHARGED
30 minute winter	S16 DD	19	102.976	0.076	11.8	0.1338	0.0000	OK
60 minute winter	S17 OUTFALL	41	102.870	0.070	11.8	0.0000	0.0000	OK
240 minute winter	S15 HB	256	105.582	1.392	12.4	2.4598	0.0000	SURCHARGED

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	S1	1.000	S2	22.0	1.396	0.473	0.2247	
15 minute summer	S2	1.001	S3	59.5	3.379	1.119	0.3407	
15 minute summer	S3	1.002	S4	58.8	3.554	1.049	1.1528	
60 minute summer	S4	1.003	S7 HB	53.1	3.018	0.927	0.2186	
15 minute summer	S5	2.000	S6	54.3	3.082	1.234	0.3889	
240 minute winter	S6	2.001	S7 HB	21.9	1.078	0.115	1.8708	
240 minute winter	S7 HB	Hydro-Brake®	S8	8.3				
30 minute summer	S8	1.005	S9	9.5	2.345	0.169	0.1288	
30 minute summer	S9	1.006	S14	9.5	2.370	0.168	0.1877	
15 minute summer	S10	3.000	S11	40.4	2.293	0.889	0.4048	
15 minute summer	S11	3.001	S12	72.6	4.127	1.291	0.1605	
360 minute winter	S12	3.002	S13 HB	25.8	1.102	0.135	1.7999	
360 minute winter	S13 HB	Hydro-Brake®	S14	3.8				
240 minute winter	S14	1.007	S15 HB	12.4	0.645	0.085	0.5130	
30 minute winter	S16 DD	1.009	S17 OUTFALL	11.8	1.059	0.213	0.0985	226.3
240 minute winter	S15 HB	Hydro-Brake®	S16 DD	11.8				