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66a Church Walk Burgess Hill West Sussex RH15 9AS	Yapton Road, Barnham Highway Drainage	
Date 25/06/2020 File Highway Network rev b.MDX	Designed by SDL Checked by	
Micro Drainage	Network 2018.1	

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	2.467	0.017	145.1	0.016	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.001	57.007	0.121	471.1	0.058	0.00	0.0	0.600	o	600	Pipe/Conduit	
S1.002	19.401	0.130	149.2	0.024	0.00	0.0	0.600	o	150	Pipe/Conduit	
S2.000	12.126	0.068	178.3	0.034	5.00	0.0	0.600	o	450	Pipe/Conduit	
S1.003	61.338	0.132	464.7	0.098	0.00	0.0	0.600	o	600	Pipe/Conduit	
S1.004	39.089	0.100	390.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	0.00	5.05	8.160	0.016	0.0	0.0	0.0	0.83	14.7	0.0
S1.001	0.00	5.90	8.143	0.074	0.0	0.0	0.0	1.12	315.3	0.0
S1.002	0.00	6.30	8.022	0.098	0.0	0.0	0.0	0.82	14.5	0.0
S2.000	0.00	5.13	7.960	0.034	0.0	0.0	0.0	1.52	241.6	0.0
S1.003	0.00	7.21	7.892	0.230	0.0	0.0	0.0	1.12	317.5	0.0
S1.004	0.00	8.50	7.760	0.230	0.0	0.0	0.0	0.50	8.9	0.0

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.016	0.016	0.016
1.001	-	-	100	0.058	0.058	0.058
1.002	-	-	100	0.024	0.024	0.024
2.000	-	-	100	0.034	0.034	0.034
1.003	-	-	100	0.098	0.098	0.098
1.004	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.230	0.230	0.230

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S5, DS/PN: S1.004, Volume (m³): 18.9

Unit Reference	MD-SHE-0149-1000-0750-1000	Sump Available	Yes
Design Head (m)	0.750	Diameter (mm)	149
Design Flow (l/s)	10.0	Invert Level (m)	7.760
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	225
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1200
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.750	10.0	Kick-Flo®	0.545	8.6
Flush-Flo™	0.256	10.0	Mean Flow over Head Range	-	8.4

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.4	0.600	9.0	1.600	14.3	2.600	18.0	5.000	24.6	7.500	29.9
0.200	9.9	0.800	10.3	1.800	15.1	3.000	19.3	5.500	25.8	8.000	30.8
0.300	10.0	1.000	11.4	2.000	15.9	3.500	20.8	6.000	26.9	8.500	31.7
0.400	9.7	1.200	12.5	2.200	16.6	4.000	22.1	6.500	27.9	9.000	32.7
0.500	9.2	1.400	13.4	2.400	17.3	4.500	23.4	7.000	29.0	9.500	33.6

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<u>2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>		
<u>Simulation Criteria</u>		
Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000 Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coefficient 0.800 Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000		
Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0 Number of Online Controls 1 Number of Storage Structures 0 Number of Real Time Controls 0		
<u>Synthetic Rainfall Details</u>		
Rainfall Model FEH Data Type Point FEH Rainfall Version 2013 Cv (Summer) 1.000 Site Location GB 496649 103835 SU 96649 03835 Cv (Winter) 1.000		
Margin for Flood Risk Warning (mm) 300.0 DVD Status ON Analysis Timestep 2.5 Second Increment (Extended) Inertia Status OFF DTS Status ON		
Profile(s) Summer and Winter Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 5760, 7200, 8640, 10080 Return Period(s) (years) 2, 30 Climate Change (%) 0, 0		
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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
S1.000	S1	30 minute 2 year Summer I+0%	8.810	8.238	-0.072	0.000	0.28		0.083	3.0	OK
S1.001	S2	30 minute 2 year Summer I+0%	8.850	8.235	-0.508	0.000	0.04		0.164	12.4	OK
S1.002	S3	30 minute 2 year Summer I+0%	8.815	8.194	0.022	0.000	0.82		2.371	11.1	SURCHARGED
S2.000	S4	30 minute 2 year Summer I+0%	9.025	8.168	-0.242	0.000	0.04		0.291	6.2	OK
S1.003	S4	30 minute 2 year Summer I+0%	8.838	8.168	-0.324	0.000	0.11		1.640	30.3	OK
S1.004	S5	30 minute 2 year Summer I+0%	8.880	8.163	0.253	0.000	1.15		10.311	9.9	SURCHARGED

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<u>30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>		
<u>Simulation Criteria</u>		
Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000 Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coefficient 0.800 Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000		
Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0 Number of Online Controls 1 Number of Storage Structures 0 Number of Real Time Controls 0		
<u>Synthetic Rainfall Details</u>		
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Margin for Flood Risk Warning (mm) 300.0 DVD Status ON Analysis Timestep 2.5 Second Increment (Extended) Inertia Status OFF DTS Status ON		
Profile(s) Summer and Winter Duration(s) (mins) 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 5760, 7200, 8640, 10080 Return Period(s) (years) 2, 30 Climate Change (%) 0, 0		
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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Water			Surcharged		Flooded		Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
				Level (m)	Depth (m)	Volume (m³)	Flow	Depth	Volume	Flow					
S1.000	S1	60 minute 30 year Winter I+0%	8.810	8.808	0.498	0.000	0.29						0.727	3.1	FLOOD RISK
S1.001	S2	60 minute 30 year Winter I+0%	8.850	8.807	0.064	0.000	0.05						1.185	15.1	FLOOD RISK
S1.002	S3	60 minute 30 year Winter I+0%	8.815	8.807	0.635	0.000	0.74						17.071	10.1	FLOOD RISK
S2.000	S4	60 minute 30 year Winter I+0%	9.025	8.786	0.376	0.000	0.04						1.175	6.4	FLOOD RISK
S1.003	S4	60 minute 30 year Winter I+0%	8.838	8.785	0.293	0.000	0.10						3.588	28.8	FLOOD RISK
S1.004	S5	60 minute 30 year Winter I+0%	8.880	8.782	0.872	0.000	1.30						18.716	11.1	FLOOD RISK