

A L Daines & Partners		Page 1
28 Castle Street Carlisle CA3 8TP		
Date 01/03/2023 08:41 File MD CALCS.MDX	Designed by petera Checked by	
Micro Drainage Network 2020.1.3		

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	16.400	Storm Duration (mins)	30
Ratio R	0.276		

©1982-2020 Innovyze

A L Daines & Partners		Page 2
28 Castle Street Carlisle CA3 8TP		
Date 01/03/2023 08:41 File MD CALCS.MDX	Designed by petera Checked by	
Micro Drainage Network 2020.1.3		

Online Controls for Storm

Hydro-Brake® Optimum Manhole: 8, DS/PN: 1.005, Volume (m³): 2.7

Unit Reference	MD-SHE-0078-3000-1300-3000
Design Head (m)	1.300
Design Flow (l/s)	3.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	78
Invert Level (m)	23.320
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.300	3.0
Flush-Flo™	0.341	2.8
Kick-Flo®	0.695	2.2
Mean Flow over Head Range	-	2.5

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)
0.100	2.2	1.200	2.9	3.000	4.4	7.000	6.6
0.200	2.7	1.400	3.1	3.500	4.7	7.500	6.8
0.300	2.8	1.600	3.3	4.000	5.0	8.000	7.0
0.400	2.8	1.800	3.5	4.500	5.3	8.500	7.2
0.500	2.7	2.000	3.7	5.000	5.6	9.000	7.4
0.600	2.6	2.200	3.8	5.500	5.9	9.500	7.6
0.800	2.4	2.400	4.0	6.000	6.1		
1.000	2.7	2.600	4.1	6.500	6.3		

A L Daines & Partners		Page 3
28 Castle Street Carlisle CA3 8TP		
Date 01/03/2023 08:41 File MD CALCS.MDX	Designed by petera Checked by	
Micro Drainage Network 2020.1.3		

Storage Structures for Storm

Cellular Storage Manhole: 5, DS/PN: 1.004

Invert Level (m) 23.400 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	28.0	0.0	0.641	0.0	0.0
0.640	28.0	0.0			

©1982-2020 Innovyze

A L Daines & Partners

28 Castle Street
Carlisle
CA3 8TP

Date 01/03/2023 08:41
File MD CALCS.MDX

Micro Drainage

Designed by petera
Checked by

Network 2020.1.3

Page 4



1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

Simulation Criteria

Volumetric Runoff Coeff 0.750Foul Sewage per hectare (l/s) 0.000
Areal Reduction Factor 1.000Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0Inlet Coefficient 0.800
Manhole Headloss Coeff (Global) 0.500Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0Number of Storage Structures 1
Number of Online Controls 1Number of Time/Area Diagrams 0
Number of Offline Controls 0Number of Real Time Controls 0

Margin for Flood Risk Warning (mm) 300.0DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s)Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720
Return Period(s) (years)1, 30, 100
Climate Change (%)0, 50, 50

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	1	+0%	100/15 Summer				24.687
1.001	2	15 Winter	1	+0%	100/15 Summer				24.668
1.002	3	15 Winter	1	+0%					24.615
1.003	4	15 Winter	1	+0%	100/120 Winter				24.482
2.000	7	15 Winter	1	+0%	100/60 Winter				24.375
3.000	6	15 Winter	1	+0%	100/60 Winter				24.369
1.004	5	30 Winter	1	+0%	30/15 Summer				23.466
1.005	8	30 Winter	1	+0%	30/15 Summer				23.459

PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.113	0.000	0.11			1.2	OK	
1.001	2	-0.097	0.000	0.27			2.2	OK	
1.002	3	-0.110	0.000	0.16			3.1	OK	
1.003	4	-0.118	0.000	0.10			4.1	OK	
2.000	7	-0.125	0.000	0.07			1.2	OK	
3.000	6	-0.131	0.000	0.04			1.2	OK	
1.004	5	-0.084	0.000	0.12		17	2.8	OK	
1.005	8	-0.011	0.000	0.07			2.5	OK	

©1982-2020 Innovyze

A L Daines & Partners		Page 5							
28 Castle Street Carlisle CA3 8TP									
Date 01/03/2023 08:41 File MD CALCS.MDX	Designed by petera Checked by								
Micro Drainage Network 2020.1.3									
30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm									
Simulation Criteria									
Volumetric Runoff Coeff 0.750 Foul Sewage per hectare (l/s) 0.000									
Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000									
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000									
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800									
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000									
Number of Input Hydrographs 0 Number of Storage Structures 1									
Number of Online Controls 1 Number of Time/Area Diagrams 0									
Number of Offline Controls 0 Number of Real Time Controls 0									
Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF									
Analysis Timestep Fine Inertia Status OFF									
DTS Status ON									
Profile(s) Summer and Winter									
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720									
Return Period(s) (years) 1, 30, 100									
Climate Change (%) 0, 50, 50									
Water									
PN	US/MH	Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	
	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act. (m)	
1.000	1	15 Winter	30	+50%	100/15 Summer			24.766	
1.001	2	15 Winter	30	+50%	100/15 Summer			24.752	
1.002	3	15 Winter	30	+50%				24.664	
1.003	4	15 Winter	30	+50%	100/120 Winter			24.518	
2.000	7	15 Winter	30	+50%	100/60 Winter			24.400	
3.000	6	15 Winter	30	+50%	100/60 Winter			24.388	
1.004	5	120 Winter	30	+50%	30/15 Summer			23.935	
1.005	8	720 Winter	30	+50%	30/15 Summer			24.045	
Surcharged Flooded Half Drain Pipe									
PN	US/MH	Depth	Volume	Flow /	Overflow	Time	Pipe	Level	
	Name	(m)	(m³)	Cap.	(l/s)	(mins)	Flow	Exceeded	
1.000	1	-0.034	0.000	0.40			4.2	OK	
1.001	2	-0.013	0.000	1.00			8.2	OK	
1.002	3	-0.061	0.000	0.64			12.6	OK	
1.003	4	-0.082	0.000	0.42			17.2	OK	
2.000	7	-0.100	0.000	0.24			4.4	OK	
3.000	6	-0.112	0.000	0.15			4.4	OK	
1.004	5	0.385	0.000	0.12		80	3.0 SURCHARGED		
1.005	8	0.575	0.000	0.07			2.6 SURCHARGED		
©1982-2020 Innovyze									

