



# TOPPING ENGINEERS

CONSULTING CIVIL &  
STRUCTURAL ENGINEERS

## DRAINAGE CALCULATIONS

**LOCATION:**

KDA Wholesale, Fall Bank Industrial Estate, Barnsley

**CLIENT:**

Bradley Stankler

**DOCUMENT REF:**

25542-CAL-C-0100 - Drainage Calcs

**REVISION/DATE:**

P01 05/06/2026

**Design Settings**

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	x
Maximum Rainfall (mm/hr)	50.0		

**Nodes**

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)
SW01	0.240	5.00	146.900	600	1.025
BPS1			147.000	1350	1.200
AT1			146.500	1	1.800
SW02			147.250	1200	2.554

**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	SW01	BPS1	1.000	0.600	145.875	145.800	0.075	13.3	225	5.00	50.0
1.001	BPS1	AT1	1.000	0.600	145.800	145.725	0.075	13.3	225	5.01	50.0
1.002	AT1	SW02	1.000	0.600	144.700	144.696	0.004	240.0	300	5.03	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	3.607	143.4	32.5	0.800	0.975	0.240	0.0	73	2.932
1.001	3.607	143.4	32.5	0.975	0.550	0.240	0.0	73	2.932
1.002	1.010	71.4	32.5	1.500	2.254	0.240	0.0	142	0.988

**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	1.000	13.3	225	Circular	146.900	145.875	0.800	147.000	145.800	0.975
1.001	1.000	13.3	225	Circular	147.000	145.800	0.975	146.500	145.725	0.550
1.002	1.000	240.0	300	Circular	146.500	144.700	1.500	147.250	144.696	2.254

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	SW01	600	Manhole	Adoptable	BPS1	1350	Manhole	Adoptable
1.001	BPS1	1350	Manhole	Adoptable	AT1	1	Manhole	Adoptable
1.002	AT1	1	Manhole	Adoptable	SW02	1200	Manhole	Adoptable

**Simulation Settings**

Rainfall Methodology	FEH-22	Analysis Speed	Detailed	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	0.750	Drain Down Time (mins)	240	Check Discharge Volume	x
Winter CV	0.840	Additional Storage (m³/ha)	20.0		

**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
2	0	0	0
30	0	0	0
100	40	0	0

**Node SW02 Online Hydro-Brake® Control**

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	144.696	Product Number	CTL-SHE-0051-1300-1200-1300
Design Depth (m)	1.200	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.3	Min Node Diameter (mm)	1200

**Node AT1 Depth/Area Storage Structure**

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	144.700
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )
0.000	170.0	170.0	1.200	170.0	225.5	1.201	0.0	225.5

**Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
15 minute winter	SW01	10	145.959	0.084	20.8	0.4187	0.0000	OK
15 minute winter	BPS1	10	145.884	0.084	20.5	0.1197	0.0000	OK
600 minute winter	AT1	435	144.873	0.173	3.4	28.0019	0.0000	OK
600 minute winter	SW02	435	144.873	0.177	1.0	0.2006	0.0000	OK

  

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
15 minute winter	SW01	1.000	BPS1	20.5	1.519	0.143	0.0135	
15 minute winter	BPS1	1.001	AT1	20.4	1.926	0.142	0.0107	
600 minute winter	AT1	1.002	SW02	1.0	0.111	0.014	0.0428	
600 minute winter	SW02	Hydro-Brake®		1.0				38.0

**Results for 2 year Critical Storm Duration. Lowest mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
15 minute winter	SW01	10	145.988	0.113	31.7	0.5605	0.0000	OK
15 minute winter	BPS1	10	145.910	0.110	31.3	0.1568	0.0000	OK
600 minute winter	AT1	465	144.936	0.236	4.3	38.0573	0.0000	OK
600 minute winter	SW02	465	144.936	0.240	1.0	0.2710	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
15 minute winter	SW01	1.000	BPS1	31.3	1.600	0.218	0.0195	
15 minute winter	BPS1	1.001	AT1	31.1	2.094	0.217	0.0149	
600 minute winter	AT1	1.002	SW02	1.0	0.130	0.015	0.0599	
600 minute winter	SW02	Hydro-Brake®		1.0				40.7

**Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
15 minute winter	SW01	10	146.160	0.285	84.4	1.4158	0.0000	SURCHARGED
15 minute winter	BPS1	11	146.026	0.226	82.1	0.3240	0.0000	SURCHARGED
960 minute winter	AT1	900	145.295	0.595	6.2	96.0762	0.0000	SURCHARGED
960 minute winter	SW02	900	145.295	0.599	1.1	0.6773	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
15 minute winter	SW01	1.000	BPS1	82.1	2.065	0.573	0.0398	
15 minute winter	BPS1	1.001	AT1	81.7	2.485	0.570	0.0308	
960 minute winter	AT1	1.002	SW02	1.1	0.130	0.015	0.0704	
960 minute winter	SW02	Hydro-Brake®		1.0				58.5

**Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 97.58%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m <sup>3</sup> )	Flood (m <sup>3</sup> )	Status
15 minute winter	SW01	11	146.765	0.890	151.6	4.4204	0.0000	FLOOD RISK
15 minute winter	BPS1	11	146.357	0.557	142.8	0.7977	0.0000	SURCHARGED
1440 minute winter	AT1	1110	145.902	1.202	12.9	193.8808	0.0000	SURCHARGED
1440 minute winter	SW02	1080	145.907	1.210	3.3	1.3691	0.0000	OK

  

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m <sup>3</sup> )	Discharge Vol (m <sup>3</sup> )
15 minute winter	SW01	1.000	BPS1	142.8	3.592	0.996	0.0398	
15 minute winter	BPS1	1.001	AT1	142.7	3.589	0.995	0.0398	
1440 minute winter	AT1	1.002	SW02	-8.4	0.131	-0.118	0.0704	
1440 minute winter	SW02	Hydro-Brake®		1.3				104.9