

CAUSEWAY 	Curtins Consulting Ltd 17-19 WHITWORTH STREET WEST, MANCHESTER M1 5WG				File: SW Highway Drainage.pfd Network: Storm Network Charlie Smith 24/01/2023				Page 1 073521-CUR-00-XX-CA-C-92009 SURFACE WATER NETWORK 1,30,100+40%CC EVENT NON-SURCHARGED			
	Design Settings											
	Rainfall Methodology FSR				Maximum Time of Concentration (mins) 30.00							
	Return Period (years) 100				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 0.400				Preferred Cover Depth (m) 1.200							
	CV 0.750				Include Intermediate Ground ✓							
	Time of Entry (mins) 5.00				Enforce best practice design rules ✓							
Nodes												
Name		Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)				
GULLY 1		0.029	5.00	37.290	150	384191.089	399014.193	0.586				
S1		0.020	5.00	37.408	1200	384195.927	399021.291	1.613				
S2				37.758	1200	384221.764	399003.154	2.279				
OUTFALL				37.758	300	384222.417	398999.581	2.319				
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	GULLY 1	S1	8.590	0.600	36.704	35.795	0.909	9.4	150	5.04	50.0	
1.001	S1	S2	32.000	0.600	35.795	35.479	0.316	101.3	150	5.58	50.0	
1.002	S2	OUTFALL	3.632	0.600	35.479	35.439	0.040	90.8	150	5.64	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		3.297	58.3	3.9	0.436	1.463	0.029	0.0	26	1.875		
1.001		0.998	17.6	6.6	1.463	2.129	0.049	0.0	64	0.927		
1.002		1.055	18.6	6.6	2.129	2.169	0.049	0.0	62	0.967		
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	8.590	9.4	150	1 STANDARD	37.290	36.704	0.436	37.408	35.795	1.463		
1.001	32.000	101.3	150	1 STANDARD	37.408	35.795	1.463	37.758	35.479	2.129		
1.002	3.632	90.8	150	1 STANDARD	37.758	35.479	2.129	37.758	35.439	2.169		
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type				
1.000	GULLY 1	150	Manhole	1 STANDARD	S1	1200	Manhole	1 STANDARD				
1.001	S1	1200	Manhole	1 STANDARD	S2	1200	Manhole	1 STANDARD				
1.002	S2	1200	Manhole	1 STANDARD	OUTFALL	300	Manhole	1 STANDARD				
Manhole Schedule												
Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)			
GULLY 1	384191.089	399014.193	37.290	0.586	150							
							0	1.000	36.704	150		
S1	384195.927	399021.291	37.408	1.613	1200							
							1	1.000	35.795	150		
S2	384221.764	399003.154	37.758	2.279	1200							
							0	1.001	35.795	150		
												
							1	1.001	35.479	150		
OUTFALL	384222.417	398999.581	37.758	2.319	300							
							0	1.002	35.479	150		
							1	1.002	35.439	150		
Simulation Settings												
Rainfall Methodology FSR				Summer CV 0.750		Drain Down Time (mins) 240						
FSR Region England and Wales				Winter CV 0.840		Additional Storage (m³/ha) 20.0						
M5-60 (mm) 17.000				Analysis Speed Normal		Check Discharge Rate(s) x						
Ratio-R 0.400				Skip Steady State x		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 %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)					
1	0	0	0	100	40	0	0					
30	0	0	0									

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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 (m³)	Flood (m³)	Status
15 minute winter	GULLY 1	10	36.729	0.025	3.5	0.0251	0.0000	OK
15 minute winter	S1	10	35.854	0.059	5.9	0.0820	0.0000	OK
15 minute winter	S2	11	35.543	0.064	5.7	0.0720	0.0000	OK
15 minute winter	OUTFALL	11	35.496	0.057	5.8	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	GULLY 1	1.000	S1	3.5	0.858	0.060	0.0362	
15 minute winter	S1	1.001	S2	5.7	0.855	0.324	0.2158	
15 minute winter	S2	1.002	OUTFALL	5.8	0.868	0.309	0.0241	2.7

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 (m³)	Flood (m³)	Status
15 minute winter	GULLY 1	10	36.742	0.038	8.4	0.0388	0.0000	OK
15 minute winter	S1	10	35.898	0.103	14.2	0.1424	0.0000	OK
15 minute winter	S2	11	35.591	0.112	13.9	0.1266	0.0000	OK
15 minute winter	OUTFALL	11	35.535	0.096	13.9	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	GULLY 1	1.000	S1	8.4	1.030	0.144	0.0709	
15 minute winter	S1	1.001	S2	13.9	1.036	0.786	0.4285	
15 minute winter	S2	1.002	OUTFALL	13.9	1.066	0.746	0.0473	6.6

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	GULLY 1	10	36.756	0.052	15.3	0.0528	0.0000	OK
15 minute winter	S1	11	36.313	0.518	25.8	0.7141	0.0000	SURCHARGED
15 minute winter	S2	11	35.685	0.206	23.1	0.2333	0.0000	SURCHARGED
15 minute winter	OUTFALL	12	35.574	0.135	23.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	GULLY 1	1.000	S1	15.3	1.116	0.262	0.0991	
15 minute winter	S1	1.001	S2	23.1	1.312	1.309	0.5634	
15 minute winter	S2	1.002	OUTFALL	23.0	1.305	1.231	0.0624	11.9