

Jelson Limited		Page 1
370 Loughborough Road	Normandy Fields	
Leicester	Hinckley	
LE4 5PR	SW Road 2 & 5	
Date 20/03/2024	Designed by EG	
File 2024-02-02 network.MDX	Checked by EG	
Micro Drainage	Network 2019.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm - Road 2

Pipe Sizes STANDARD Manhole Sizes STANDARD

FEH Rainfall Model	
Return Period (years)	2
FEH Rainfall Version	1999
Site Location GB 440550 294500 SP 40550 94500	
C (1km)	-0.028
D1 (1km)	0.364
D2 (1km)	0.347
D3 (1km)	0.258
E (1km)	0.307
F (1km)	2.353
Maximum Rainfall (mm/hr)	50
Maximum Time of Concentration (mins)	30
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	0.750
PIMP (%)	100
Add Flow / Climate Change (%)	0
Minimum Backdrop Height (m)	0.000
Maximum Backdrop Height (m)	1.500
Min Design Depth for Optimisation (m)	1.200
Min Vel for Auto Design only (m/s)	1.00
Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm - Road 2

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.697	4-8	0.230

Total Area Contributing (ha) = 0.927

Total Pipe Volume (m³) = 19.859

Network Design Table for Storm - Road 2

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	46.651	0.416	112.1	0.149	4.00	0.0	0.600	o	300	Pipe/Conduit	
S1.001	25.626	0.228	112.4	0.157	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.002	20.220	0.177	114.2	0.082	0.00	0.0	0.600	o	300	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	50.00	4.52	100.555	0.149	0.0	0.0	0.0	1.48	104.9	20.2
S1.001	50.00	4.81	100.139	0.306	0.0	0.0	0.0	1.48	104.8	41.5
S1.002	50.00	5.04	99.911	0.388	0.0	0.0	0.0	1.47	103.9	52.6

Jelson Limited		Page 2
370 Loughborough Road Leicester LE4 5PR	Normandy Fields Hinckley SW Road 2 & 5	
Date 20/03/2024 File 2024-02-02 network.MDX	Designed by EG Checked by EG	
Micro Drainage		Network 2019.1

Network Design Table for Storm - Road 2

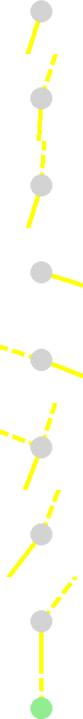
PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S2.000	50.646	0.207	244.7	0.138	4.00	0.0	0.600	o	300	Pipe/Conduit	
S2.001	20.496	0.084	244.0	0.141	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.003	14.221	0.059	241.0	0.033	0.00	0.0	0.600	o	450	Pipe/Conduit	
S1.004	17.423	0.072	242.0	0.040	0.00	0.0	0.600	o	450	Pipe/Conduit	
S1.005	15.054	0.062	242.8	0.187	0.00	0.0	0.600	o	525	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)
S2.000	50.00	4.84	100.025	0.138	0.0	0.0	0.0	1.00	70.7	18.7
S2.001	50.00	5.18	99.818	0.279	0.0	0.0	0.0	1.00	70.8	37.8
S1.003	50.00	5.37	99.584	0.700	0.0	0.0	0.0	1.31	207.6	94.8
S1.004	50.00	5.59	99.525	0.740	0.0	0.0	0.0	1.30	207.2	100.2
S1.005	50.00	5.76	99.378	0.927	0.0	0.0	0.0	1.43	310.2	125.6

Manhole Schedules for Storm - Road 2

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)
S1	102.554	1.999	Open Manhole	1200	S1.000	100.555	300				
S2	102.140	2.001	Open Manhole	1200	S1.001	100.139	300	S1.000	100.139	300	
S3	101.800	1.889	Open Manhole	1200	S1.002	99.911	300	S1.001	99.911	300	
S7	101.730	1.705	Open Manhole	1200	S2.000	100.025	300				
S8	101.360	1.542	Open Manhole	1200	S2.001	99.818	300	S2.000	99.818	300	
S4	101.620	2.036	Open Manhole	1500	S1.003	99.584	450	S1.002	99.734	300	
								S2.001	99.734	300	
S5	101.640	2.115	Open Manhole	1350	S1.004	99.525	450	S1.003	99.525	450	
S6	101.750	2.372	Open Manhole	1500	S1.005	99.378	525	S1.004	99.453	450	
S	101.953	2.637	Open Manhole	0		OUTFALL		S1.005	99.316	525	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	440525.025	295024.554	440525.025	295024.554	Required	
S2	440510.720	294980.151	440510.720	294980.151	Required	
S3	440509.154	294954.572	440509.154	294954.572	Required	
S7	440435.650	294957.672	440435.650	294957.672	Required	
S8	440484.005	294942.612	440484.005	294942.612	Required	
S4	440503.140	294935.268	440503.140	294935.268	Required	
S5	440498.007	294922.006	440498.007	294922.006	Required	
S6	440487.395	294908.187	440487.395	294908.187	Required	
S	440487.277	294893.134			No Entry	

PIPELINE SCHEDULES for Storm - Road 2

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	300	S1	102.554	100.555	1.699	Open Manhole	1200
S1.001	o	300	S2	102.140	100.139	1.701	Open Manhole	1200
S1.002	o	300	S3	101.800	99.911	1.589	Open Manhole	1200
S2.000	o	300	S7	101.730	100.025	1.405	Open Manhole	1200
S2.001	o	300	S8	101.360	99.818	1.242	Open Manhole	1200
S1.003	o	450	S4	101.620	99.584	1.586	Open Manhole	1500
S1.004	o	450	S5	101.640	99.525	1.665	Open Manhole	1350
S1.005	o	525	S6	101.750	99.378	1.847	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	46.651	112.1	S2	102.140	100.139	1.701	Open Manhole	1200
S1.001	25.626	112.4	S3	101.800	99.911	1.589	Open Manhole	1200
S1.002	20.220	114.2	S4	101.620	99.734	1.586	Open Manhole	1500
S2.000	50.646	244.7	S8	101.360	99.818	1.242	Open Manhole	1200
S2.001	20.496	244.0	S4	101.620	99.734	1.586	Open Manhole	1500
S1.003	14.221	241.0	S5	101.640	99.525	1.665	Open Manhole	1350
S1.004	17.423	242.0	S6	101.750	99.453	1.847	Open Manhole	1500
S1.005	15.054	242.8	S	101.953	99.316	2.112	Open Manhole	0

Jelson Limited		Page 5
370 Loughborough Road Leicester LE4 5PR	Normandy Fields Hinckley SW Road 2 & 5	
Date 20/03/2024 File 2024-02-02 network.MDX	Designed by EG Checked by EG	
Micro Drainage		Network 2019.1

Area Summary for Storm - Road 2

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.059	0.059	0.059
	User	-	100	0.009	0.009	0.068
	User	-	100	0.049	0.049	0.117
	User	-	100	0.009	0.009	0.127
	User	-	100	0.023	0.023	0.149
1.001	User	-	100	0.009	0.009	0.009
	User	-	100	0.004	0.004	0.013
	User	-	100	0.025	0.025	0.038
	User	-	100	0.026	0.026	0.064
	User	-	100	0.015	0.015	0.080
	User	-	100	0.028	0.028	0.108
	User	-	100	0.005	0.005	0.113
	User	-	100	0.044	0.044	0.157
1.002	User	-	100	0.019	0.019	0.019
	User	-	100	0.005	0.005	0.025
	User	-	100	0.009	0.009	0.034
	User	-	100	0.009	0.009	0.043
	User	-	100	0.012	0.012	0.055
2.000	User	-	100	0.027	0.027	0.082
	User	-	100	0.008	0.008	0.008
	User	-	100	0.092	0.092	0.100
	User	-	100	0.009	0.009	0.110
	User	-	100	0.029	0.029	0.138
2.001	User	-	100	0.020	0.020	0.020
	User	-	100	0.022	0.022	0.042
	User	-	100	0.023	0.023	0.065
	User	-	100	0.025	0.025	0.090
	User	-	100	0.017	0.017	0.107
1.003	User	-	100	0.034	0.034	0.141
	User	-	100	0.014	0.014	0.014
	User	-	100	0.000	0.000	0.014
1.004	User	-	100	0.019	0.019	0.033
	User	-	100	0.028	0.028	0.028
	User	-	100	0.012	0.012	0.040
1.005	User	-	100	0.013	0.013	0.013
	User	-	100	0.015	0.015	0.029
	User	-	100	0.121	0.121	0.150
	User	-	100	0.016	0.016	0.166
	User	-	100	0.021	0.021	0.187
				Total	Total	Total
				0.927	0.927	0.927

Free Flowing Outfall Details for Storm - Road 2

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D, L (mm)	W (mm)
S1.005	S	101.953	99.316	99.316	0	0

Jelson Limited		Page 6
370 Loughborough Road Leicester LE4 5PR	Normandy Fields Hinckley SW Road 2 & 5	
Date 20/03/2024 File 2024-02-02 network.MDX	Designed by EG Checked by EG	
Micro Drainage		Network 2019.1

Simulation Criteria for Storm - Road 2

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

Synthetic Rainfall Details

Rainfall Model	FEH
Return Period (years)	2
FEH Rainfall Version	1999
Site Location	GB 440550 294500 SP 40550 94500
C (1km)	-0.028
D1 (1km)	0.364
D2 (1km)	0.347
D3 (1km)	0.258
E (1km)	0.307
F (1km)	2.353
Summer Storms	Yes
Winter Storms	No
Cv (Summer)	0.750
Cv (Winter)	0.840
Storm Duration (mins)	30

Jelson Limited		Page 7
370 Loughborough Road	Normandy Fields	
Leicester	Hinckley	
LE4 5PR	SW Road 2 & 5	
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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm - Road 2

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
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 Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	0	Number of Storage Structures	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH	D3 (1km)	0.258
FEH Rainfall Version	1999	E (1km)	0.307
Site Location	GB 440550 294500 SP 40550 94500	F (1km)	2.353
C (1km)	-0.028	Cv (Summer)	0.750
D1 (1km)	0.364	Cv (Winter)	0.840
D2 (1km)	0.347		

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, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

US/MH		Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth
PN	Name							(m)	(m)
S1.000	S1 15 Winter	1	+0%	100/15 Summer				100.642	-0.213
S1.001	S2 15 Winter	1	+0%	30/15 Summer	100/15 Winter			100.261	-0.178
S1.002	S3 15 Winter	1	+0%	30/15 Summer				100.051	-0.160
S2.000	S7 15 Winter	1	+0%	30/15 Summer				100.127	-0.198
S2.001	S8 15 Winter	1	+0%	30/15 Summer				99.960	-0.158
S1.003	S4 15 Winter	1	+0%	30/15 Summer				99.796	-0.238
S1.004	S5 15 Winter	1	+0%	30/15 Summer				99.737	-0.238
S1.005	S6 15 Winter	1	+0%	30/15 Summer				99.606	-0.297

		Flooded		Pipe		Level	
PN	US/MH Name	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Exceeded
S1.000	S1	0.000	0.18		17.6	OK	
S1.001	S2	0.000	0.35		32.6	OK	1
S1.002	S3	0.000	0.44		39.8	OK	
S2.000	S7	0.000	0.24		15.9	OK	
S2.001	S8	0.000	0.45		28.0	OK	
S1.003	S4	0.000	0.45		70.8	OK	
S1.004	S5	0.000	0.45		73.3	OK	
S1.005	S6	0.000	0.39		88.8	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm -
Road 2

Simulation Criteria

Areal Reduction Factor 1.000

Hot Start (mins) 0

Hot Start Level (mm) 0

Manhole Headloss Coeff (Global) 0.500

Foul Sewage per hectare (l/s) 0.000

Additional Flow - % of Total Flow 0.000

MADD Factor * 10m³/ha Storage 0.000

Inlet Coeffiecient 0.800

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 0

Number of Storage Structures 0

Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model

FEH Rainfall Version

Site Location GB 440550 294500 SP 40550 94500

C (1km)

D1 (1km)

D2 (1km)

FEH

1999

-0.028

0.364

0.347

D3 (1km) 0.258

E (1km) 0.307

F (1km) 2.353

Cv (Summer) 0.750

Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0

Analysis Timestep

DTS Status

DVD Status OFF

Fine Inertia Status OFF

ON

Profile(s)

Duration(s) (mins)

Return Period(s) (years)

Climate Change (%)

Summer and Winter

15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440

1, 30, 100

0, 0, 40

US/MH		Return Climate		First (X)		First (Y)		First (Z)		Water	Surcharged
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Overflow	Act.	Level (m)	Depth (m)
S1.000	S1 15 Winter		30	+0%	100/15 Summer					100.733	-0.122
S1.001	S2 15 Winter		30	+0%	30/15 Summer	100/15 Winter				100.649	0.210
S1.002	S3 15 Winter		30	+0%	30/15 Summer					100.447	0.236
S2.000	S7 15 Winter		30	+0%	30/15 Summer					100.369	0.044
S2.001	S8 15 Winter		30	+0%	30/15 Summer					100.304	0.186
S1.003	S4 15 Winter		30	+0%	30/15 Summer					100.181	0.147
S1.004	S5 15 Winter		30	+0%	30/15 Summer					100.063	0.088
S1.005	S6 15 Winter		30	+0%	30/15 Summer					99.932	0.029

		Flooded			Pipe			
PN	US/MH Name	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded	
S1.000	S1	0.000	0.58		57.5	OK		
S1.001	S2	0.000	0.96		89.7	SURCHARGED	1	
S1.002	S3	0.000	1.22		110.7	SURCHARGED		
S2.000	S7	0.000	0.66		44.1	SURCHARGED		
S2.001	S8	0.000	1.22		75.4	SURCHARGED		
S1.003	S4	0.000	1.24		194.6	SURCHARGED		
S1.004	S5	0.000	1.25		203.9	SURCHARGED		
S1.005	S6	0.000	1.11		253.3	SURCHARGED		

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm -
Road 2

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000
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 Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH D3 (1km) 0.258
FEH Rainfall Version 1999 E (1km) 0.307
Site Location GB 440550 294500 SP 40550 94500 F (1km) 2.353
C (1km) -0.028 Cv (Summer) 0.750
D1 (1km) 0.364 Cv (Winter) 0.840
D2 (1km) 0.347

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, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH		Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water	Surcharged
	Name	Storm							Level (m)	Depth (m)
S1.000	S1	15 Winter	100	+40%	100/15 Summer				102.366	1.511
S1.001	S2	15 Winter	100	+40%	30/15 Summer	100/15 Winter			102.140	1.701
S1.002	S3	15 Winter	100	+40%	30/15 Summer				101.632	1.421
S2.000	S7	15 Winter	100	+40%	30/15 Summer				101.584	1.259
S2.001	S8	15 Winter	100	+40%	30/15 Summer				101.352	1.234
S1.003	S4	15 Winter	100	+40%	30/15 Summer				100.921	0.887
S1.004	S5	15 Winter	100	+40%	30/15 Summer				100.579	0.604
S1.005	S6	15 Winter	100	+40%	30/15 Summer				100.196	0.293

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
S1.000	S1	0.000	0.70		69.2	FLOOD RISK	
S1.001	S2	0.259	1.52		142.2	FLOOD	1
S1.002	S3	0.000	2.00		180.9	FLOOD RISK	
S2.000	S7	0.000	1.04		69.4	FLOOD RISK	
S2.001	S8	0.000	2.25		139.5	FLOOD RISK	
S1.003	S4	0.000	2.15		337.0	SURCHARGED	
S1.004	S5	0.000	2.18		355.9	SURCHARGED	
S1.005	S6	0.000	2.03		461.8	SURCHARGED	