

	The Civil Engineering Practice BN41 1RA www.civil.co.uk reception@civil.co.uk	File: 23346 Detailed Design Surcharged O Network: Storm Network Steve Doughty 30/07/2020	Page 1 23346 Old Blacksmiths Yard, Water Lane Storm - Surcharged Outfall
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Design Settings

Rainfall Methodology	FEH-13	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	Preferred Cover Depth (m)	0.800
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)
SW7	0.022	5.00	9.550	480	0.950
RE	0.007	5.00	9.675	480	0.950
SW8 HB			9.400	1200	0.952
SW1			8.750	480	0.950
Headwall			7.500		0.150

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	SW7	SW8 HB	10.590	0.600	8.600	8.448	0.152	69.7	150	5.15	50.0
2.000	RE	SW8 HB	17.340	0.600	8.725	8.448	0.277	62.6	150	5.23	50.0
1.001	SW8 HB	SW1	4.650	0.600	8.448	7.800	0.648	7.2	150	5.25	50.0
1.002	SW1	Headwall	2.210	0.600	7.800	7.350	0.450	4.9	150	5.26	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	1.206	21.3	3.0	0.800	0.802	0.022	0.0	38	0.852
2.000	1.273	22.5	0.9	0.800	0.802	0.007	0.0	21	0.626
1.001	3.785	66.9	3.9	0.802	0.800	0.029	0.0	24	2.063
1.002	4.578	80.9	3.9	0.800	0.000	0.029	0.0	23	2.383

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	10.590	69.7	150	Circular	9.550	8.600	0.800	9.400	8.448	0.802
2.000	17.340	62.6	150	Circular	9.675	8.725	0.800	9.400	8.448	0.802
1.001	4.650	7.2	150	Circular	9.400	8.448	0.802	8.750	7.800	0.800
1.002	2.210	4.9	150	Circular	8.750	7.800	0.800	7.500	7.350	0.000

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	SW7	480	Manhole	Adoptable	SW8 HB	1200	Manhole	Adoptable
2.000	RE	480	Manhole	Adoptable	SW8 HB	1200	Manhole	Adoptable
1.001	SW8 HB	1200	Manhole	Adoptable	SW1	480	Manhole	Adoptable
1.002	SW1	480	Manhole	Adoptable	Headwall		Junction	

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
SW7	9.550	0.950	480					
				0	1.000	8.600	150	
RE	9.675	0.950	480					
				0	2.000	8.725	150	
SW8 HB	9.400	0.952	1200		1	2.000	8.448	150
				2	1.000	8.448	150	
				0	1.001	8.448	150	
SW1	8.750	0.950	480		1	1.001	7.800	150
				0	1.002	7.800	150	
Headwall	7.500	0.150			1	1.002	7.350	150

Simulation Settings

Rainfall Methodology	FEH-13	Analysis Speed	Detailed	Additional Storage (m ³ /ha)	20.0
Summer CV	0.750	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	0.840	Drain Down Time (mins)	2160	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	40	0	0

Node Headwall Surcharged Outfall

Overrides Design Area	x	Depression Storage Area (m ²)	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	1.280	420	1.280	840	1.280	1260	1.280	1680	1.280	2100	1.280
60	1.280	480	1.280	900	1.280	1320	1.280	1740	1.280	2160	1.280
120	1.280	540	1.280	960	1.280	1380	1.280	1800	1.280		
180	1.280	600	1.280	1020	1.280	1440	1.280	1860	1.280		
240	1.280	660	1.280	1080	1.280	1500	1.280	1920	1.280		
300	1.280	720	1.280	1140	1.280	1560	1.280	1980	1.280		
360	1.280	780	1.280	1200	1.280	1620	1.280	2040	1.280		

Node SW8 HB Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	8.448	Product Number	CTL-SHE-0068-2000-0950-2000
Design Depth (m)	0.950	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node SW7 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	8.960	Slope (1:X)	9999.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	41	Depth (m)	0.400
Safety Factor	2.0	Width (m)	10.140	Inf Depth (m)	
Porosity	0.30	Length (m)	10.140		



Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 91.07%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	SW7	58	9.210	0.610	8.2	8.0052	0.0000	SURCHARGED
60 minute winter	RE	59	9.209	0.484	2.6	0.1588	0.0000	SURCHARGED
60 minute winter	SW8 HB	58	9.209	0.761	3.6	0.8606	0.0000	FLOOD RISK
15 minute summer	SW1	12	8.633	0.833	2.0	0.1508	0.0000	FLOOD RISK
15 minute summer	Headwall	1	7.500	0.150	2.0	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)
60 minute winter	SW7	1.000	SW8 HB	3.6	0.578	0.169	0.1864	
60 minute winter	RE	2.000	SW8 HB	2.6	0.284	0.117	0.3053	
60 minute winter	SW8 HB	Hydro-Brake®	SW1	2.0				
15 minute summer	SW1	1.002	Headwall	2.0	0.115	0.025	0.0389	6.7