

Mucklow & Harris Ltd		Page 1
Bradford Court 123-131 Bradford Street Birmingham B12 0NS	18155 - Oakamoor Road, Cheadle SW Network Calculations 1 in 100 year storm + 40%	
Date 30/10/2019	Designed by DGW	
File 18155 SW Calcs 100+40 n...	Checked by	
XP Solutions		Network 2018.1

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

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	34.130	1.500	22.8	0.043	4.00	0.0	0.600	o	375	Pipe/Conduit	
1.001	18.300	0.600	30.5	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.002	46.900	2.675	17.5	0.092	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.003	50.100	3.205	15.6	0.220	0.00	0.0	0.600	o	450	Pipe/Conduit	
2.000	11.500	0.200	57.5	0.166	4.00	0.0	0.600	o	375	Pipe/Conduit	
2.001	16.350	0.225	72.7	0.056	0.00	0.0	0.600	o	450	Pipe/Conduit	
2.002	47.150	0.850	55.5	0.043	0.00	0.0	0.600	o	450	Pipe/Conduit	
2.003	8.400	0.150	56.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
2.004	32.200	0.300	107.3	0.019	0.00	0.0	0.600	o	450	Pipe/Conduit	
2.005	28.250	2.055	13.7	0.133	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.004	33.900	0.284	119.4	0.155	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.005	19.100	0.161	118.6	0.141	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.006	13.500	0.105	128.6	0.115	0.00	0.0	0.600	o	450	Pipe/Conduit	
3.000	27.900	0.150	186.0	0.152	4.00	0.0	0.600	o	300	Pipe/Conduit	
3.001	19.100	0.690	27.7	0.024	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.002	62.350	0.065	959.2	0.148	0.00	0.0	0.600	[]	15	Pipe/Conduit	
1.007	64.050	0.063	1016.7	0.062	0.00	0.0	0.600	[]	15	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	0.00	4.15	163.000	0.043	0.0	0.0	0.0	3.81	421.1	0.0
1.001	0.00	4.24	161.500	0.043	0.0	0.0	0.0	3.29	363.5	0.0
1.002	0.00	4.40	160.825	0.135	0.0	0.0	0.0	4.87	775.1	0.0
1.003	0.00	4.56	158.150	0.355	0.0	0.0	0.0	5.16	821.0	0.0
2.000	0.00	4.08	158.800	0.166	0.0	0.0	0.0	2.39	264.4	0.0
2.001	0.00	4.19	158.525	0.222	0.0	0.0	0.0	2.39	379.7	0.0
2.002	0.00	4.48	158.300	0.265	0.0	0.0	0.0	2.73	434.9	0.0
2.003	0.00	4.53	157.450	0.265	0.0	0.0	0.0	2.72	432.8	0.0
2.004	0.00	4.81	157.300	0.284	0.0	0.0	0.0	1.96	312.0	0.0
2.005	0.00	4.89	157.000	0.417	0.0	0.0	0.0	5.51	875.6	0.0
1.004	0.00	5.20	154.945	0.927	0.0	0.0	0.0	1.86	295.8	0.0
1.005	0.00	5.37	154.661	1.068	0.0	0.0	0.0	1.87	296.7	0.0
1.006	0.00	5.49	154.500	1.183	0.0	0.0	0.0	1.79	284.9	0.0
3.000	0.00	4.40	155.450	0.152	0.0	0.0	0.0	1.15	81.3	0.0
3.001	0.00	4.51	155.300	0.176	0.0	0.0	0.0	3.00	212.1	0.0
3.002	0.00	5.22	153.710	0.324	0.0	0.0	0.0	1.47	4130.7	0.0
1.007	0.00	6.24	153.645	1.569	0.0	0.0	0.0	1.42	4011.4	0.0

Mucklow & Harris Ltd		Page 2
Bradford Court 123-131 Bradford Street Birmingham B12 0NS	18155 - Oakamoor Road, Cheadle SW Network Calculations 1 in 100 year storm + 40%	
Date 30/10/2019 File 18155 SW Calcs 100+40 n...	Designed by DGW Checked by	
XP Solutions	Network 2018.1	

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

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
4.000	58.750	0.068	864.0	0.000	4.00	0.0	0.600	o	300	Pipe/Conduit	
1.008	32.050	0.032	1001.6	0.234	0.00	0.0	0.600	[]	15	Pipe/Conduit	
5.000	13.650	1.075	12.7	0.000	4.00	0.0	0.600	o	300	Pipe/Conduit	
1.009	10.500	0.100	105.0	0.048	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)
4.000	0.00	5.86	154.550	0.000	0.0	0.0	0.0	0.53	37.3	0.0
1.008	0.00	6.61	153.582	1.803	0.0	0.0	0.0	1.43	4041.7	0.0
5.000	0.00	4.05	154.625	0.000	0.0	0.0	0.0	4.44	313.5	0.0
1.009	0.00	6.73	153.550	1.851	0.0	0.0	0.0	1.53	108.4	0.0

Conduit Sections for Storm

NOTE: Diameters less than 66 refer to section numbers of hydraulic conduits. These conduits are marked by the symbols:- [] box culvert, \ / open channel, oo dual pipe, ooo triple pipe, O egg.

Section numbers < 0 are taken from user conduit table

Section Number	Conduit Type	Major Dimn. (mm)	Minor Dimn. (mm)	Side Slope (Deg)	Corner Splay (mm)	4*Hyd Radius (m)	XSect Area (m ²)
15	[]	2400	1200	90.0	175	1.661	2.819

Mucklow & Harris Ltd		Page 3
Bradford Court 123-131 Bradford Street Birmingham B12 0NS	18155 - Oakamoor Road, Cheadle SW Network Calculations 1 in 100 year storm + 40%	
Date 30/10/2019 File 18155 SW Calcs 100+40 n...	Designed by DGW Checked by	
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)	Backfall (mm)
S2	164.575	1.575	Open Manhole	1500	1.000	163.000	375				
S4	163.200	1.700	Open Manhole	1500	1.001	161.500	375	1.000	161.500	375	
S6	162.425	1.600	Open Manhole	1500	1.002	160.825	450	1.001	160.900	375	
S8	160.650	2.500	Open Manhole	1500	1.003	158.150	450	1.002	158.150	450	
S10	160.500	1.700	Open Manhole	1500	2.000	158.800	375				
S12	160.350	1.825	Open Manhole	1500	2.001	158.525	450	2.000	158.600	375	
S14	160.000	1.700	Open Manhole	1500	2.002	158.300	450	2.001	158.300	450	
S16	159.250	1.800	Open Manhole	1500	2.003	157.450	450	2.002	157.450	450	
S18	159.150	1.850	Open Manhole	1500	2.004	157.300	450	2.003	157.300	450	
S20	158.850	1.850	Open Manhole	1500	2.005	157.000	450	2.004	157.000	450	
S22	158.650	3.705	Open Manhole	1500	1.004	154.945	450	1.003	154.945	450	
								2.005	154.945	450	
S24	157.650	2.989	Open Manhole	1500	1.005	154.661	450	1.004	154.661	450	
S26	157.200	2.700	Open Manhole	1500	1.006	154.500	450	1.005	154.500	450	
S30	157.450	2.000	Open Manhole	1500	3.000	155.450	300				
S32	157.450	2.150	Open Manhole	1500	3.001	155.300	300	3.000	155.300	300	
S34	157.800	4.090	Open Manhole	3000	3.002	153.710	15	3.001	154.610	300	
S36	156.900	3.255	Open Manhole	3000	1.007	153.645	15	1.006	154.395	450	
								3.002	153.645	15	
S50	157.100	2.550	Open Manhole	1200	4.000	154.550	300				
S38	159.900	6.318	Open Manhole	3000	1.008	153.582	15	1.007	153.582	15	
								4.000	154.482	300	
S52	156.500	1.875	Open Manhole	1200	5.000	154.625	300				
S40	156.475	2.925	Open Manhole	3000	1.009	153.550	300	1.008	153.550	15	
								5.000	153.550	300	
S42 Headwall	154.050	0.600	Open Manhole	1000 x 750		OUTFALL		1.009	153.450	300	

Mucklow & Harris Ltd		Page 4
Bradford Court 123-131 Bradford Street Birmingham B12 0NS	18155 - Oakamoor Road, Cheadle SW Network Calculations 1 in 100 year storm + 40%	
Date 30/10/2019 File 18155 SW Calcs 100+40 n...	Designed by DGW Checked by	
XP Solutions	Network 2018.1	

PIPELINE SCHEDULES for Storm

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	375	S2	164.575	163.000	1.200	Open Manhole	1500
1.001	o	375	S4	163.200	161.500	1.325	Open Manhole	1500
1.002	o	450	S6	162.425	160.825	1.150	Open Manhole	1500
1.003	o	450	S8	160.650	158.150	2.050	Open Manhole	1500
2.000	o	375	S10	160.500	158.800	1.325	Open Manhole	1500
2.001	o	450	S12	160.350	158.525	1.375	Open Manhole	1500
2.002	o	450	S14	160.000	158.300	1.250	Open Manhole	1500
2.003	o	450	S16	159.250	157.450	1.350	Open Manhole	1500
2.004	o	450	S18	159.150	157.300	1.400	Open Manhole	1500
2.005	o	450	S20	158.850	157.000	1.400	Open Manhole	1500
1.004	o	450	S22	158.650	154.945	3.255	Open Manhole	1500
1.005	o	450	S24	157.650	154.661	2.539	Open Manhole	1500
1.006	o	450	S26	157.200	154.500	2.250	Open Manhole	1500
3.000	o	300	S30	157.450	155.450	1.700	Open Manhole	1500
3.001	o	300	S32	157.450	155.300	1.850	Open Manhole	1500
3.002	[]	15	S34	157.800	153.710	2.890	Open Manhole	3000
1.007	[]	15	S36	156.900	153.645	2.055	Open Manhole	3000

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	34.130	22.8	S4	163.200	161.500	1.325	Open Manhole	1500
1.001	18.300	30.5	S6	162.425	160.900	1.150	Open Manhole	1500
1.002	46.900	17.5	S8	160.650	158.150	2.050	Open Manhole	1500
1.003	50.100	15.6	S22	158.650	154.945	3.255	Open Manhole	1500
2.000	11.500	57.5	S12	160.350	158.600	1.375	Open Manhole	1500
2.001	16.350	72.7	S14	160.000	158.300	1.250	Open Manhole	1500
2.002	47.150	55.5	S16	159.250	157.450	1.350	Open Manhole	1500
2.003	8.400	56.0	S18	159.150	157.300	1.400	Open Manhole	1500
2.004	32.200	107.3	S20	158.850	157.000	1.400	Open Manhole	1500
2.005	28.250	13.7	S22	158.650	154.945	3.255	Open Manhole	1500
1.004	33.900	119.4	S24	157.650	154.661	2.539	Open Manhole	1500
1.005	19.100	118.6	S26	157.200	154.500	2.250	Open Manhole	1500
1.006	13.500	128.6	S36	156.900	154.395	2.055	Open Manhole	3000
3.000	27.900	186.0	S32	157.450	155.300	1.850	Open Manhole	1500
3.001	19.100	27.7	S34	157.800	154.610	2.890	Open Manhole	3000
3.002	62.350	959.2	S36	156.900	153.645	2.055	Open Manhole	3000
1.007	64.050	1016.7	S38	159.900	153.582	5.118	Open Manhole	3000

Mucklow & Harris Ltd		Page 6
Bradford Court 123-131 Bradford Street Birmingham B12 0NS	18155 - Oakamoor Road, Cheadle SW Network Calculations 1 in 100 year storm + 40%	
Date 30/10/2019	Designed by DGW	
File 18155 SW Calcs 100+40 n...	Checked by	
XP Solutions		Network 2018.1

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)	18.000	Storm Duration (mins)	30
Ratio R	0.375		

Mucklow & Harris Ltd		Page 7
Bradford Court 123-131 Bradford Street Birmingham B12 0NS	18155 - Oakamoor Road, Cheadle SW Network Calculations 1 in 100 year storm + 40%	
Date 30/10/2019	Designed by DGW	
File 18155 SW Calcs 100+40 n...	Checked by	
XP Solutions	Network 2018.1	

Online Controls for Storm

Hydro-Brake® Optimum Manhole: S40, DS/PN: 1.009, Volume (m³): 103.4

Unit Reference	MD-SHE-0182-2000-2100-2000
Design Head (m)	2.100
Design Flow (l/s)	20.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	182
Invert Level (m)	153.550
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1800

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.100	19.9
Flush-Flo™	0.613	19.9
Kick-Flo®	1.289	15.8
Mean Flow over Head Range	-	17.4

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	6.4	1.200	17.2	3.000	23.6	7.000	35.5
0.200	16.4	1.400	16.4	3.500	25.4	7.500	36.7
0.300	18.3	1.600	17.5	4.000	27.1	8.000	37.9
0.400	19.3	1.800	18.5	4.500	28.7	8.500	39.0
0.500	19.7	2.000	19.5	5.000	30.2	9.000	40.1
0.600	19.9	2.200	20.4	5.500	31.6	9.500	41.2
0.800	19.6	2.400	21.2	6.000	33.0		
1.000	18.9	2.600	22.1	6.500	34.3		

Mucklow & Harris Ltd		Page 8
Bradford Court 123-131 Bradford Street Birmingham B12 0NS	18155 - Oakamoor Road, Cheadle SW Network Calculations 1 in 100 year storm + 40%	
Date 30/10/2019	Designed by DGW	
File 18155 SW Calcs 100+40 n...	Checked by	
XP Solutions		Network 2018.1

Storage Structures for Storm

Tank or Pond Manhole: S50, DS/PN: 4.000

Invert Level (m) 154.650

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	411.0	0.700	411.0	1.400	0.0	2.100	0.0
0.100	411.0	0.800	411.0	1.500	0.0	2.200	0.0
0.200	411.0	0.801	0.0	1.600	0.0	2.300	0.0
0.300	411.0	1.000	0.0	1.700	0.0	2.400	0.0
0.400	411.0	1.100	0.0	1.800	0.0	2.500	0.0
0.500	411.0	1.200	0.0	1.900	0.0		
0.600	411.0	1.300	0.0	2.000	0.0		

Tank or Pond Manhole: S52, DS/PN: 5.000

Invert Level (m) 154.650

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	150.0	1.400	0.0	2.800	0.0	4.200	0.0
0.200	150.0	1.600	0.0	3.000	0.0	4.400	0.0
0.400	150.0	1.800	0.0	3.200	0.0	4.600	0.0
0.600	150.0	2.000	0.0	3.400	0.0	4.800	0.0
0.800	150.0	2.200	0.0	3.600	0.0	5.000	0.0
0.801	0.0	2.400	0.0	3.800	0.0		
1.200	0.0	2.600	0.0	4.000	0.0		

Mucklow & Harris Ltd		Page 9
Bradford Court 123-131 Bradford Street Birmingham B12 0NS	18155 - Oakamoor Road, Cheadle SW Network Calculations 1 in 100 year storm + 40%	
Date 30/10/2019	Designed by DGW	
File 18155 SW Calcs 100+40 n...	Checked by	
XP Solutions		Network 2018.1

Manhole Headloss for Storm

PN	US/MH Name	US/MH Headloss
1.000	S2	0.500
1.001	S4	0.500
1.002	S6	0.500
1.003	S8	0.500
2.000	S10	0.500
2.001	S12	0.500
2.002	S14	0.500
2.003	S16	0.500
2.004	S18	0.500
2.005	S20	0.500
1.004	S22	0.500
1.005	S24	0.500
1.006	S26	0.500
3.000	S30	0.500
3.001	S32	0.500
3.002	S34	0.500
1.007	S36	0.500
4.000	S50	0.500
1.008	S38	0.500
5.000	S52	0.500
1.009	S40	0.500

Mucklow & Harris Ltd

Page 10

Bradford Court
123-131 Bradford Street
Birmingham B12 0NS

18155 - Oakamoor Road, Cheadle
SW Network Calculations
1 in 100 year storm + 40%

Date 30/10/2019
File 18155 SW Calcs 100+40 n...

Designed by DGW
Checked by

XP Solutions

Network 2018.1

Micro
Drainage

2 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 * 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 Storage Structures 2

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

Ratio R 0.375

Region England and Wales Cv (Summer) 0.750

M5-60 (mm) 18.000 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, 240, 360, 480, 960, 1440

Return Period(s) (years) 2, 30, 100

Climate Change (%) 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	S2	15 Summer	2	+0%					163.034
1.001	S4	15 Summer	2	+0%					161.539
1.002	S6	15 Winter	2	+0%					160.875
1.003	S8	15 Winter	2	+0%					158.225
2.000	S10	15 Winter	2	+0%					158.900
2.001	S12	15 Winter	2	+0%					158.634
2.002	S14	15 Winter	2	+0%					158.397
2.003	S16	15 Winter	2	+0%	100/15 Summer				157.582
2.004	S18	15 Winter	2	+0%	100/15 Summer				157.421
2.005	S20	15 Winter	2	+0%	100/15 Summer				157.086
1.004	S22	15 Winter	2	+0%	30/15 Summer				155.173
1.005	S24	15 Winter	2	+0%	30/15 Summer				154.928
1.006	S26	15 Winter	2	+0%	30/15 Summer				154.833
3.000	S30	15 Winter	2	+0%	100/15 Summer				155.572
3.001	S32	15 Winter	2	+0%					155.379
3.002	S34	120 Winter	2	+0%	100/30 Summer				154.173
1.007	S36	120 Winter	2	+0%	100/15 Winter				154.173
4.000	S50	60 Winter	2	+0%	100/30 Winter				154.550
1.008	S38	120 Winter	2	+0%	100/15 Winter				154.163

©1982-2018 Innovyze

Mucklow & Harris Ltd		Page 11
Bradford Court 123-131 Bradford Street Birmingham B12 0NS	18155 - Oakamoor Road, Cheadle SW Network Calculations 1 in 100 year storm + 40%	
Date 30/10/2019	Designed by DGW	
File 18155 SW Calcs 100+40 n...	Checked by	
XP Solutions		Network 2018.1

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

PN	US/MH Name	Surcharged Flooded		Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)					
1.000	S2	-0.341	0.000	0.02		7.3	OK	
1.001	S4	-0.336	0.000	0.02		7.3	OK	
1.002	S6	-0.400	0.000	0.03		19.7	OK	
1.003	S8	-0.375	0.000	0.07		49.1	OK	
2.000	S10	-0.275	0.000	0.16		28.1	OK	
2.001	S12	-0.341	0.000	0.13		35.7	OK	
2.002	S14	-0.353	0.000	0.10		41.1	OK	
2.003	S16	-0.318	0.000	0.19		41.0	OK	
2.004	S18	-0.329	0.000	0.16		43.8	OK	
2.005	S20	-0.364	0.000	0.08		61.3	OK	
1.004	S22	-0.222	0.000	0.50		130.2	OK	
1.005	S24	-0.183	0.000	0.65		147.9	OK	
1.006	S26	-0.117	0.000	0.89		162.1	OK	
3.000	S30	-0.178	0.000	0.35		25.6	OK	
3.001	S32	-0.221	0.000	0.16		28.6	OK	
3.002	S34	-0.737	0.000	0.01		15.4	OK	
1.007	S36	-0.672	0.000	0.02		50.3	OK	
4.000	S50	-0.300	0.000	0.00		0.0	OK	
1.008	S38	-0.619	0.000	0.02		32.0	OK	

Mucklow & Harris Ltd			Page 12
Bradford Court 123-131 Bradford Street Birmingham B12 0NS		18155 - Oakamoor Road, Cheadle SW Network Calculations 1 in 100 year storm + 40%	
Date 30/10/2019 File 18155 SW Calcs 100+40 n...		Designed by DGW Checked by	
XP Solutions		Network 2018.1	

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

US/MH		Return Climate		First (X)		First (Y)		First (Z)		Overflow	Water
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.			Level
5.000	S52	60 Winter	2	+0%	100/30 Winter						154.625
1.009	S40	120 Winter	2	+0%	2/15 Summer						154.156

US/MH		Surcharged Flooded		Pipe		Level	
PN	Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)	Status Exceeded
5.000	S52	-0.300	0.000	0.00		0.0	OK
1.009	S40	0.306	0.000	0.25		19.9	SURCHARGED

Mucklow & Harris Ltd		Page 13	
Bradford Court 123-131 Bradford Street Birmingham B12 0NS		18155 - Oakamoor Road, Cheadle SW Network Calculations 1 in 100 year storm + 40%	
Date 30/10/2019		Designed by DGW	
File 18155 SW Calcs 100+40 n...		Checked by	
XP Solutions		Network 2018.1	

**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 ³ /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 Storage Structures	2
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	Ratio R	0.375
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.000	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, 240, 360, 480, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	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	S2	15 Winter	30	+0%					163.046
1.001	S4	15 Winter	30	+0%					161.551
1.002	S6	15 Summer	30	+0%					160.897
1.003	S8	15 Summer	30	+0%					158.267
2.000	S10	15 Winter	30	+0%					158.941
2.001	S12	15 Winter	30	+0%					158.682
2.002	S14	15 Summer	30	+0%					158.441
2.003	S16	15 Winter	30	+0%	100/15 Summer				157.644
2.004	S18	15 Winter	30	+0%	100/15 Summer				157.479
2.005	S20	15 Winter	30	+0%	100/15 Summer				157.128
1.004	S22	15 Winter	30	+0%	30/15 Summer				155.856
1.005	S24	15 Winter	30	+0%	30/15 Summer				155.521
1.006	S26	15 Winter	30	+0%	30/15 Summer				155.204
3.000	S30	15 Winter	30	+0%	100/15 Summer				155.629
3.001	S32	15 Winter	30	+0%					155.413
3.002	S34	120 Winter	30	+0%	100/30 Summer				154.793
1.007	S36	120 Winter	30	+0%	100/15 Winter				154.789
4.000	S50	240 Winter	30	+0%	100/30 Winter				154.691
1.008	S38	120 Winter	30	+0%	100/15 Winter				154.707

©1982-2018 Innovyze

Mucklow & Harris Ltd		Page 14
Bradford Court 123-131 Bradford Street Birmingham B12 0NS	18155 - Oakamoor Road, Cheadle SW Network Calculations 1 in 100 year storm + 40%	
Date 30/10/2019	Designed by DGW	
File 18155 SW Calcs 100+40 n...	Checked by	
XP Solutions		Network 2018.1

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

PN	US/MH Name	Surcharged Flooded		Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)					
1.000	S2	-0.329	0.000	0.04		13.8	OK	
1.001	S4	-0.324	0.000	0.05		13.8	OK	
1.002	S6	-0.378	0.000	0.06		43.2	OK	
1.003	S8	-0.333	0.000	0.15		113.7	OK	
2.000	S10	-0.234	0.000	0.30		53.2	OK	
2.001	S12	-0.293	0.000	0.27		71.1	OK	
2.002	S14	-0.309	0.000	0.22		84.6	OK	
2.003	S16	-0.256	0.000	0.39		84.1	OK	
2.004	S18	-0.271	0.000	0.33		89.6	OK	
2.005	S20	-0.322	0.000	0.17		127.8	OK	
1.004	S22	0.461	0.000	1.07		276.8	SURCHARGED	
1.005	S24	0.410	0.000	1.40		315.6	SURCHARGED	
1.006	S26	0.254	0.000	1.90		346.4	SURCHARGED	
3.000	S30	-0.121	0.000	0.66		48.3	OK	
3.001	S32	-0.187	0.000	0.30		55.7	OK	
3.002	S34	-0.117	0.000	0.01		29.0	OK	
1.007	S36	-0.056	0.000	0.03		88.7	OK	
4.000	S50	-0.159	0.000	0.18		6.5	OK	
1.008	S38	-0.075	0.000	0.02		47.5	OK	

Mucklow & Harris Ltd		Page 15
Bradford Court 123-131 Bradford Street Birmingham B12 0NS	18155 - Oakamoor Road, Cheadle SW Network Calculations 1 in 100 year storm + 40%	
Date 30/10/2019 File 18155 SW Calcs 100+40 n...	Designed by DGW Checked by	
XP Solutions	Network 2018.1	

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

US/MH		Return Climate		First (X)		First (Y)		First (Z)		Overflow	Water
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.			Level
5.000	S52	240 Winter	30	+0%	100/30 Winter						154.659
1.009	S40	120 Winter	30	+0%	2/15 Summer						154.682

		Surcharged Flooded				Pipe			
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)	Status	Level Exceeded	
5.000	S52	-0.266	0.000	0.01		1.9	OK		
1.009	S40	0.832	0.000	0.25		19.9	SURCHARGED		

Mucklow & Harris Ltd

Bradford Court
123-131 Bradford Street
Birmingham B12 0NS

Date 30/10/2019
File 18155 SW Calcs 100+40 n...

XP Solutions

18155 - Oakamoor Road, Cheadle
SW Network Calculations
1 in 100 year storm + 40%

Designed by DGW
Checked by

Network 2018.1

Page 16



100 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 * 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 Storage Structures 2

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

Ratio R 0.375

Region England and Wales Cv (Summer) 0.750

M5-60 (mm)

18.000 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, 240, 360, 480, 960, 1440

Return Period(s) (years)

2, 30, 100

Climate Change (%)

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	S2	15 Winter	100	+40%					163.063
1.001	S4	15 Winter	100	+40%					161.572
1.002	S6	15 Summer	100	+40%					160.925
1.003	S8	15 Summer	100	+40%					158.310
2.000	S10	15 Winter	100	+40%					158.998
2.001	S12	15 Winter	100	+40%					158.745
2.002	S14	15 Summer	100	+40%					158.495
2.003	S16	15 Winter	100	+40%	100/15 Summer				158.142
2.004	S18	15 Winter	100	+40%	100/15 Summer				157.996
2.005	S20	15 Winter	100	+40%	100/15 Summer				157.838
1.004	S22	15 Winter	100	+40%	30/15 Summer				157.398
1.005	S24	15 Winter	100	+40%	30/15 Summer				156.603
1.006	S26	15 Summer	100	+40%	30/15 Summer				155.822
3.000	S30	15 Winter	100	+40%	100/15 Summer				155.801
3.001	S32	60 Winter	100	+40%					155.533
3.002	S34	60 Winter	100	+40%	100/30 Summer				155.501
1.007	S36	60 Winter	100	+40%	100/15 Winter				155.501
4.000	S50	240 Winter	100	+40%	100/30 Winter				155.391
1.008	S38	60 Winter	100	+40%	100/15 Winter				155.496

©1982-2018 Innovyze

Mucklow & Harris Ltd		Page 17
Bradford Court 123-131 Bradford Street Birmingham B12 0NS	18155 - Oakamoor Road, Cheadle SW Network Calculations 1 in 100 year storm + 40%	
Date 30/10/2019	Designed by DGW	
File 18155 SW Calcs 100+40 n...	Checked by	
XP Solutions	Network 2018.1	

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

PN	US/MH Name	Surcharged Flooded		Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)					
1.000	S2	-0.312	0.000	0.07		24.9	OK	
1.001	S4	-0.303	0.000	0.08		24.9	OK	
1.002	S6	-0.350	0.000	0.11		78.2	OK	
1.003	S8	-0.290	0.000	0.28		205.6	OK	
2.000	S10	-0.177	0.000	0.55		96.1	OK	
2.001	S12	-0.230	0.000	0.48		128.6	OK	
2.002	S14	-0.255	0.000	0.39		153.0	OK	
2.003	S16	0.242	0.000	0.66		143.1	SURCHARGED	
2.004	S18	0.246	0.000	0.58		156.6	SURCHARGED	
2.005	S20	0.388	0.000	0.32		238.4	SURCHARGED	
1.004	S22	2.003	0.000	1.65		425.7	SURCHARGED	
1.005	S24	1.492	0.000	2.20		498.2	SURCHARGED	
1.006	S26	0.872	0.000	3.02		551.5	SURCHARGED	
3.000	S30	0.051	0.000	1.19		87.2	SURCHARGED	
3.001	S32	-0.067	0.000	0.28		51.5	OK	
3.002	S34	0.591	0.000	0.03		83.5	SURCHARGED	
1.007	S36	0.656	0.000	0.09		266.0	SURCHARGED	
4.000	S50	0.541	0.000	0.38		13.5	SURCHARGED	
1.008	S38	0.714	0.000	0.10		203.3	SURCHARGED	

Mucklow & Harris Ltd		Page 18
Bradford Court 123-131 Bradford Street Birmingham B12 0NS	18155 - Oakamoor Road, Cheadle SW Network Calculations 1 in 100 year storm + 40%	
Date 30/10/2019	Designed by DGW	
File 18155 SW Calcs 100+40 n...	Checked by	
XP Solutions	Network 2018.1	

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

US/MH		Return Climate		First (X)		First (Y)		First (Z)		Overflow	Water
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.			Level
											(m)
5.000	S52	120 Winter	100	+40%	100/30 Winter						155.491
1.009	S40	60 Winter	100	+40%	2/15 Summer						155.493

		Surcharged Flooded				Pipe			
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)	Status	Level Exceeded	
5.000	S52	0.566	0.000	0.08		20.9	SURCHARGED		
1.009	S40	1.643	0.000	0.25		19.9	SURCHARGED		