

JMS (Midlands) Ltd		Page 1
Victoria Count Tennant St Nuneaton Warwickshire CV11 4LZ	The Grove (Latest Site Plan) CO22/289/07	
Date 24/10/2024 File NETWORK.MDX	Designed by MN Checked by MN	
XP Solutions	Network 2018.1	

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

« - Indicates pipe capacity < flow

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
1.000	8.000	0.055	145.5	0.041	5.00	0.0	0.600	o	150	Pipe/Conduit	
2.000	8.500	0.105	81.0	0.014	5.00	0.0	0.600	o	100	Pipe/Conduit	
1.001	18.770	0.035	536.3	0.030	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	8.000	0.035	228.6	0.025	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	45.000	0.225	200.0	0.005	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.004	9.600	0.050	192.0	0.035	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.005	10.250	0.070	146.4	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)
1.000	50.00	5.16	198.250	0.041	0.0	0.0	0.0	0.83	14.7	5.6
2.000	50.00	5.17	198.350	0.014	0.0	0.0	0.0	0.86	6.7	1.9
1.001	50.00	5.73	198.120	0.085	0.0	0.0	0.0	0.56	22.2	11.5
1.002	50.00	5.88	198.085	0.110	0.0	0.0	0.0	0.86	34.2	14.9
1.003	50.00	6.70	198.050	0.115	0.0	0.0	0.0	0.92	36.6	15.6
1.004	50.00	6.87	197.825	0.150	0.0	0.0	0.0	0.94	37.4	20.3
1.005	50.00	7.07	197.850	0.150	0.0	0.0	0.0	0.83	14.6«	20.3

JMS (Midlands) Ltd		Page 2
Victoria Count Tennant St Nuneaton Warwickshire CV11 4LZ	The Grove (Latest Site Plan) CO22/289/07	
Date 24/10/2024 File NETWORK.MDX	Designed by MN Checked by MN	
XP Solutions		Network 2018.1

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
1	199.350	1.100	Open Manhole	1200	1.000	198.250	150				
2	199.230	0.880	Open Manhole	1200	2.000	198.350	100				
3	199.170	1.050	Open Manhole	1200	1.001	198.120	225	1.000	198.195	150	
								2.000	198.245	100	
4	199.170	1.085	Open Manhole	1200	1.002	198.085	225	1.001	198.085	225	
5	199.230	1.180	Open Manhole	1200	1.003	198.050	225	1.002	198.050	225	
6	199.680	1.855	Open Manhole	1200	1.004	197.825	225	1.003	197.825	225	
7	199.680	1.905	Open Manhole	1200	1.005	197.850	150	1.004	197.775	225	
	200.080	2.300	Open Manhole	0		OUTFALL		1.005	197.780	150	

JMS (Midlands) Ltd		Page 4
Victoria Count Tennant St Nuneaton Warwickshire CV11 4LZ	The Grove (Latest Site Plan) CO22/289/07	
Date 24/10/2024 File NETWORK.MDX	Designed by MN Checked by MN	
XP Solutions Network 2018.1		

Simulation Criteria for Storm

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.405		

JMS (Midlands) Ltd		Page 5
Victoria Count Tennant St Nuneaton Warwickshire CV11 4LZ	The Grove (Latest Site Plan) CO22/289/07	
Date 24/10/2024 File NETWORK.MDX	Designed by MN Checked by MN	
XP Solutions	Network 2018.1	

Online Controls for Storm

Hydro-Brake® Optimum Manhole: 7, DS/PN: 1.005, Volume (m³): 2.4

Unit Reference	MD-SHE-0063-2000-1320-2000
Design Head (m)	1.320
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	63
Invert Level (m)	197.850
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.320	2.0
Flush-Flo™	0.277	1.7
Kick-Flo®	0.560	1.4
Mean Flow over Head Range	-	1.6

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	1.4	1.200	1.9	3.000	2.9	7.000	4.3
0.200	1.6	1.400	2.0	3.500	3.1	7.500	4.5
0.300	1.7	1.600	2.2	4.000	3.3	8.000	4.6
0.400	1.6	1.800	2.3	4.500	3.5	8.500	4.7
0.500	1.5	2.000	2.4	5.000	3.7	9.000	4.9
0.600	1.4	2.200	2.5	5.500	3.9	9.500	5.0
0.800	1.6	2.400	2.6	6.000	4.0		
1.000	1.8	2.600	2.7	6.500	4.2		

JMS (Midlands) Ltd								Page 6																																																																																			
Victoria Count Tennant St Nuneaton Warwickshire CV11 4LZ					The Grove (Latest Site Plan) CO22/289/07																																																																																						
Date 24/10/2024 File NETWORK.MDX					Designed by MN Checked by MN																																																																																						
XP Solutions					Network 2018.1																																																																																						
<u>Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>																																																																																											
<u>Simulation Criteria</u> <table><tr><td>Areal Reduction Factor</td><td>1.000</td><td>Additional Flow - % of Total Flow</td><td>0.000</td></tr><tr><td>Hot Start (mins)</td><td>0</td><td>MADD Factor * 10m³/ha Storage</td><td>2.000</td></tr><tr><td>Hot Start Level (mm)</td><td>0</td><td>Inlet Coefficient</td><td>0.800</td></tr><tr><td>Manhole Headloss Coeff (Global)</td><td>0.500</td><td>Flow per Person per Day (l/per/day)</td><td>0.000</td></tr><tr><td>Foul Sewage per hectare (l/s)</td><td>0.000</td><td></td><td></td></tr></table> <table><tr><td>Number of Input Hydrographs</td><td>0</td><td>Number of Storage Structures</td><td>1</td></tr><tr><td>Number of Online Controls</td><td>1</td><td>Number of Time/Area Diagrams</td><td>0</td></tr><tr><td>Number of Offline Controls</td><td>0</td><td>Number of Real Time Controls</td><td>0</td></tr></table>										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 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	1	Number of Online Controls	1	Number of Time/Area Diagrams	0	Number of Offline Controls	0	Number of Real Time Controls	0																																																		
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 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	1																																																																																								
Number of Online Controls	1	Number of Time/Area Diagrams	0																																																																																								
Number of Offline Controls	0	Number of Real Time Controls	0																																																																																								
<u>Synthetic Rainfall Details</u> <table><tr><td>Rainfall Model</td><td>FSR</td><td>Ratio R</td><td>0.407</td></tr><tr><td>Region England and Wales Cv (Summer)</td><td>0.750</td><td></td><td></td></tr><tr><td>M5-60 (mm)</td><td>19.900</td><td>Cv (Winter)</td><td>0.840</td></tr></table> <table><tr><td>Margin for Flood Risk Warning (mm)</td><td>300.0</td></tr><tr><td>Analysis Timestep</td><td>2.5 Second Increment (Extended)</td></tr><tr><td>DTS Status</td><td>OFF</td></tr><tr><td>DVD Status</td><td>ON</td></tr><tr><td>Inertia Status</td><td>OFF</td></tr></table> <table><tr><td>Profile(s)</td><td>Summer and Winter</td></tr><tr><td>Duration(s) (mins)</td><td>15, 30, 60, 120, 240, 360, 480, 960, 1440</td></tr><tr><td>Return Period(s) (years)</td><td>1, 30, 100</td></tr><tr><td>Climate Change (%)</td><td>0, 0, 40</td></tr></table>										Rainfall Model	FSR	Ratio R	0.407	Region England and Wales Cv (Summer)	0.750			M5-60 (mm)	19.900	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	OFF	Profile(s)	Summer and Winter	Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440	Return Period(s) (years)	1, 30, 100	Climate Change (%)	0, 0, 40																																																				
Rainfall Model	FSR	Ratio R	0.407																																																																																								
Region England and Wales Cv (Summer)	0.750																																																																																										
M5-60 (mm)	19.900	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	OFF																																																																																										
Profile(s)	Summer and Winter																																																																																										
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440																																																																																										
Return Period(s) (years)	1, 30, 100																																																																																										
Climate Change (%)	0, 0, 40																																																																																										
<table><tr><th colspan="2">US/MH</th><th rowspan="2">Return Storm</th><th rowspan="2">Climate Period</th><th rowspan="2">Change</th><th rowspan="2">First (X) Surcharge</th><th rowspan="2">First (Y) Flood</th><th rowspan="2">First (Z) Overflow</th><th rowspan="2">Overflow Act.</th><th rowspan="2">Water Level (m)</th></tr><tr><th>PN</th><th>Name</th></tr><tr><td>1.000</td><td>1</td><td>240</td><td>Winter</td><td>100</td><td>+40%</td><td>30/15</td><td>Winter</td><td></td><td>198.968</td></tr><tr><td>2.000</td><td>2</td><td>240</td><td>Winter</td><td>100</td><td>+40%</td><td>100/15</td><td>Summer</td><td></td><td>198.967</td></tr><tr><td>1.001</td><td>3</td><td>240</td><td>Winter</td><td>100</td><td>+40%</td><td>30/60</td><td>Summer</td><td></td><td>198.966</td></tr><tr><td>1.002</td><td>4</td><td>240</td><td>Winter</td><td>100</td><td>+40%</td><td>30/15</td><td>Summer</td><td></td><td>198.964</td></tr><tr><td>1.003</td><td>5</td><td>240</td><td>Winter</td><td>100</td><td>+40%</td><td>1/30</td><td>Winter</td><td></td><td>198.962</td></tr><tr><td>1.004</td><td>6</td><td>240</td><td>Winter</td><td>100</td><td>+40%</td><td>1/15</td><td>Summer</td><td></td><td>198.958</td></tr><tr><td>1.005</td><td>7</td><td>240</td><td>Winter</td><td>100</td><td>+40%</td><td>1/15</td><td>Summer</td><td></td><td>198.956</td></tr></table>										US/MH		Return Storm	Climate Period	Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	PN	Name	1.000	1	240	Winter	100	+40%	30/15	Winter		198.968	2.000	2	240	Winter	100	+40%	100/15	Summer		198.967	1.001	3	240	Winter	100	+40%	30/60	Summer		198.966	1.002	4	240	Winter	100	+40%	30/15	Summer		198.964	1.003	5	240	Winter	100	+40%	1/30	Winter		198.962	1.004	6	240	Winter	100	+40%	1/15	Summer		198.958	1.005	7	240	Winter	100	+40%	1/15	Summer		198.956
US/MH		Return Storm	Climate Period	Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)																																																																																		
PN	Name																																																																																										
1.000	1	240	Winter	100	+40%	30/15	Winter		198.968																																																																																		
2.000	2	240	Winter	100	+40%	100/15	Summer		198.967																																																																																		
1.001	3	240	Winter	100	+40%	30/60	Summer		198.966																																																																																		
1.002	4	240	Winter	100	+40%	30/15	Summer		198.964																																																																																		
1.003	5	240	Winter	100	+40%	1/30	Winter		198.962																																																																																		
1.004	6	240	Winter	100	+40%	1/15	Summer		198.958																																																																																		
1.005	7	240	Winter	100	+40%	1/15	Summer		198.956																																																																																		
<table><tr><th colspan="2">US/MH</th><th rowspan="2">Depth (m)</th><th rowspan="2">Surcharged Volume (m³)</th><th rowspan="2">Flooded Flow / Cap.</th><th rowspan="2">Pipe Overflow (l/s)</th><th rowspan="2">Pipe Flow (l/s)</th><th rowspan="2">Status</th><th rowspan="2">Level Exceeded</th></tr><tr><th>PN</th><th>Name</th></tr><tr><td>1.000</td><td>1</td><td>0.568</td><td>0.000</td><td>0.36</td><td></td><td>4.6</td><td>SURCHARGED</td><td></td></tr><tr><td>2.000</td><td>2</td><td>0.517</td><td>0.000</td><td>0.25</td><td></td><td>1.5</td><td>FLOOD RISK</td><td></td></tr><tr><td>1.001</td><td>3</td><td>0.621</td><td>0.000</td><td>0.10</td><td></td><td>1.8</td><td>FLOOD RISK</td><td></td></tr><tr><td>1.002</td><td>4</td><td>0.654</td><td>0.000</td><td>0.08</td><td></td><td>2.3</td><td>FLOOD RISK</td><td></td></tr><tr><td>1.003</td><td>5</td><td>0.687</td><td>0.000</td><td>0.07</td><td></td><td>2.3</td><td>FLOOD RISK</td><td></td></tr><tr><td>1.004</td><td>6</td><td>0.908</td><td>0.000</td><td>0.06</td><td></td><td>1.9</td><td>SURCHARGED</td><td></td></tr><tr><td>1.005</td><td>7</td><td>0.956</td><td>0.000</td><td>0.14</td><td></td><td>1.8</td><td>SURCHARGED</td><td></td></tr></table>										US/MH		Depth (m)	Surcharged Volume (m³)	Flooded Flow / Cap.	Pipe Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded	PN	Name	1.000	1	0.568	0.000	0.36		4.6	SURCHARGED		2.000	2	0.517	0.000	0.25		1.5	FLOOD RISK		1.001	3	0.621	0.000	0.10		1.8	FLOOD RISK		1.002	4	0.654	0.000	0.08		2.3	FLOOD RISK		1.003	5	0.687	0.000	0.07		2.3	FLOOD RISK		1.004	6	0.908	0.000	0.06		1.9	SURCHARGED		1.005	7	0.956	0.000	0.14		1.8	SURCHARGED									
US/MH		Depth (m)	Surcharged Volume (m³)	Flooded Flow / Cap.	Pipe Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded																																																																																			
PN	Name																																																																																										
1.000	1	0.568	0.000	0.36		4.6	SURCHARGED																																																																																				
2.000	2	0.517	0.000	0.25		1.5	FLOOD RISK																																																																																				
1.001	3	0.621	0.000	0.10		1.8	FLOOD RISK																																																																																				
1.002	4	0.654	0.000	0.08		2.3	FLOOD RISK																																																																																				
1.003	5	0.687	0.000	0.07		2.3	FLOOD RISK																																																																																				
1.004	6	0.908	0.000	0.06		1.9	SURCHARGED																																																																																				
1.005	7	0.956	0.000	0.14		1.8	SURCHARGED																																																																																				
©1982-2018 Innovyze																																																																																											