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760 Mandarin Court, Centre Park Warrington Cheshire WA1 1GG		
Date 01-Jan-01 File 21071 - Sw Microdrainage...		
Designed by LucindaMcLoughlin		
Checked by		
Micro Drainage		Network 2017.1.1

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for 21071 - SW.SWS

Pipe Sizes 21071 - SW Manhole Sizes 21071 - SW

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	19.000	Add Flow / Climate Change (%)	0
Ratio R	0.286	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	0.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	0.75
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for 21071 - SW.SWS

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.163	4-8	0.062

Total Area Contributing (ha) = 0.225

Total Pipe Volume (m³) = 1.217

Network Design Table for 21071 - SW.SWS

« - 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	4.196	0.014	299.7	0.225	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	6.692	0.045	148.7	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	19.719	0.371	53.2	0.000	0.00	0.0	0.600	o	225	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	5.09	64.430	0.225	0.0	0.0	0.0	0.75	29.8«	30.5
1.001	50.00	5.20	64.416	0.225	0.0	0.0	0.0	1.07	42.5	30.5
1.002	50.00	5.38	64.371	0.225	0.0	0.0	0.0	1.80	71.5	30.5

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Manhole Schedules for 21071 - SW.SWS

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)
TANK	67.186	2.756	Open Manhole	1200	1.000	64.430	225				
1	67.000	2.584	Open Manhole	1200	1.001	64.416	225	1.000	64.416	225	
3	67.500	3.129	Open Manhole	1200	1.002	64.371	225	1.001	64.371	225	
3	65.286	1.286	Open Manhole	0		OUTFALL		1.002	64.000	225	

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PIPELINE SCHEDULES for 21071 - SW.SWS

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)
1.000	o	225	TANK	67.186	64.430	2.531	Open Manhole	1200
1.001	o	225	1	67.000	64.416	2.359	Open Manhole	1200
1.002	o	225	3	67.500	64.371	2.904	Open Manhole	1200

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)
1.000	4.196	299.7	1	67.000	64.416	2.359	Open Manhole	1200
1.001	6.692	148.7	3	67.500	64.371	2.904	Open Manhole	1200
1.002	19.719	53.2	3	65.286	64.000	1.061	Open Manhole	0

Free Flowing Outfall Details for 21071 - SW.SWS

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.002	3	65.286	64.000	0.000	0	0

Simulation Criteria for 21071 - SW.SWS

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

Synthetic Rainfall Details

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)	19.000	Storm Duration (mins)	30
Ratio R	0.286		

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Micro Drainage Network 2017.1.1		
Online Controls for 21071 - SW.SWS Orifice Manhole: 1, DS/PN: 1.001, Volume (m³): 3.0 Diameter (m) 0.048 Discharge Coefficient 0.600 Invert Level (m) 64.416		
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Storage Structures for 21071 - SW.SWS

Tank or Pond Manhole: TANK, DS/PN: 1.000

Invert Level (m) 64.758

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	130.6	1.400	0.0	2.800	0.0	4.200	0.0
0.200	130.6	1.600	0.0	3.000	0.0	4.400	0.0
0.400	130.6	1.800	0.0	3.200	0.0	4.600	0.0
0.600	130.6	2.000	0.0	3.400	0.0	4.800	0.0
0.800	130.6	2.200	0.0	3.600	0.0	5.000	0.0
1.000	0.0	2.400	0.0	3.800	0.0		
1.200	0.0	2.600	0.0	4.000	0.0		

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for
21071 - SW.SWS

Simulation Criteria

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.292
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	OFF

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, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

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	TANK	120 Winter	1	+0%	1/15 Summer				64.855
1.001	1	120 Winter	1	+0%	1/15 Summer				64.875
1.002	3	120 Winter	1	+0%					64.403

Surcharged Flooded				Pipe		Level
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s) Status
1.000	TANK	0.200	0.000	0.14	3.6	SURCHARGED
1.001	1	0.234	0.000	0.10	3.1	SURCHARGED
1.002	3	-0.193	0.000	0.05	3.1	OK

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 21071 - SW.SWS

Simulation Criteria

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.292
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	OFF

Profile(s)

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, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

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	TANK	120 Winter	2	+0%	1/15 Summer				64.897
1.001	1	120 Winter	2	+0%	1/15 Summer				64.911
1.002	3	120 Winter	2	+0%					64.403

Surcharged Flooded					Pipe		Level
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	TANK	0.242	0.000	0.18		4.5	SURCHARGED
1.001	1	0.270	0.000	0.11		3.3	SURCHARGED
1.002	3	-0.193	0.000	0.05		3.3	OK

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for 21071 - SW.SWS

Simulation Criteria

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.292
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	OFF

Profile(s)

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, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

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	TANK	180 Winter	30	+0%	1/15 Summer				65.106
1.001	1	180 Winter	30	+0%	1/15 Summer				65.120
1.002	3	180 Winter	30	+0%					64.407

Surcharged Flooded					Pipe		Level	
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Exceeded
1.000	TANK	0.451	0.000	0.18		4.4	SURCHARGED	
1.001	1	0.479	0.000	0.13		3.9	SURCHARGED	
1.002	3	-0.189	0.000	0.06		3.9	OK	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for 21071 - SW.SWS

Simulation Criteria

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.292
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	OFF

Profile(s)

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, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

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	TANK	180 Winter	100	+40%	1/15 Summer				65.536
1.001	1	180 Winter	100	+40%	1/15 Summer				65.550
1.002	3	180 Winter	100	+40%					64.412

Surcharged Flooded					Pipe		Level	
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Exceeded
1.000	TANK	0.881	0.000	0.22		5.5	SURCHARGED	
1.001	1	0.909	0.000	0.17		5.0	SURCHARGED	
1.002	3	-0.184	0.000	0.08		5.0	OK	

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