


Existing Network Details for Storm

PN	Length (m)	Fall (m)	Slope (%)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
1.000	7.260	0.100	1.377	0.160	5.00	0.0	0.600	o	225	Pipe/Conduit
1.001	28.490	1.535	5.388	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit
2.000	18.195	0.120	0.660	0.016	5.00	0.0	0.600	o	150	Pipe/Conduit
2.001	4.626	0.045	0.973	0.011	0.00	0.0	0.600	o	225	Pipe/Conduit
2.002	31.387	1.127	3.591	0.072	0.00	0.0	0.600	o	225	Pipe/Conduit
3.000	35.395	0.115	0.325	0.106	5.00	0.0	0.600	o	450	Pipe/Conduit
3.001	34.285	0.110	0.321	0.178	0.00	0.0	0.600	o	450	Pipe/Conduit
3.002	5.534	0.020	0.361	0.066	0.00	0.0	0.600	o	450	Pipe/Conduit
3.003	7.217	0.025	0.346	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit
3.004	20.799	0.070	0.337	0.055	0.00	0.0	0.600	o	450	Pipe/Conduit
2.003	14.094	1.160	8.230	0.126	0.00	0.0	0.600	o	450	Pipe/Conduit
1.002	18.192	0.100	0.550	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
1.003	15.620	0.055	0.352	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
4.000	22.772	1.122	4.927	0.060	5.00	0.0	0.600	o	300	Pipe/Conduit
4.001	7.910	0.100	1.264	0.202	0.00	0.0	0.600	o	300	Pipe/Conduit
4.002	4.892	0.660	13.491	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
4.003	14.296	0.100	0.699	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
1.000	81.185	0.160	0.0	1.54	61.1
1.001	81.085	0.160	0.0	3.05	121.3
2.000	82.360	0.016	0.0	0.81	14.4
2.001	82.165	0.027	0.0	1.29	51.3
2.002	82.120	0.099	0.0	2.49	99.0
3.000	81.050	0.106	0.0	1.15	183.5
3.001	80.935	0.284	0.0	1.15	182.3
3.002	80.825	0.351	0.0	1.22	193.6
3.003	80.805	0.351	0.0	1.19	189.5
3.004	80.780	0.406	0.0	1.17	186.8
2.003	80.710	0.631	0.0	5.86	931.5
1.002	79.550	0.791	0.0	1.16	82.2
1.003	79.450	0.791	0.0	0.93	65.6
4.000	81.432	0.060	0.0	3.51	247.8
4.001	80.310	0.262	0.0	1.77	125.1
4.002	80.210	0.262	0.0	5.81	410.7
4.003	79.550	0.262	0.0	1.31	92.8

BWB Consulting Ltd		Page 2
5th Floor, Waterfront House 35 Station Street Nottingham, NG2 3DQ		
Date 21/06/2022 23:09 File Drainage model.MDX	Designed by Jean.Benard Checked by	
Innovyze		Network 2020.1

Existing Network Details for Storm

PN	Length (m)	Fall (m)	Slope (%)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
4.004	16.130	1.230	7.626	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
4.004	79.450	0.262	0.0	4.36	308.5

Area Summary for Storm


Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.160	0.160	0.160
1.001	-	-	100	0.000	0.000	0.000
2.000	User	-	100	0.016	0.016	0.016
2.001	User	-	100	0.011	0.011	0.011
2.002	User	-	100	0.072	0.072	0.072
3.000	User	-	100	0.083	0.083	0.083
	User	-	100	0.023	0.023	0.106
3.001	User	-	100	0.178	0.178	0.178
3.002	User	-	100	0.066	0.066	0.066
3.003	-	-	100	0.000	0.000	0.000
3.004	User	-	100	0.055	0.055	0.055
2.003	User	-	100	0.126	0.126	0.126
1.002	-	-	100	0.000	0.000	0.000
1.003	-	-	100	0.000	0.000	0.000
4.000	User	-	100	0.060	0.060	0.060
4.001	User	-	100	0.202	0.202	0.202
4.002	-	-	100	0.000	0.000	0.000
4.003	-	-	100	0.000	0.000	0.000
4.004	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				1.053	1.053	1.053

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/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	2
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0


Synthetic Rainfall Details

Rainfall Model	FEH
Return Period (years)	1
FEH Rainfall Version	1999
Site Location	GB 524800 213300 TL 24800 13300
C (1km)	-0.028
D1 (1km)	0.292
D2 (1km)	0.317
D3 (1km)	0.283
E (1km)	0.322
F (1km)	2.478
Summer Storms	Yes
Winter Storms	Yes

BWB Consulting Ltd		Page 4
5th Floor, Waterfront House 35 Station Street Nottingham, NG2 3DQ		
Date 21/06/2022 23:09 File Drainage model.MDX	Designed by Jean.Benard Checked by	
Innovyze	Network 2020.1	

Synthetic Rainfall Details

Cv (Summer) 0.750  
Cv (Winter) 0.840  
Storm Duration (mins) 30

BWB Consulting Ltd		Page 5
5th Floor, Waterfront House 35 Station Street Nottingham, NG2 3DQ		
Date 21/06/2022 23:09 File Drainage model.MDX	Designed by Jean.Benard Checked by	
Innovyze		Network 2020.1

Online Controls for Storm

Hydro-Brake® Optimum Manhole: 6, DS/PN: 1.003, Volume (m³): 4.7

Unit Reference	MD-SHE-0123-8500-1800-8500
Design Head (m)	1.800
Design Flow (l/s)	8.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	123
Invert Level (m)	79.450
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200


Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.800	8.5
Flush-Flo™	0.534	8.4
Kick-Flo®	1.091	6.7
Mean Flow over Head Range	-	7.4

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)
0.100	4.4	1.200	7.0	3.000	10.8	7.000	16.1
0.200	7.2	1.400	7.5	3.500	11.6	7.500	16.7
0.300	8.0	1.600	8.0	4.000	12.4	8.000	17.2
0.400	8.3	1.800	8.5	4.500	13.1	8.500	17.7
0.500	8.4	2.000	8.9	5.000	13.7	9.000	18.2
0.600	8.4	2.200	9.3	5.500	14.4	9.500	18.7
0.800	8.1	2.400	9.7	6.000	15.0		
1.000	7.4	2.600	10.1	6.500	15.6		

Hydro-Brake® Optimum Manhole: 20, DS/PN: 4.004, Volume (m³): 3.5

Unit Reference	MD-SHE-0069-2900-2000-2900
Design Head (m)	2.000
Design Flow (l/s)	2.9
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	69
Invert Level (m)	79.450
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200


BWB Consulting Ltd		Page 6
5th Floor, Waterfront House 35 Station Street Nottingham, NG2 3DQ		
Date 21/06/2022 23:09 File Drainage model.MDX	Designed by Jean.Benard Checked by	
Innovyze		Network 2020.1

Hydro-Brake® Optimum Manhole: 20, DS/PN: 4.004, Volume (m³): 3.5

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.000	2.9
Flush-Flo™	0.303	2.1
Kick-Flo®	0.619	1.7
Mean Flow over Head Range	-	2.2

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	1.7	1.200	2.3	3.000	3.5	7.000	5.2
0.200	2.0	1.400	2.5	3.500	3.8	7.500	5.4
0.300	2.1	1.600	2.6	4.000	4.0	8.000	5.5
0.400	2.1	1.800	2.8	4.500	4.2	8.500	5.7
0.500	2.0	2.000	2.9	5.000	4.4	9.000	5.9
0.600	1.8	2.200	3.0	5.500	4.6	9.500	6.0
0.800	1.9	2.400	3.2	6.000	4.8		
1.000	2.1	2.600	3.3	6.500	5.0		

BWB Consulting Ltd		Page 7
5th Floor, Waterfront House 35 Station Street Nottingham, NG2 3DQ		
Date 21/06/2022 23:09 File Drainage model.MDX	Designed by Jean.Benard Checked by	
Innovyze		Network 2020.1

Storage Structures for Storm

Tank or Pond Manhole: 13, DS/PN: 1.002

Invert Level (m) 79.550


Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )
0.000	450.0	1.500	450.0	1.501	0.0

Tank or Pond Manhole: 18, DS/PN: 4.003

Invert Level (m) 79.550

Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )
0.000	160.0	1.000	160.0	1.001	0.0



BWB Consulting Ltd		Page 9
5th Floor, Waterfront House 35 Station Street Nottingham, NG2 3DQ		
Date 21/06/2022 23:09 File Drainage model.MDX	Designed by Jean.Benard Checked by	
Innovyze		Network 2020.1

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m <sup>3</sup> )	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	11	81.300	-0.110	0.000	0.51		22.7	OK	2
1.001	12	81.154	-0.156	0.000	0.20		22.6	OK	
2.000	SW106	82.402	-0.108	0.000	0.17		2.3	OK	
2.001	SW106	82.217	-0.173	0.000	0.12		3.6	OK	
2.002	W03	82.174	-0.171	0.000	0.13		12.2	OK	
3.000	SW101	81.150	-0.350	0.000	0.09		14.7	OK	2
3.001	SW102	81.087	-0.298	0.000	0.22		34.4	OK	2
3.002	SW103	81.014	-0.261	0.000	0.37		41.7	OK	
3.003	SW104	80.987	-0.268	0.000	0.34		41.5	OK	
3.004	SW105	80.952	-0.278	0.000	0.31		47.1	OK	

5th Floor, Waterfront House  
 35 Station Street  
 Nottingham, NG2 3DQ



Date 21/06/2022 23:09  
 File Drainage model.MDX

Designed by Jean.Benard  
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Innovyze Network 2020.1

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
2.003	9	15	Winter	1	+0%			
1.002	13	120	Winter	1	+0%	30/15	Summer	
1.003	6	120	Winter	1	+0%	30/15	Summer	
4.000	16	15	Winter	1	+0%	100/15	Summer	
4.001	17	15	Winter	1	+0%	30/15	Summer	100/15 Summer
4.002	17	15	Winter	1	+0%	100/15	Summer	
4.003	18	120	Winter	1	+0%	30/15	Summer	
4.004	20	120	Winter	1	+0%	30/15	Summer	

PN	US/MH Name	Water Surcharged			Flooded		Half Drain Pipe		Level Exceeded
		Level (m)	Depth (m)	Volume (m <sup>3</sup> )	Flow / Overflow Cap. (l/s)	Time (mins)	Flow (l/s)	Status	
2.003	9	80.813	-0.347	0.000	0.12		71.3	OK	
1.002	13	79.694	-0.156	0.000	0.11		7.6	OK	
1.003	6	79.687	-0.063	0.000	0.14		7.6	OK	
4.000	16	81.470	-0.262	0.000	0.04		8.6	OK	
4.001	17	80.446	-0.164	0.000	0.41		32.8	OK	
4.002	17	80.291	-0.219	0.000	0.16		33.0	OK	
4.003	18	79.680	-0.170	0.000	0.03		2.3	OK	
4.004	20	79.678	-0.072	0.000	0.01		2.1	OK	

2

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m <sup>3</sup> /ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coefficient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		


Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 524800 213300 TL 24800 13300
C (1km)	-0.028
D1 (1km)	0.292
D2 (1km)	0.317
D3 (1km)	0.283
E (1km)	0.322
F (1km)	2.478
Cv (Summer)	0.750
Cv (Winter)	0.840
Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	11	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
1.001	12	15 Winter	30	+0%	100/15 Summer			
2.000	SW106	15 Winter	30	+0%	100/15 Summer			
2.001	SW106	15 Winter	30	+0%	100/15 Summer			
2.002	W03	15 Winter	30	+0%	100/15 Summer			
3.000	SW101	15 Winter	30	+0%	30/15 Winter	100/15 Summer		
3.001	SW102	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
3.002	SW103	15 Winter	30	+0%	30/15 Summer			
3.003	SW104	15 Winter	30	+0%	30/15 Summer			
3.004	SW105	15 Winter	30	+0%	30/15 Winter			

BWB Consulting Ltd		Page 12
5th Floor, Waterfront House 35 Station Street Nottingham, NG2 3DQ		
Date 21/06/2022 23:09 File Drainage model.MDX	Designed by Jean.Benard Checked by	
Innovyze		Network 2020.1

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m <sup>3</sup> )	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	11	81.610	0.200	0.000	1.72		76.8	SURCHARGED
1.001	12	81.223	-0.087	0.000	0.68		77.2	OK
2.000	SW106	82.443	-0.067	0.000	0.57		7.7	OK
2.001	SW106	82.270	-0.120	0.000	0.43		13.0	OK
2.002	W03	82.239	-0.106	0.000	0.54		50.2	OK
3.000	SW101	81.503	0.003	0.000	0.29		46.5	SURCHARGED
3.001	SW102	81.406	0.021	0.000	0.76		120.6	SURCHARGED
3.002	SW103	81.310	0.035	0.000	1.31		148.4	SURCHARGED
3.003	SW104	81.275	0.020	0.000	1.22		147.0	SURCHARGED
3.004	SW105	81.234	0.004	0.000	1.11		168.3	SURCHARGED

PN	US/MH Name	Level Exceeded
1.000	11	2
1.001	12	
2.000	SW106	
2.001	SW106	
2.002	W03	
3.000	SW101	2
3.001	SW102	2
3.002	SW103	
3.003	SW104	
3.004	SW105	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
2.003	9	15 Winter	30	+0%				
1.002	13	180 Winter	30	+0%	30/15 Summer			
1.003	6	60 Winter	30	+0%	30/15 Summer			
4.000	16	15 Winter	30	+0%	100/15 Summer			
4.001	17	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
4.002	17	15 Winter	30	+0%	100/15 Summer			
4.003	18	180 Winter	30	+0%	30/15 Summer			
4.004	20	180 Winter	30	+0%	30/15 Summer			

PN	US/MH Name	Water Surcharged Flooded			Half Drain Pipe		Status
		Level (m)	Depth (m)	Volume (m³)	Flow / Overflow Cap. (l/s)	Time (mins)	
2.003	9	80.921	-0.239	0.000	0.43	260.7	OK
1.002	13	80.044	0.194	0.000	0.15	10.8	SURCHARGED
1.003	6	80.312	0.562	0.000	0.15	8.4	SURCHARGED
4.000	16	81.505	-0.227	0.000	0.13	29.2	OK
4.001	17	80.783	0.173	0.000	1.68	133.2	SURCHARGED
4.002	17	80.388	-0.122	0.000	0.65	132.4	OK
4.003	18	80.026	0.176	0.000	0.03	2.6	SURCHARGED
4.004	20	80.029	0.279	0.000	0.01	2.1	SURCHARGED

PN	US/MH Name	Level Exceeded
2.003	9	
1.002	13	
1.003	6	
4.000	16	
4.001	17	2
4.002	17	
4.003	18	
4.004	20	



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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m <sup>3</sup> )	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	11	82.616	1.206	5.215	2.88		128.4	FLOOD
1.001	12	81.905	0.595	0.000	1.12		126.2	SURCHARGED
2.000	SW106	82.724	0.214	0.000	1.27		17.1	SURCHARGED
2.001	SW106	82.583	0.193	0.000	0.99		29.7	SURCHARGED
2.002	W03	82.526	0.181	0.000	1.07		98.9	SURCHARGED
3.000	SW101	82.625	1.125	0.491	0.62		99.8	FLOOD
3.001	SW102	82.567	1.182	1.235	1.67		266.1	FLOOD
3.002	SW103	82.301	1.026	0.000	2.89		326.6	FLOOD RISK
3.003	SW104	81.949	0.694	0.000	2.72		327.1	SURCHARGED
3.004	SW105	81.602	0.372	0.000	2.49		378.4	SURCHARGED

PN	US/MH Name	Level Exceeded
1.000	11	2
1.001	12	
2.000	SW106	
2.001	SW106	
2.002	W03	
3.000	SW101	2
3.001	SW102	2
3.002	SW103	
3.003	SW104	
3.004	SW105	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
2.003	9	15 Winter	100	+40%				
1.002	13	240 Winter	100	+40%	30/15 Summer			
1.003	6	60 Winter	100	+40%	30/15 Summer			
4.000	16	15 Winter	100	+40%	100/15 Summer			
4.001	17	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
4.002	17	240 Winter	100	+40%	100/15 Summer			
4.003	18	240 Winter	100	+40%	30/15 Summer			
4.004	20	240 Winter	100	+40%	30/15 Summer			

PN	US/MH Name	Water Surcharged Flooded			Half Drain Pipe		Status
		Level (m)	Depth (m)	Volume (m³)	Flow / Overflow Cap. (l/s)	Time (mins)	
2.003	9	81.079	-0.081	0.000	0.99	599.1	OK
1.002	13	80.680	0.830	0.000	0.18	12.7	SURCHARGED
1.003	6	81.226	1.476	0.000	0.15	8.3	SURCHARGED
4.000	16	82.024	0.292	0.000	0.29	63.7	FLOOD RISK
4.001	17	81.816	1.206	2.897	3.11	246.7	FLOOD
4.002	17	81.382	0.872	0.000	0.17	35.5	SURCHARGED
4.003	18	81.381	1.531	0.000	0.04	3.1	SURCHARGED
4.004	20	81.378	1.628	0.000	0.01	2.8	SURCHARGED

PN	US/MH Name	Level Exceeded
2.003	9	
1.002	13	
1.003	6	
4.000	16	
4.001	17	2
4.002	17	
4.003	18	
4.004	20	