

T.R. Collier & Associates Limited

Consulting Civil & Structural Engineers

Rochester House
275 Baddow Road
Chelmsford Essex
CM2 7QA

Tel: 01245 500360 Fax: 01245 500390

DESIGN INFORMATION

Job No: 4132	Date: 30/09/19	Sheet: 1	By: CE
Job Title: Stonefield Close, Ruislip, HA4 0XT			
Client: Magrock Ltd.		Architect: CMP Architects	
Relevant British Standards, Codes of Practice and Design Standards: B.S. 8301 Code of Practice for Building Drainage B.S. EN 12056 Drainage to Paved Areas Environment Agency PPG3 CIRIA Technical Note 100 Design & Analysis of Urban Storm Drainage - Wallingford 1-4 B.S. EN 1433 : 2002 Drainage Channels for Vehicle Areas		Building Usage: All Pipe Design Surface Water Drainage Petrol Interceptors Attenuation Design Attenuation Design Drainage Channels	
Additional Specific Regulations: Surface Water Design Based on F.E.H Rainfall figures			
Special Considerations: Surface Water Attenuation Design Criteria = 1 in 100 Year Storm Returns + 40% Climate Change Pipe design criteria - 1:30 year return events, with no flooding for 1:100 +40% Climate Change Events Discharge Rate to be 2No 5 litres/sec (As Flood Risk Assessment)			

INDEX

Pages	Elements of Drainage	Pages	Elements of Drainage
1-2	Pipeline Schedule	25-29	Tank 2 Source Control Results
2	Rainfall Simulation Criteria		
3-4	Simulation Results		
5-19	Pipeline Graphs		
20-24	Tank 1 Source Control Results		

QUALITY ASSURANCE PROCEDURE

Rev.	Date	Checked	Pages	Rev.	Date	Checked	Pages
0	30/09/18	TRC					

T.R. Collier & Associates Ltd		Page 1
Rochester House 275 Baddow Road Chelmsford CM2 7QA	Stonefield Close Ruislip	
Date 30/09/2019 10:22	Designed by CE	
File 4132 Sim.MDX	Checked by TRC	
Micro Drainage		Network 2019.1

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	150	RE	36.150	35.550	0.450	Junction	
1.001	o	150	SW1	35.970	35.060	0.760	Open Manhole	1200
2.000	o	150	RE	36.150	35.550	0.450	Junction	
2.001	o	150	SW2	36.150	35.060	0.940	Open Manhole	1200
3.000	o	150	RE	36.150	35.550	0.450	Junction	
3.001	o	150	SW3	36.150	35.060	0.940	Open Manhole	1200
4.000	o	150	RE	36.150	35.550	0.450	Open Manhole	1200
5.000	o	300	CP	35.600	35.075	0.225	Open Manhole	1200
4.001	o	300	SW4	35.700	34.930	0.470	Open Manhole	1200
6.000	o	150	RE	37.000	36.425	0.425	Junction	
6.001	o	225	SW5	37.000	35.920	0.855	Open Manhole	1200
7.000	o	225	RE	37.000	36.425	0.350	Junction	
7.001	o	225	SW6	37.000	36.075	0.700	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	22.000	44.9	SW1	35.970	35.060	0.760	Open Manhole	1200
1.001	0.760	30.4	Tank 1 Inlet 1	35.970	35.035	0.785	Open Manhole	0
2.000	22.000	44.9	SW2	36.150	35.060	0.940	Open Manhole	1200
2.001	0.760	30.4	Tank 1 Inlet 2	35.970	35.035	0.785	Open Manhole	0
3.000	25.000	51.0	SW3	36.150	35.060	0.940	Open Manhole	1200
3.001	23.000	920.0	Tank 1 Inlet 3	35.970	35.035	0.785	Open Manhole	0
4.000	29.000	61.7	SW4	35.700	35.080	0.470	Open Manhole	1200
5.000	8.500	58.6	SW4	35.700	34.930	0.470	Open Manhole	1200
4.001	2.900	64.4	Tank 1 Inlet 4	35.700	34.885	0.515	Open Manhole	0
6.000	40.000	93.0	SW5	37.000	35.995	0.855	Open Manhole	1200
6.001	1.400	175.0	Tank 2 Inlet 2	36.750	35.912	0.613	Open Manhole	0
7.000	40.000	114.3	SW6	37.000	36.075	0.700	Open Manhole	1200
7.001	1.400	56.0	Tank 2 Inlet 2	36.750	36.050	0.475	Open Manhole	0

T.R. Collier & Associates Ltd		Page 2
Rochester House 275 Baddow Road Chelmsford CM2 7QA	Stonefield Close Ruislip	
Date 30/09/2019 10:22	Designed by CE	
File 4132 Sim.MDX	Checked by TRC	
Micro Drainage	Network 2019.1	

PIPELINE SCHEDULES for Storm

Upstream Manhole

FN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
8.000	o	300	CP	36.600	36.050	0.250	Open Manhole	1200
8.001	o	300	SW7	36.750	35.900	0.625	Open Manhole	1200

Downstream Manhole

FN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
8.000	4.600	30.7	SW7	36.750	35.900	0.550	Open Manhole	1200
8.001	3.100	20.7	Tank 2 Inlet 3	36.750	35.750	0.775	Open Manhole	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.840	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	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH	Summer Storms	No
Return Period (years)	30	Winter Storms	Yes
FEH Rainfall Version	2013	Cv (Summer)	0.750
Site Location	GB 512109 185388	Cv (Winter)	0.840
Data Type	Point Storm Duration (mins)		30

T.R. Collier & Associates Ltd		Page 3
Rochester House 275 Baddow Road Chelmsford CM2 7QA	Stonefield Close Ruislip	
Date 30/09/2019 10:22	Designed by CE	
File 4132 Sim.MDX	Checked by TRC	
Micro Drainage	Network 2019.1	

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 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 0
 Number of Online Controls 0 Number of Time/Area Diagrams 0
 Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 0.750
 Site Location GB 512109 185388 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 100.0 DVD Status OFF
 Analysis Timestep Fine Inertia Status OFF
 DTS Status ON

Profile(s)

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	RE 15	Winter	100	+40%					35.700
1.001	SW1 15	Winter	100	+40%	30/15	Summer			35.546
2.000	RE 15	Winter	100	+40%					35.628
2.001	SW2 15	Winter	100	+40%	30/15	Summer			35.390
3.000	RE 30	Winter	100	+40%					35.700
3.001	SW3 15	Winter	100	+40%	2/15	Summer			35.959
4.000	RE 15	Winter	100	+40%	100/15	Summer			35.778
5.000	CP 15	Winter	100	+40%	100/15	Summer			35.485
4.001	SW4 15	Winter	100	+40%	100/15	Summer			35.357
6.000	RE 60	Winter	30	+0%					36.575
6.001	SW5 15	Winter	100	+40%	30/15	Summer			36.629
7.000	RE 30	Winter	100	+40%					36.650
7.001	SW6 15	Winter	100	+40%	30/15	Summer			36.930
8.000	CP 15	Winter	100	+40%	100/15	Winter			36.364
8.001	SW7 15	Winter	100	+40%					36.200

		Surcharged	Flooded				Pipe		
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)	Status	Level Exceeded	
1.000	RE	0.000	0.000	0.71		19.0	SURCHARGED*		

T.R. Collier & Associates Ltd		Page 4
Rochester House 275 Baddow Road Chelmsford CM2 7QA	Stonefield Close Ruislip	
Date 30/09/2019 10:22	Designed by CE	
File 4132 Sim.MDX	Checked by TRC	
Micro Drainage		Network 2019.1

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

PN	US/MH Name	Surcharged		Flooded		Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)			
1.001	SW1	0.336	0.000	3.46		37.6	SURCHARGED	
2.000	RE	-0.072	0.000	0.52		13.9	OK*	
2.001	SW2	0.180	0.000	2.58		28.0	SURCHARGED	
3.000	RE	0.000	0.000	0.55		13.7	SURCHARGED*	
3.001	SW3	0.749	0.000	6.28		29.8	SURCHARGED	
4.000	RE	0.078	0.000	0.94		20.3	SURCHARGED	
5.000	CP	0.110	0.000	0.92		88.0	SURCHARGED	
4.001	SW4	0.127	0.000	1.76		108.1	SURCHARGED	
6.000	RE	0.000	0.000	0.95		17.4	SURCHARGED*	
6.001	SW5	0.484	0.000	3.25		97.1	SURCHARGED	
7.000	RE	0.000	0.000	1.00		48.4	SURCHARGED*	
7.001	SW6	0.630	0.000	3.81		113.8	FLOOD RISK	
8.000	CP	0.014	0.000	1.04		101.1	SURCHARGED	
8.001	SW7	0.000	0.000	1.03		100.4	OK	

Rochester House
275 Baddow Road
Chelmsford CM2 7QA

Stonefield Close
Ruislip

Date 30/09/2019 10:22
File 4132 Sim.MDX

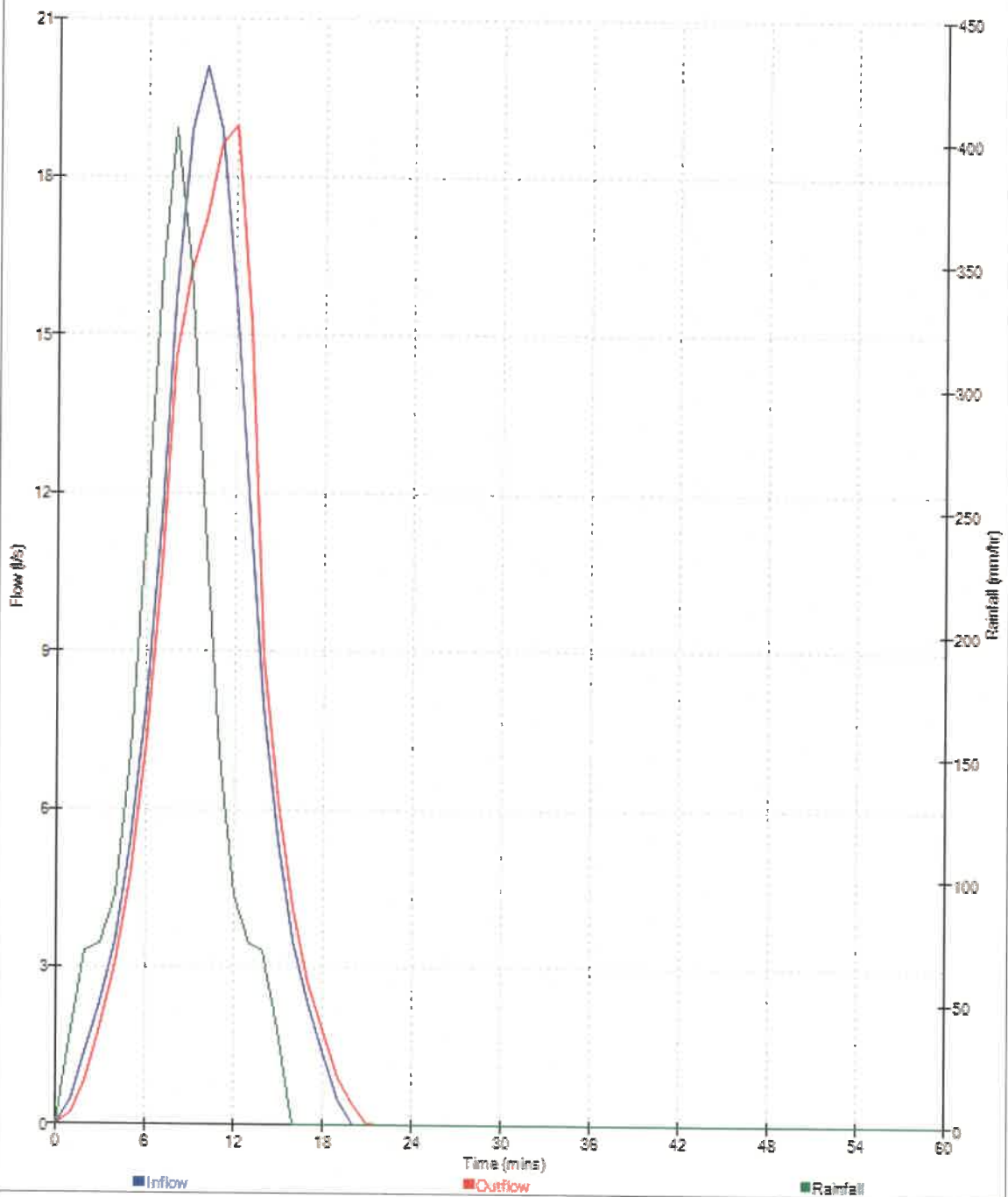
Designed by CE
Checked by TRC



Micro Drainage

Network 2019.1

Graphs for Pipe 1.000 US/MH RE (Storm)
15 minute 100 year Winter I+40%
Status: OK*



Rochester House
275 Baddow Road
Chelmsford CM2 7QA

Stonefield Close
Ruislip

Date 30/09/2019 10:22
File 4132 Sim.MDX

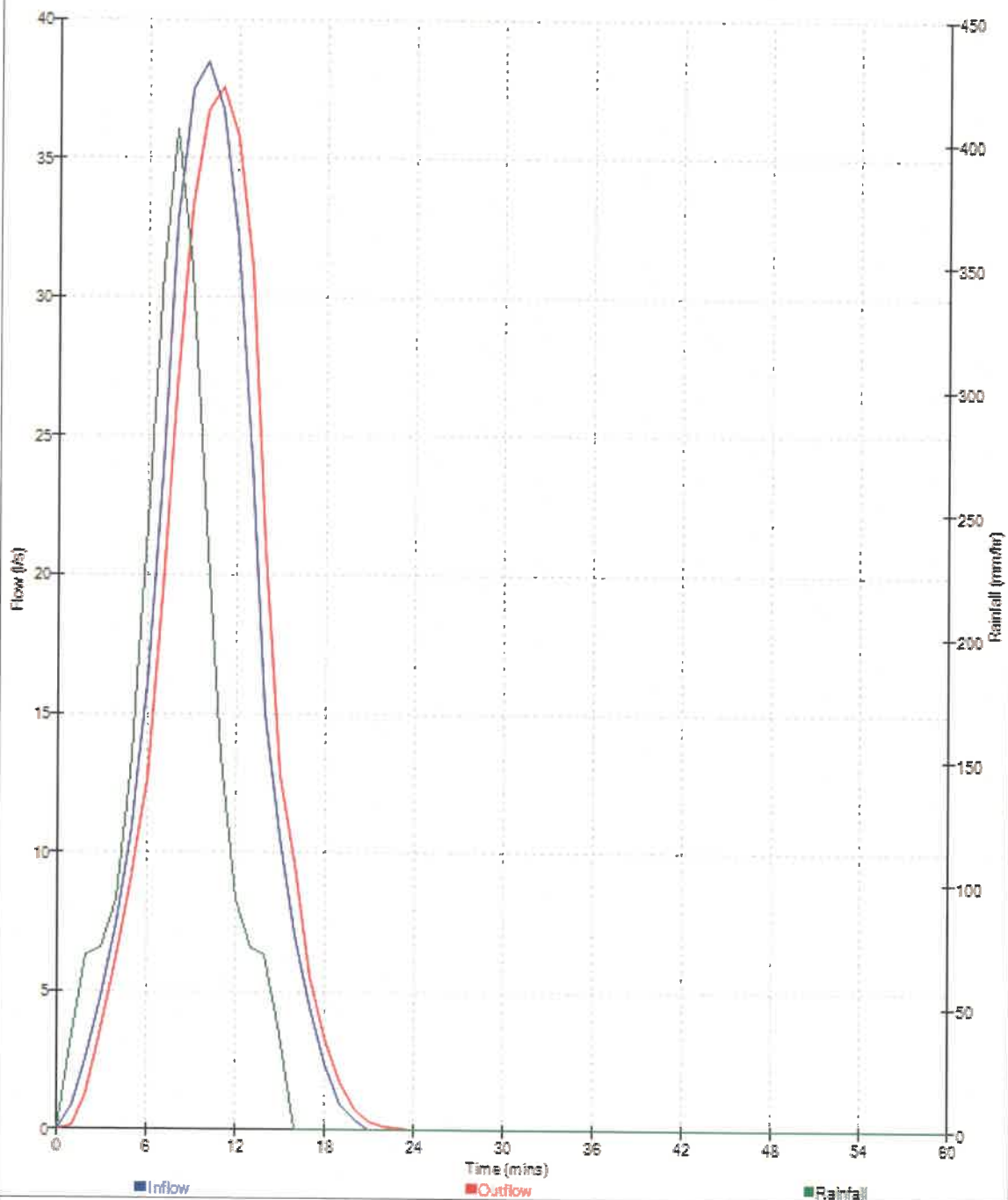
Designed by CE
Checked by TRC

Micro Drainage

Network 2019.1



Graphs for Pipe 1.001 US/MH SW1 (Storm)
15 minute 100 year Winter I+40%
Status: SURCHARGED



Rochester House
275 Baddow Road
Chelmsford CM2 7QA

Stonefield Close
Ruislip

Date 30/09/2019 10:22
File 4132 Sim.MDX

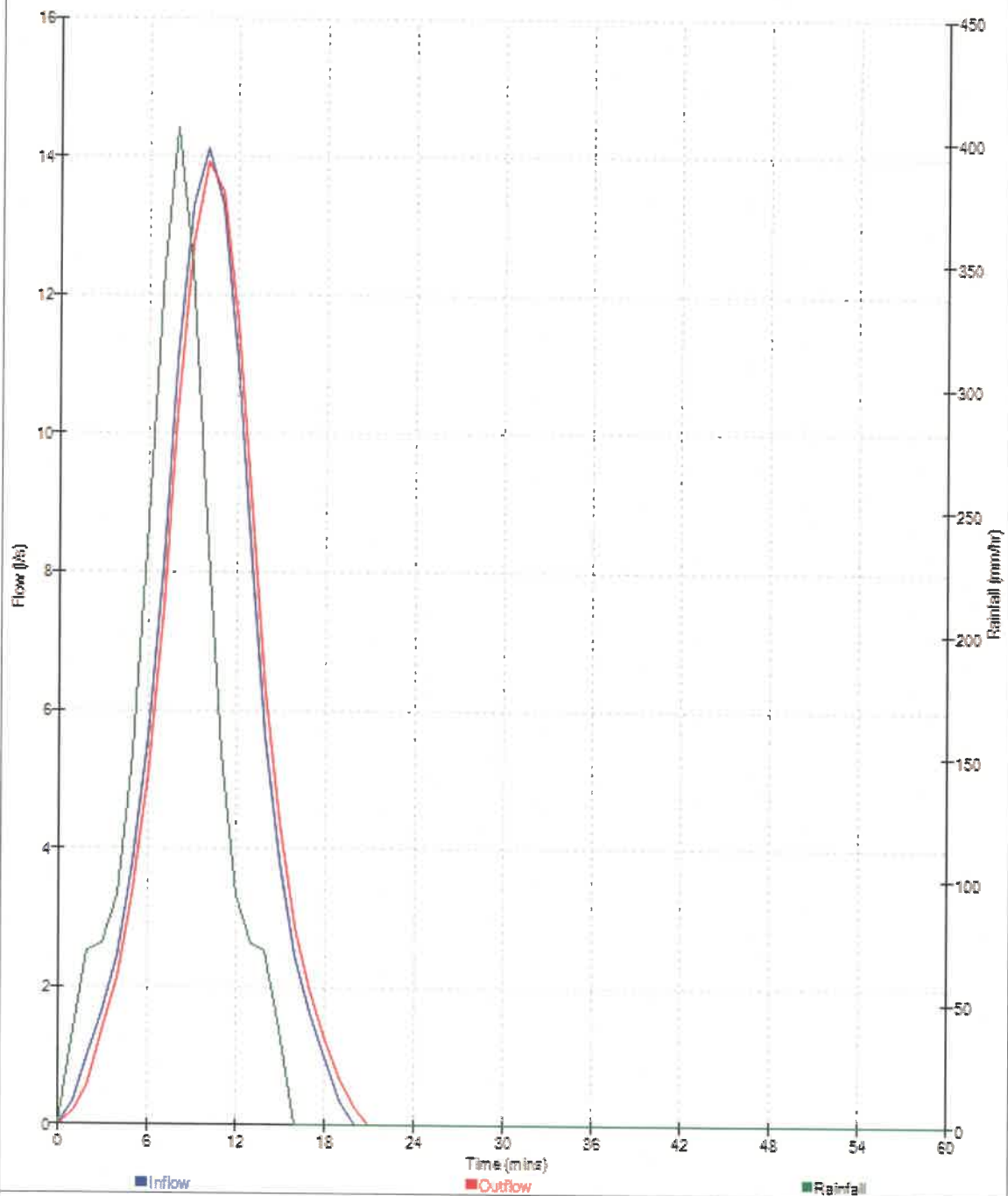
Designed by CE
Checked by TRC

Micro Drainage

Network 2019.1



Graphs for Pipe 2.000 US/MH RE (Storm)
15 minute 100 year Winter I+40%
Status: OK*



Rochester House
275 Baddow Road
Chelmsford CM2 7QA

Stonefield Close
Ruislip

Date 30/09/2019 10:22
File 4132 Sim.MDX

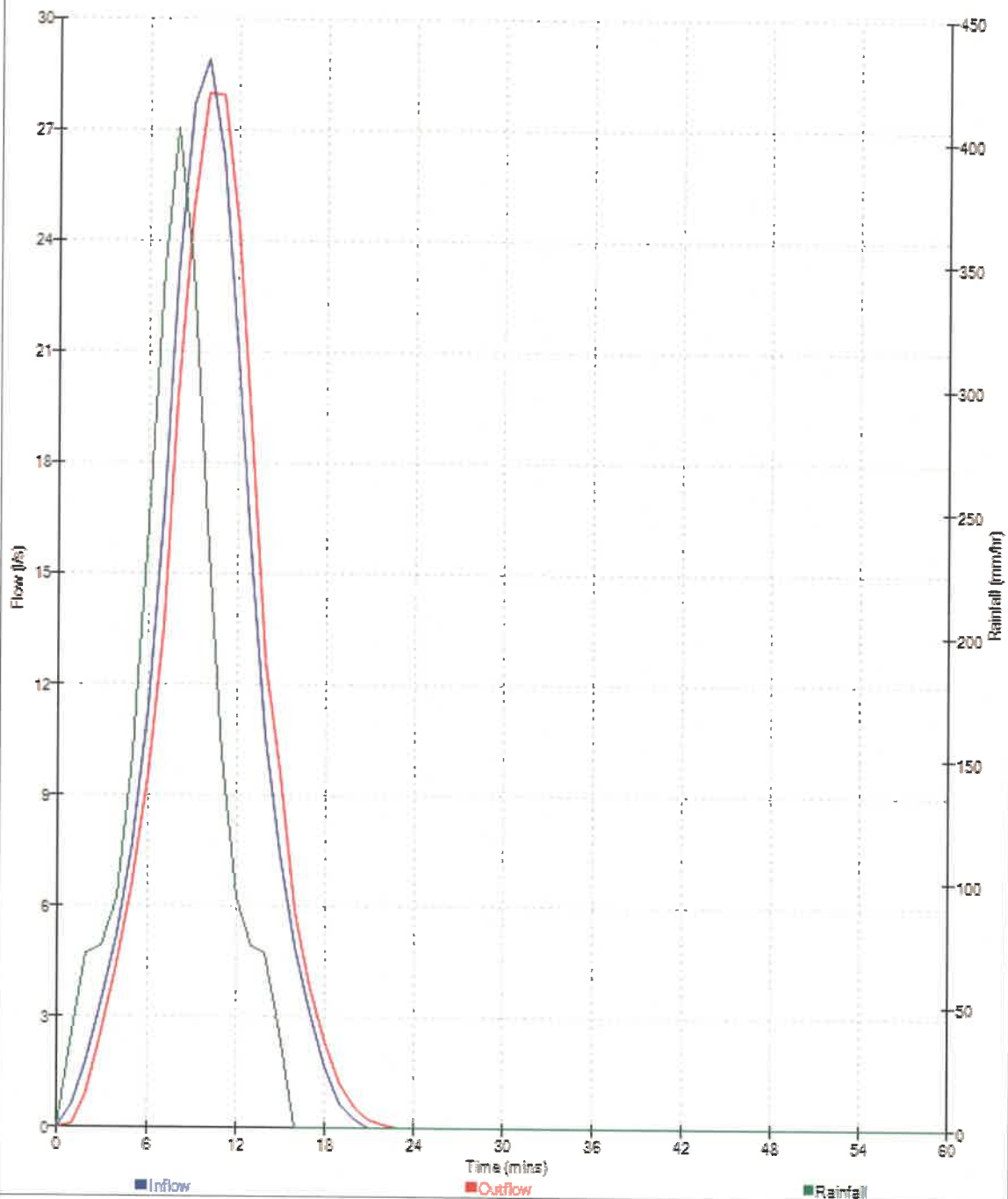
Designed by CE
Checked by TRC



Micro Drainage

Network 2019.1

Graphs for Pipe 2.001 US/MH SW2 (Storm)
15 minute 100 year Winter I+40%
Status: SURCHARGED



Rochester House

Stonefield Close

275 Baddow Road

Ruislip

Chelmsford CM2 7QA

Date 30/09/2019 10:22

Designed by CE

File 4132 Sim.MDX

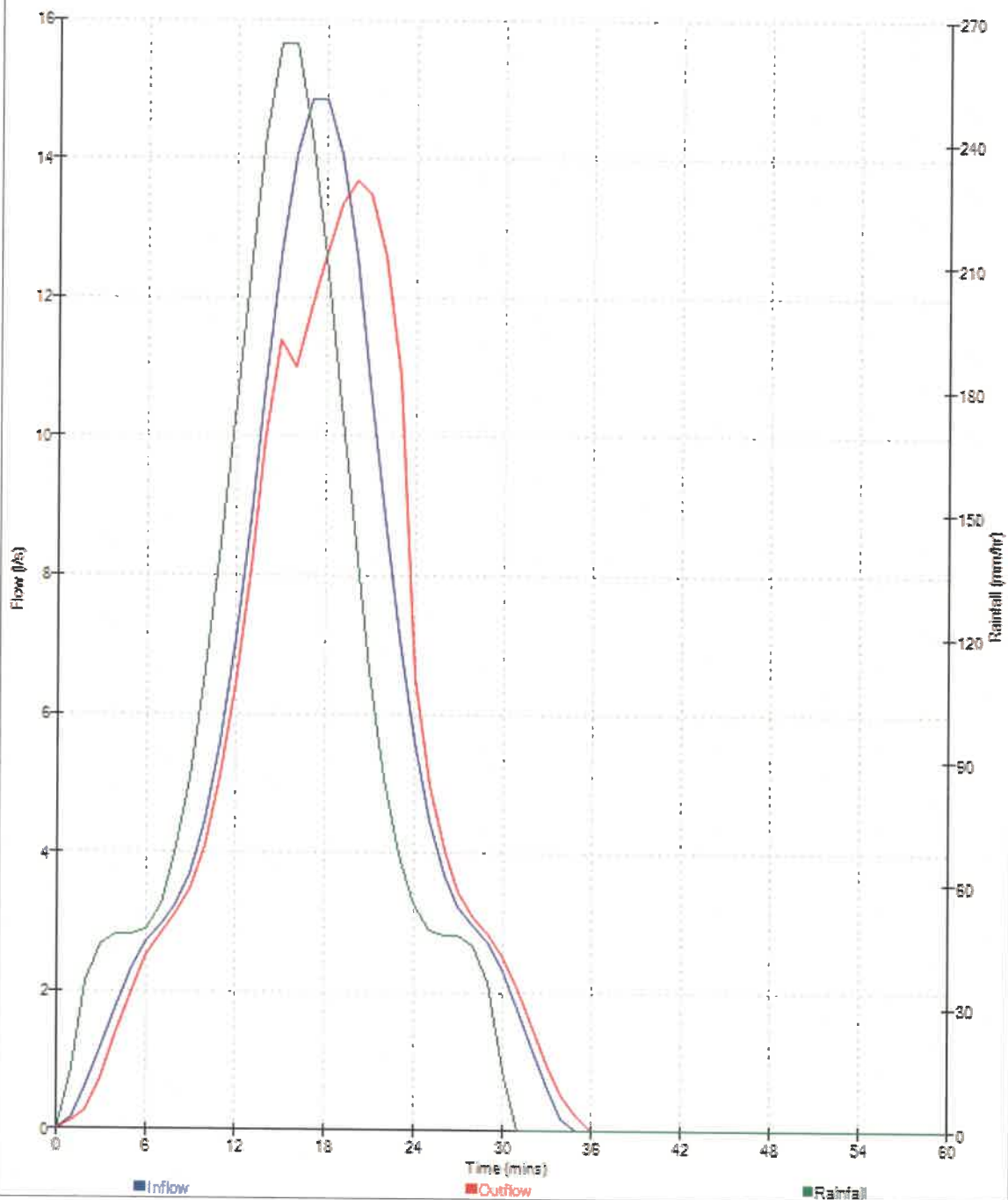
Checked by TRC

Micro Drainage

Network 2019.1



Graphs for Pipe 3.000 US/MH RE (Storm)
30 minute 100 year Winter I+40%
Status: OK*



Rochester House

Stonefield Close

275 Baddow Road

Ruislip

Chelmsford CM2 7QA

Date 30/09/2019 10:22

Designed by CE

File 4132 Sim.MDX

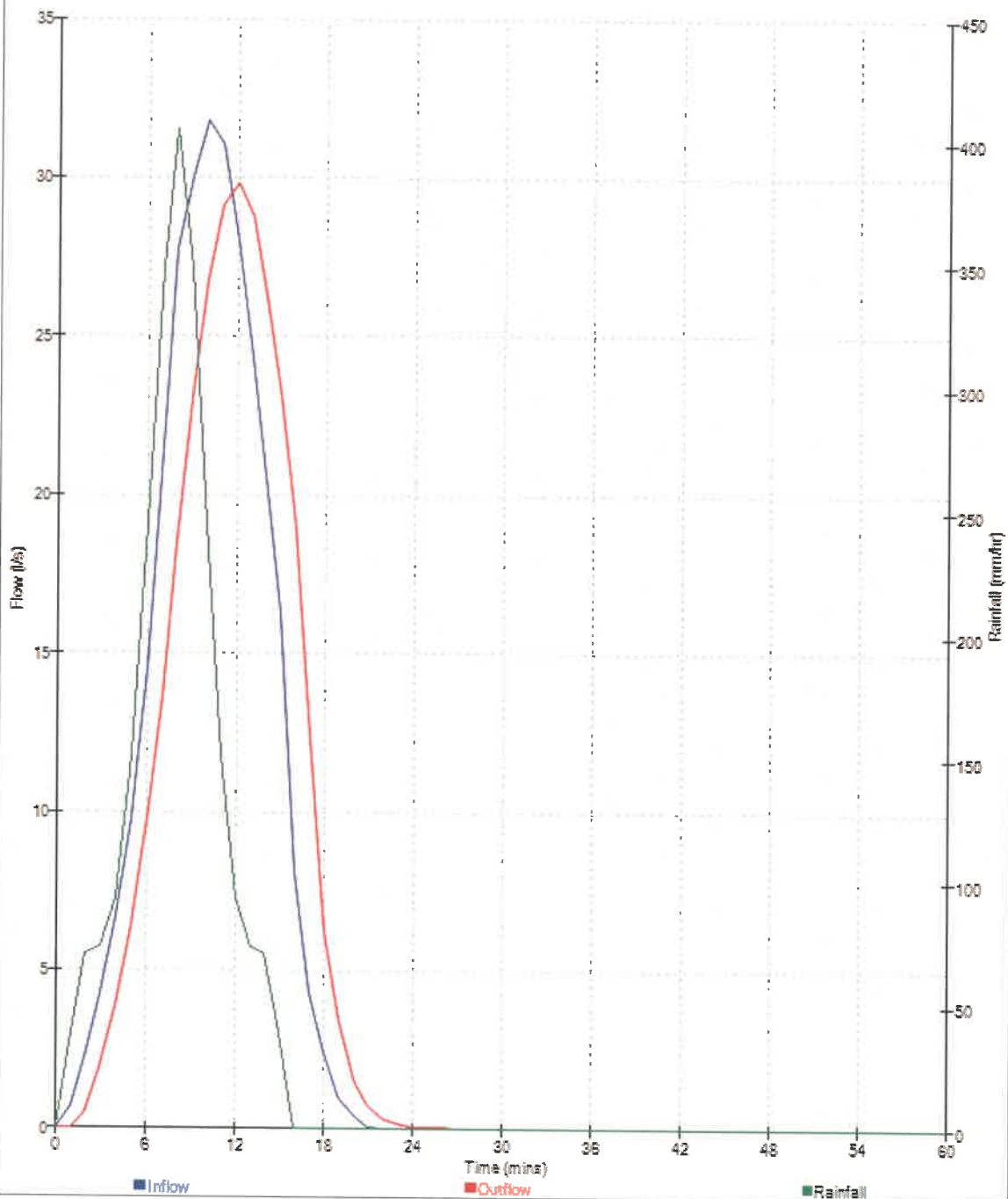
Checked by TRC

Micro Drainage

Network 2019.1



Graphs for Pipe 3.001 US/MH SW3 (Storm)
15 minute 100 year Winter I+40%
Status: SURCHARGED



Rochester House

Stonefield Close

275 Baddow Road

Ruislip

Chelmsford CM2 7QA

Date 30/09/2019 10:22

Designed by CE

File 4132 Sim.MDX

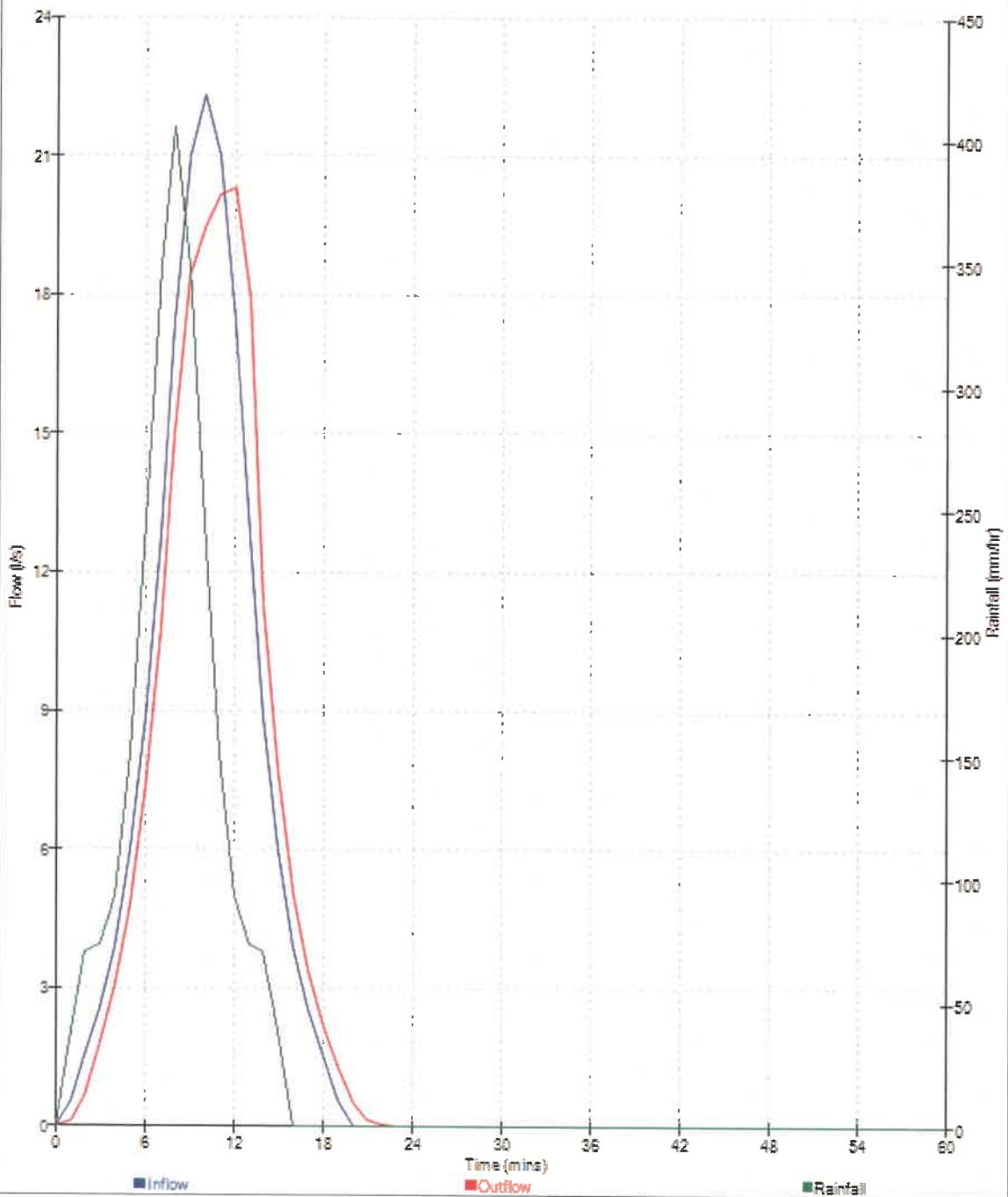
Checked by TRC

Micro Drainage

Network 2019.1



Graphs for Pipe 4.000 US/MH RE (Storm)
15 minute 100 year Winter I+40%
Status: SURCHARGED



Rochester House
275 Baddow Road
Chelmsford CM2 7QA

Stonefield Close
Ruislip

Date 30/09/2019 10:22

Designed by CE

File 4132 Sim.MDX

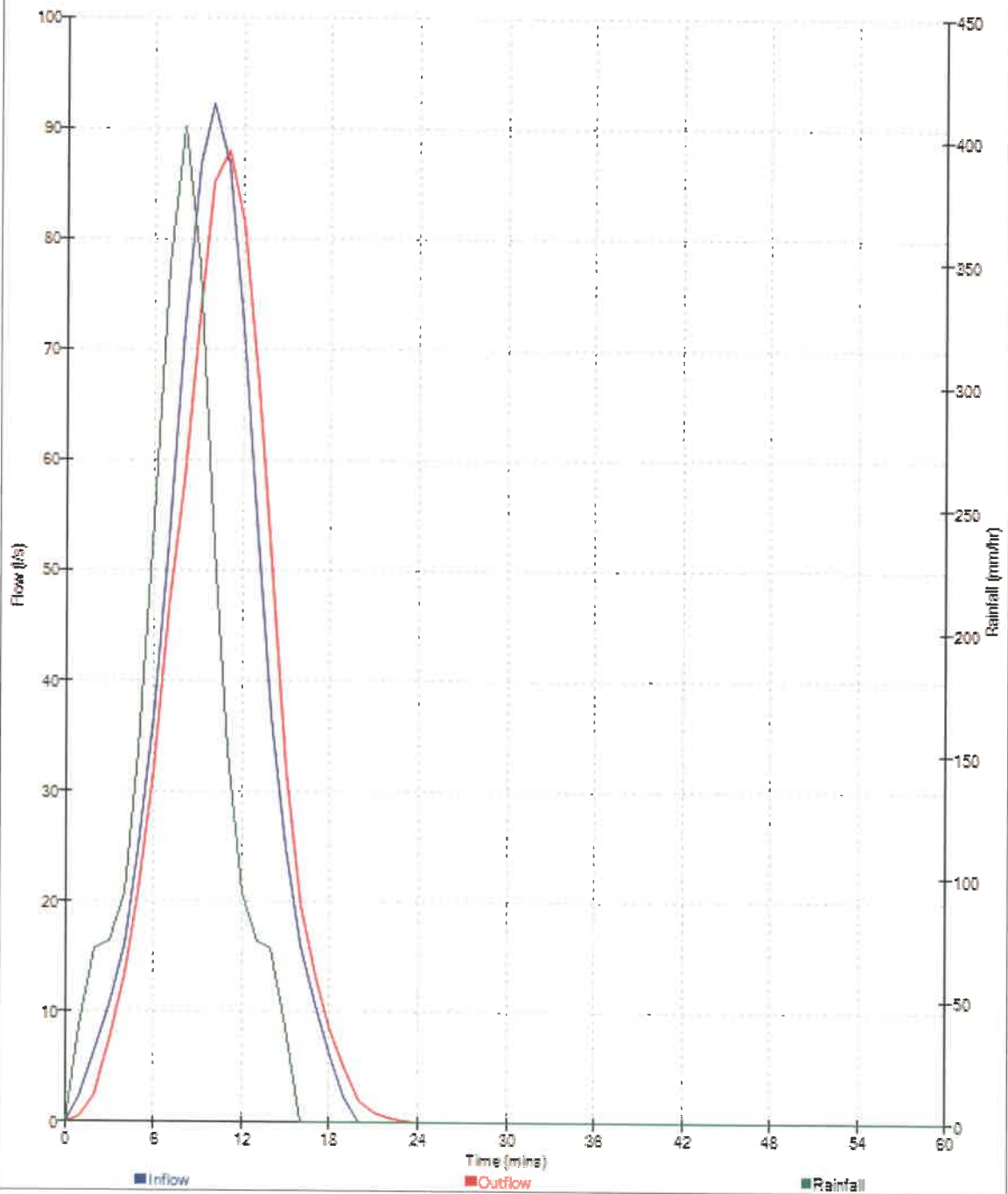
Checked by TRC

Micro Drainage

Network 2019.1



Graphs for Pipe 5.000 US/MH CP (Storm)
15 minute 100 year Winter I+40%
Status: SURCHARGED



Rochester House
275 Baddow Road
Chelmsford CM2 7QA

Stonefield Close
Ruislip

Date 30/09/2019 10:22
File 4132 Sim.MDX

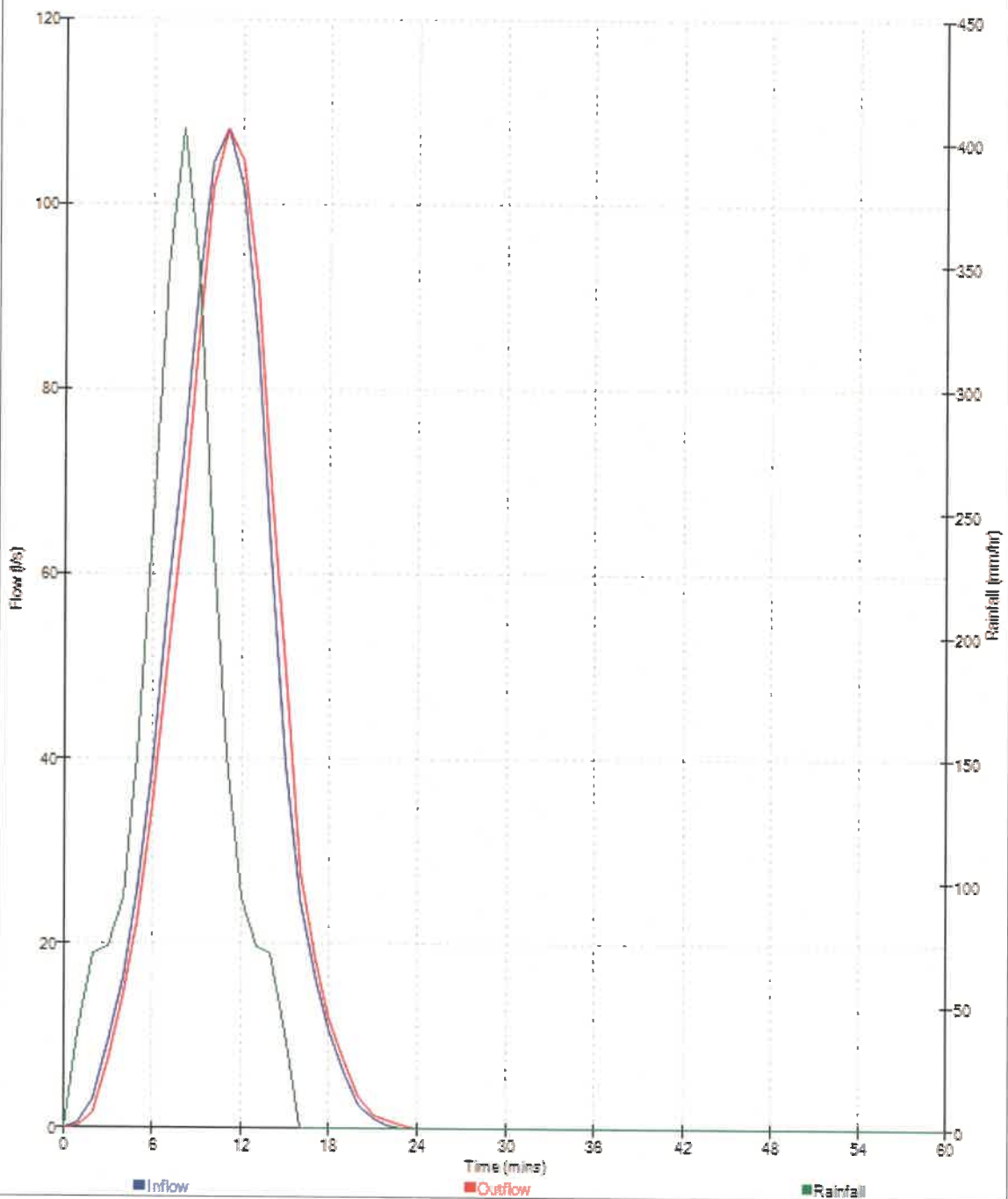
Designed by CE
Checked by TRC



Micro Drainage

Network 2019.1

Graphs for Pipe 4.001 US/MH SW4 (Storm)
15 minute 100 year Winter I+40%
Status: SURCHARGED



Rochester House

Stonefield Close

275 Baddow Road

Ruislip

Chelmsford CM2 7QA

Date 30/09/2019 10:22

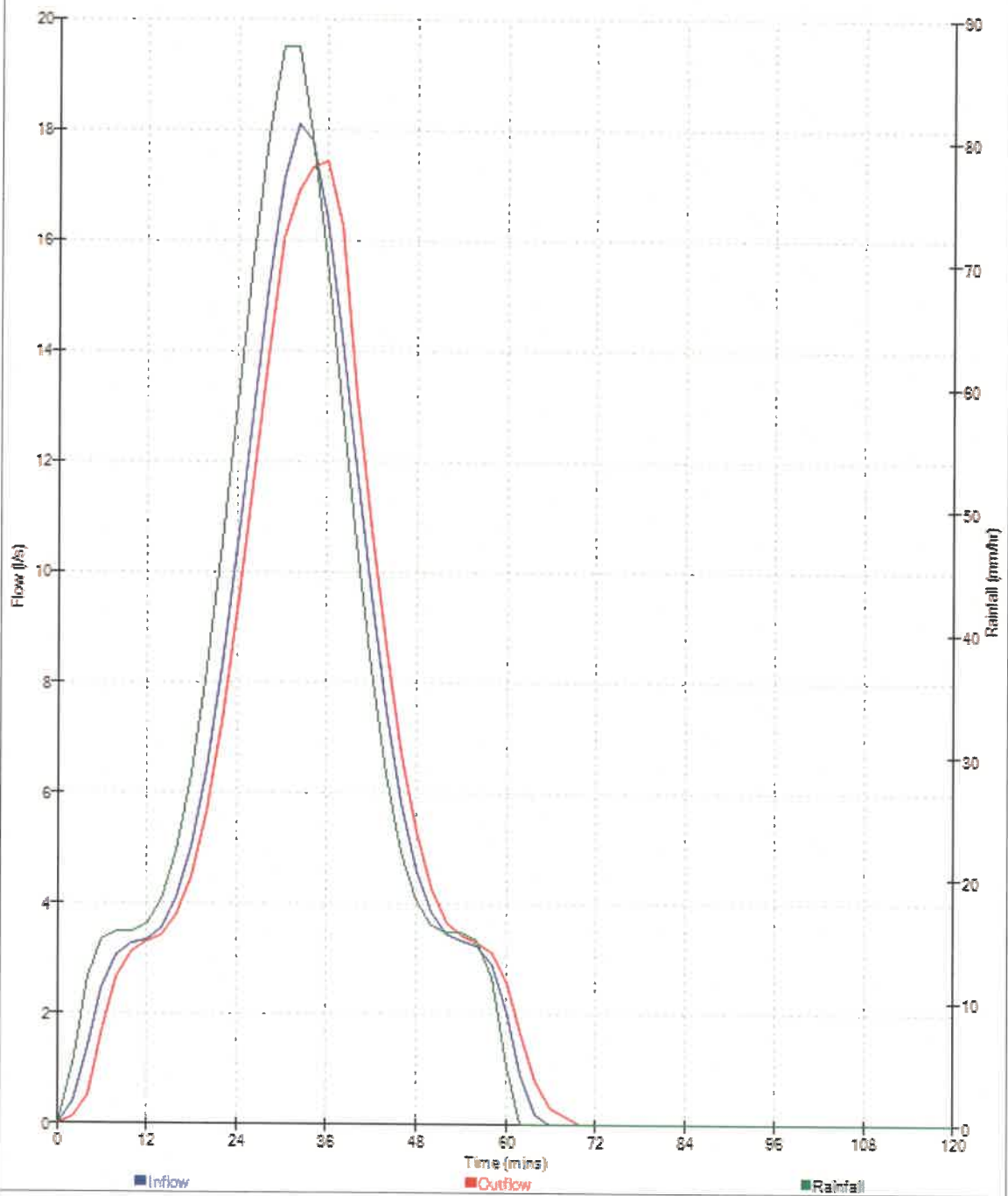
Designed by CE

File 4132 Sim.MDX

Checked by TRC

Micro Drainage

Network 2019.1

Graphs for Pipe 6.000 US/MH RE (Storm)60 minute 30 year Winter I+0%Status: OK*

Rochester House
275 Baddow Road
Chelmsford CM2 7QA

Stonefield Close
Ruislip

Date 30/09/2019 10:22
File 4132 Sim.MDX

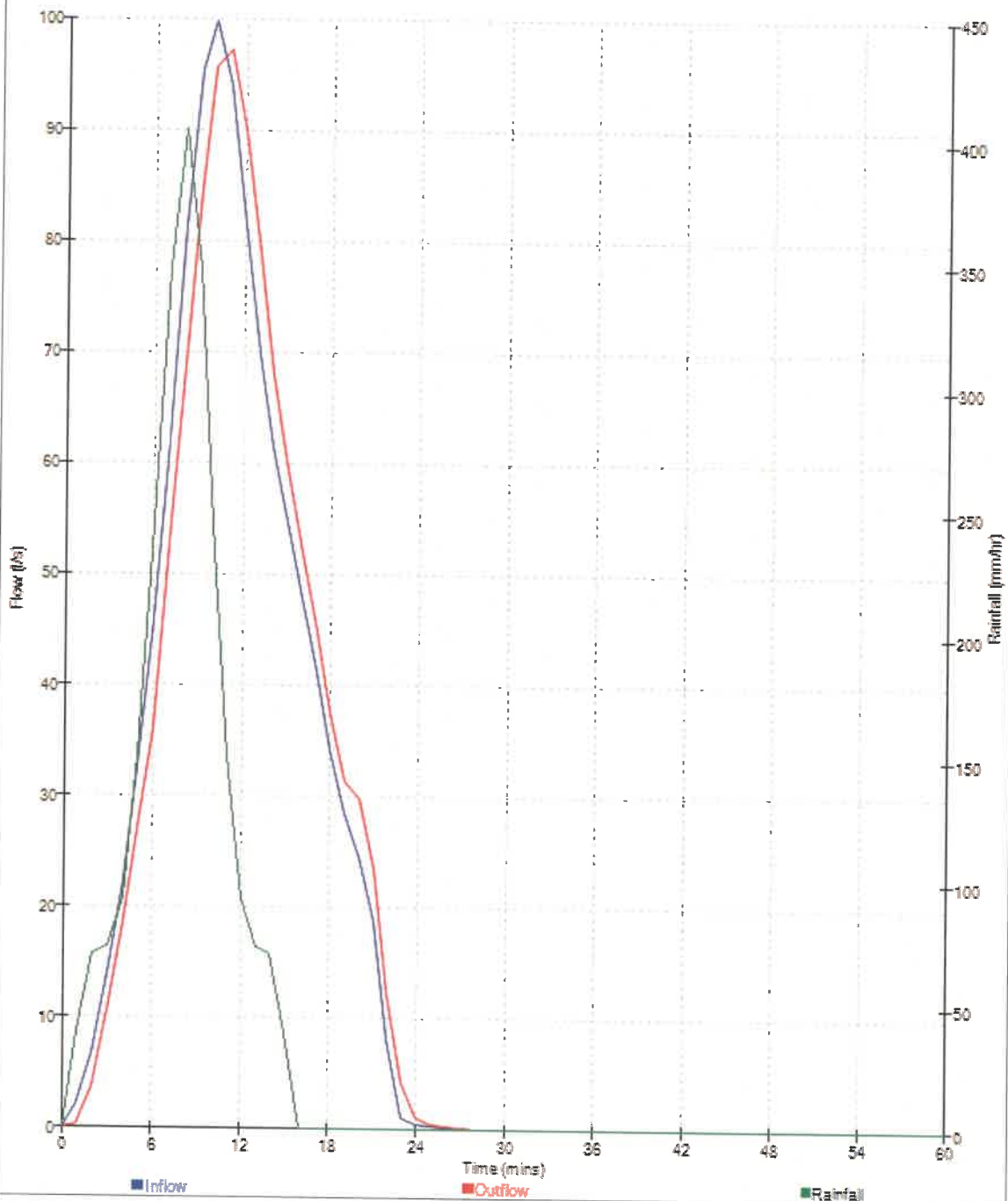
Designed by CE
Checked by TRC



Micro Drainage

Network 2019.1

Graphs for Pipe 6.001 US/MH SW5 (Storm)
15 minute 100 year Winter I+40%
Status: SURCHARGED



Rochester House

Stonefield Close

275 Baddow Road

Ruislip

Chelmsford CM2 7QA

Date 30/09/2019 10:22

Designed by CE

File 4132 Sim.MDX

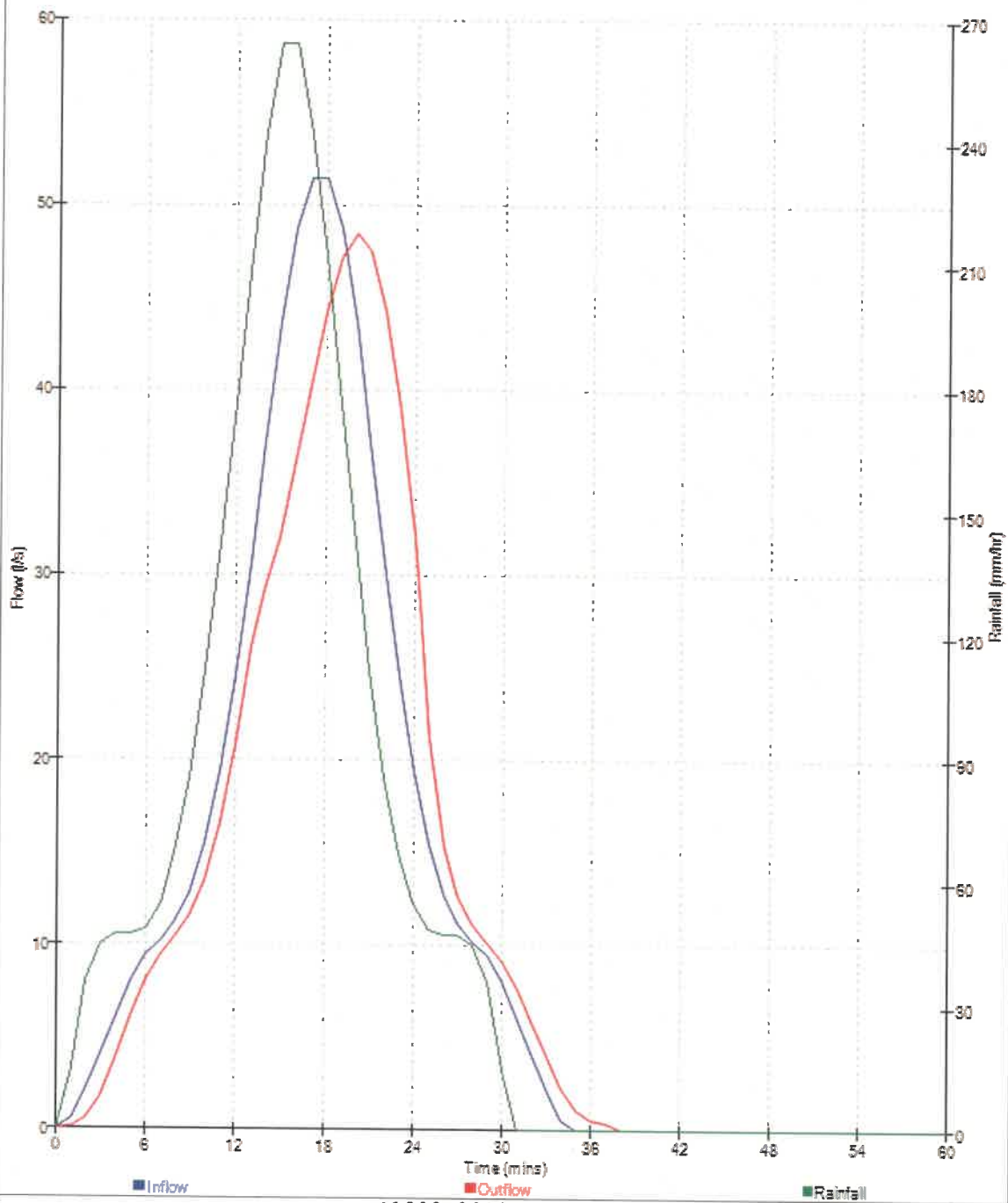
Checked by TRC

Micro Drainage

Network 2019.1



Graphs for Pipe 7.000 US/MH RE (Storm)
30 minute 100 year Winter I+40%
Status: OK*



Rochester House

Stonefield Close

275 Baddow Road

Ruislip

Chelmsford CM2 7QA

Date 30/09/2019 10:22

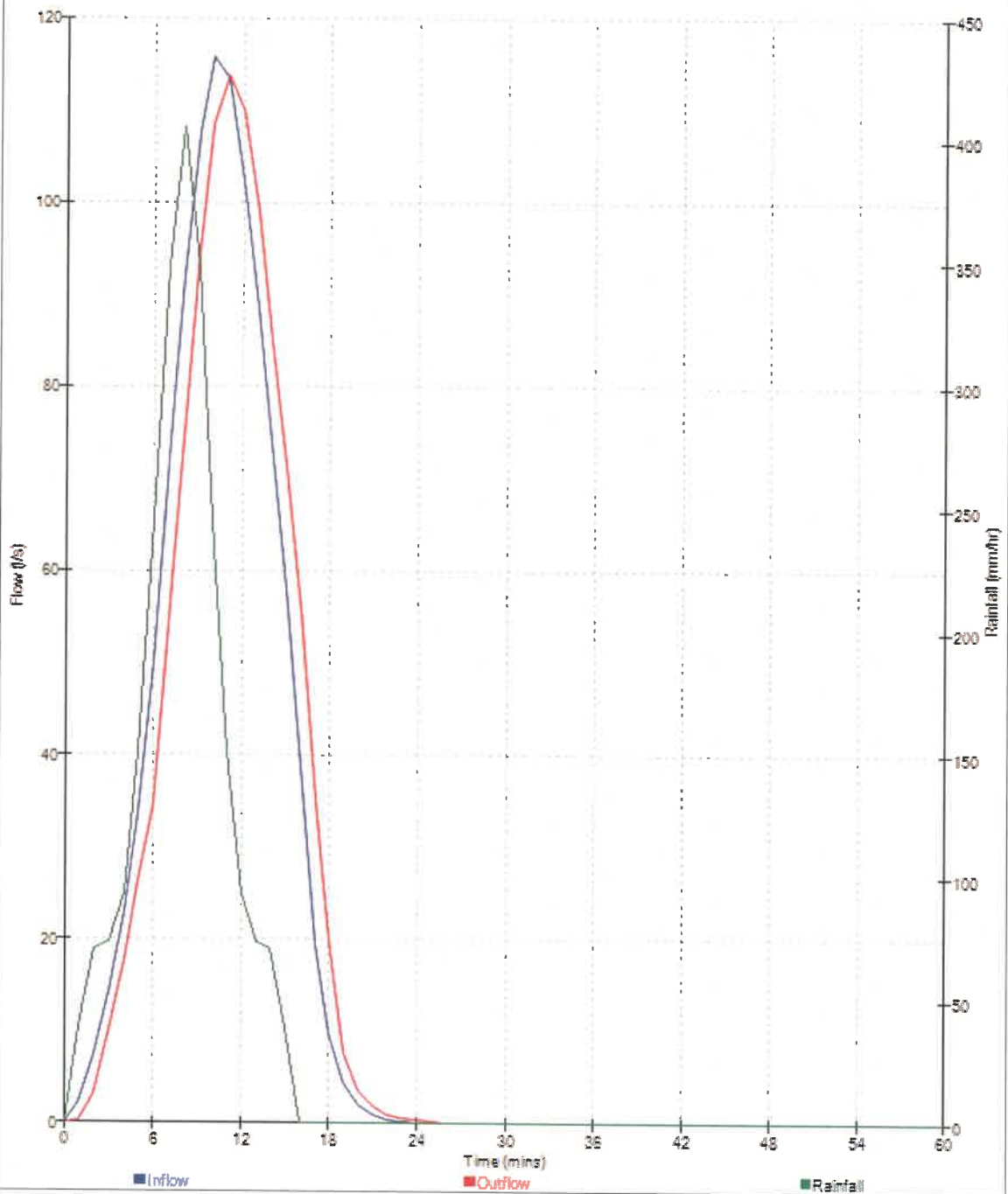
Designed by CE

File 4132 Sim.MDX

Checked by TRC

Micro Drainage

Network 2019.1

Graphs for Pipe 7.001 US/MH SW6 (Storm)15 minute 100 year Winter I+40%Status: FLOOD RISK

Rochester House

Stonefield Close

275 Baddow Road

Ruislip

Chelmsford CM2 7QA

Date 30/09/2019 10:22

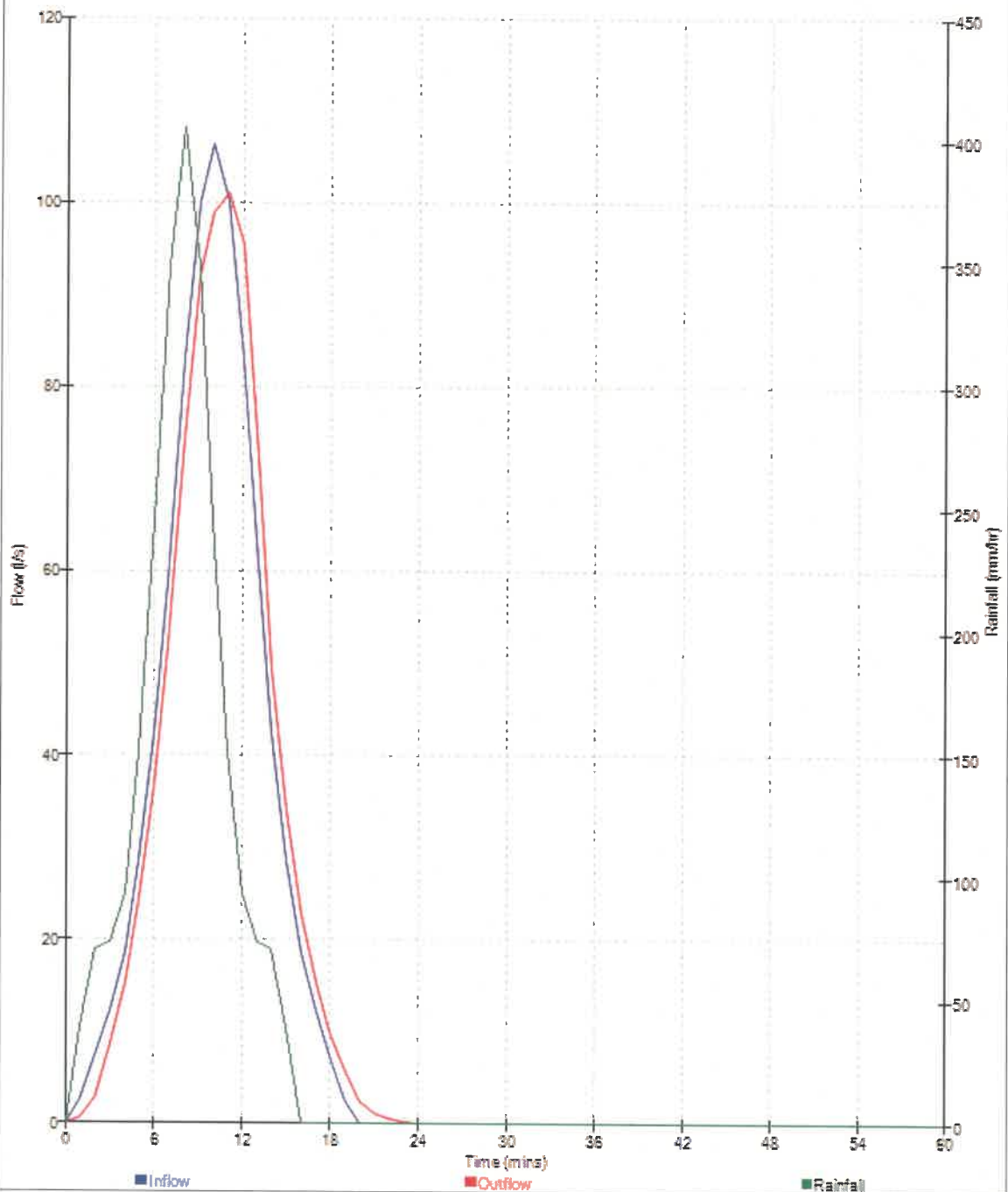
Designed by CE

File 4132 Sim.MDX

Checked by TRC

Micro Drainage

Network 2019.1

Graphs for Pipe 8.000 US/MH CP (Storm)15 minute 100 year Winter I+40%Status: SURCHARGED

Rochester House

Stonefield Close

275 Baddow Road

Ruislip

Chelmsford CM2 7QA

Date 30/09/2019 10:22

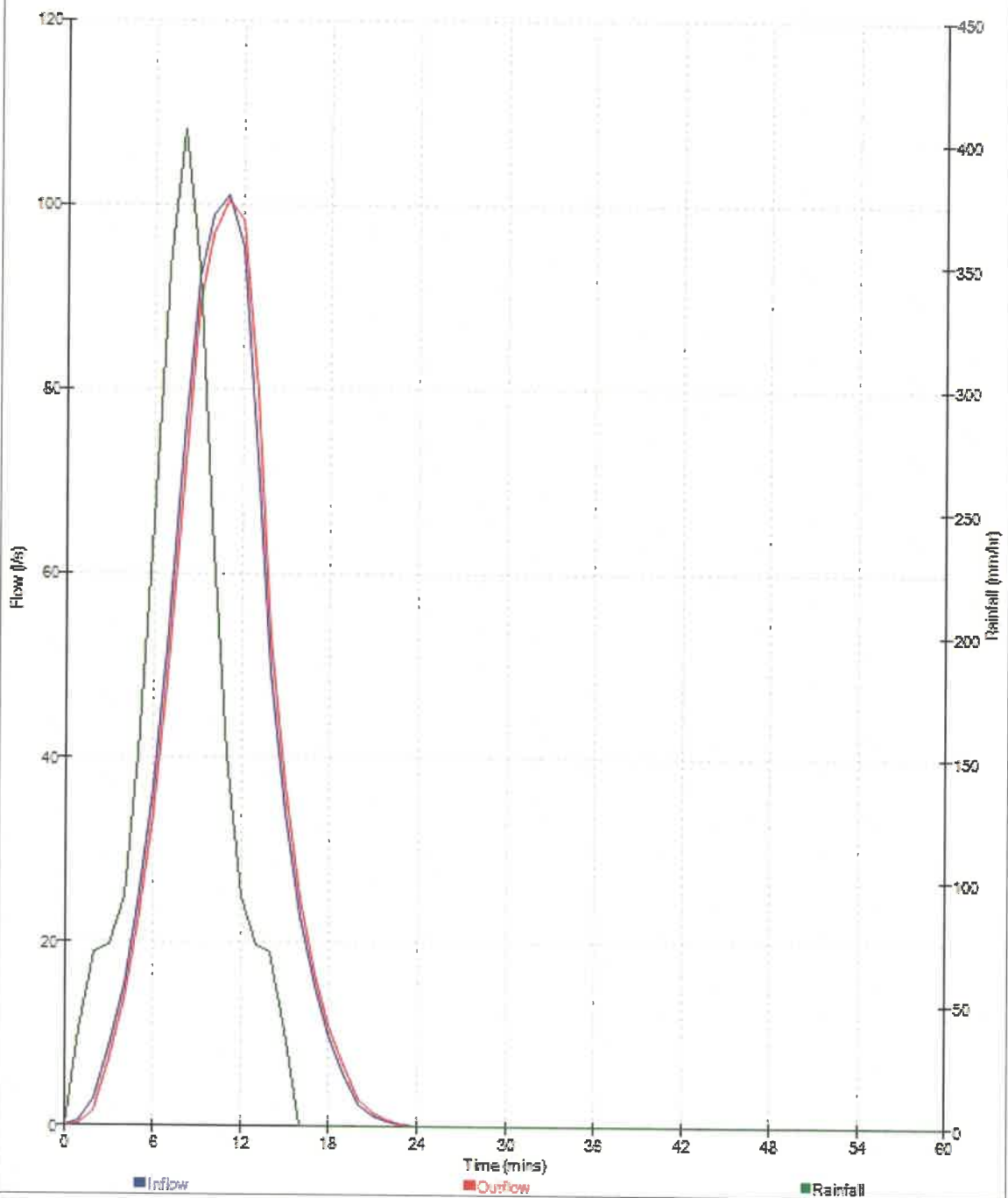
Designed by CE

File 4132 Sim.MDX

Checked by TRC

Micro Drainage

Network 2019.1

Graphs for Pipe 8.001 US/MH SW7 (Storm)15 minute 100 year Winter I+40%Status: OK

T.R. Collier & Associates Ltd		Page 20
Rochester House 275 Baddow Road Chelmsford CM2 7QA	Stonefield Close Ruislip Tank 1	
Date 30/09/2019 10:26 File 4132 Tank 1.SRCX	Designed by CE Checked by TRC	
Micro Drainage Source Control 2019.1		

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 381 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	34.783	0.698	0.0	5.0	5.0	142.3	O K
30 min Summer	34.853	0.768	0.0	5.0	5.0	158.7	O K
60 min Summer	34.922	0.837	0.0	5.0	5.0	174.0	O K
120 min Summer	34.974	0.889	0.0	5.0	5.0	184.7	O K
180 min Summer	34.984	0.899	0.0	5.0	5.0	186.5	O K
240 min Summer	34.974	0.889	0.0	5.0	5.0	184.6	O K
360 min Summer	34.933	0.848	0.0	5.0	5.0	176.2	O K
480 min Summer	34.895	0.810	0.0	5.0	5.0	168.1	O K
600 min Summer	34.861	0.776	0.0	5.0	5.0	160.7	O K
720 min Summer	34.831	0.746	0.0	5.0	5.0	153.8	O K
960 min Summer	34.781	0.696	0.0	5.0	5.0	142.0	O K
1440 min Summer	34.682	0.597	0.0	5.0	5.0	117.7	O K
2160 min Summer	34.559	0.474	0.0	5.0	5.0	87.6	O K
2880 min Summer	34.460	0.375	0.0	5.0	5.0	63.7	O K
4320 min Summer	34.303	0.218	0.0	4.9	4.9	29.7	O K
5760 min Summer	34.225	0.140	0.0	4.5	4.5	15.5	O K
7200 min Summer	34.197	0.112	0.0	3.9	3.9	11.1	O K
8640 min Summer	34.182	0.097	0.0	3.4	3.4	8.9	O K
10080 min Summer	34.171	0.086	0.0	3.0	3.0	7.5	O K
15 min Winter	34.858	0.773	0.0	5.0	5.0	160.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	225.588	0.0	147.2	22
30 min Summer	127.960	0.0	167.0	37
60 min Summer	72.582	0.0	189.4	66
120 min Summer	41.170	0.0	214.9	124
180 min Summer	29.549	0.0	231.4	182
240 min Summer	23.353	0.0	243.8	242
360 min Summer	16.761	0.0	262.5	332
480 min Summer	13.246	0.0	276.6	390
600 min Summer	11.036	0.0	288.0	454
720 min Summer	9.507	0.0	297.8	520
960 min Summer	7.561	0.0	315.8	658
1440 min Summer	5.476	0.0	343.0	912
2160 min Summer	3.965	0.0	372.6	1296
2880 min Summer	3.154	0.0	395.1	1644
4320 min Summer	2.204	0.0	414.1	2296
5760 min Summer	1.709	0.0	428.2	2952
7200 min Summer	1.403	0.0	439.4	3672
8640 min Summer	1.194	0.0	448.8	4400
10080 min Summer	1.042	0.0	456.9	5136
15 min Winter	225.588	0.0	164.9	22

T.R. Collier & Associates Ltd		Page 21
Rochester House 275 Baddow Road Chelmsford CM2 7QA	Stonefield Close Ruislip Tank 1	
Date 30/09/2019 10:26 File 4132 Tank 1.SRCX	Designed by CE Checked by TRC	
Micro Drainage	Source Control 2019.1	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	34.945	0.860	0.0	5.0	5.0	178.7	O K
60 min Winter	35.038	0.953	0.0	5.0	5.0	196.5	O K
120 min Winter	35.134	1.049	0.0	5.0	5.0	210.2	O K
180 min Winter	35.174	1.089	0.0	5.0	5.0	213.7	O K
240 min Winter	35.163	1.078	0.0	5.0	5.0	212.9	O K
360 min Winter	35.098	1.013	0.0	5.0	5.0	205.7	O K
480 min Winter	35.033	0.948	0.0	5.0	5.0	195.5	O K
600 min Winter	34.983	0.898	0.0	5.0	5.0	186.4	O K
720 min Winter	34.940	0.855	0.0	5.0	5.0	177.7	O K
960 min Winter	34.867	0.782	0.0	5.0	5.0	162.0	O K
1440 min Winter	34.715	0.630	0.0	5.0	5.0	125.9	O K
2160 min Winter	34.524	0.439	0.0	5.0	5.0	79.0	O K
2880 min Winter	34.382	0.297	0.0	5.0	5.0	46.1	O K
4320 min Winter	34.216	0.131	0.0	4.4	4.4	14.1	O K
5760 min Winter	34.185	0.100	0.0	3.5	3.5	9.3	O K
7200 min Winter	34.170	0.085	0.0	2.9	2.9	7.2	O K
8640 min Winter	34.161	0.076	0.0	2.5	2.5	6.1	O K
10080 min Winter	34.154	0.069	0.0	2.1	2.1	5.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	127.960	0.0	187.0	36
60 min Winter	72.582	0.0	212.2	64
120 min Winter	41.170	0.0	240.7	122
180 min Winter	29.549	0.0	259.1	180
240 min Winter	23.353	0.0	273.1	236
360 min Winter	16.761	0.0	294.0	344
480 min Winter	13.246	0.0	309.8	440
600 min Winter	11.036	0.0	322.6	476
720 min Winter	9.507	0.0	333.5	554
960 min Winter	7.561	0.0	353.7	710
1440 min Winter	5.476	0.0	384.2	998
2160 min Winter	3.965	0.0	417.3	1364
2880 min Winter	3.154	0.0	442.5	1700
4320 min Winter	2.204	0.0	463.8	2256
5760 min Winter	1.709	0.0	479.5	2936
7200 min Winter	1.403	0.0	492.1	3632
8640 min Winter	1.194	0.0	502.6	4368
10080 min Winter	1.042	0.0	511.7	5120

T.R. Collier & Associates Ltd		Page 22
Rochester House	Stonefield Close	
275 Baddow Road	Ruislip	
Chelmsford CM2 7QA	Tank 1	
Date 30/09/2019 10:26	Designed by CE	
File 4132 Tank 1.SRCX	Checked by TRC	
Micro Drainage	Source Control 2019.1	

Rainfall Details

Rainfall Model	FEH	D2 (1km)	0.319	Cv (Summer)	0.750
Return Period (years)	100	D3 (1km)	0.231	Cv (Winter)	0.840
FEH Rainfall Version	1999	E (1km)	0.307	Shortest Storm (mins)	15
Site Location		F (1km)	2.536	Longest Storm (mins)	10080
C (1km)	-0.025	Summer Storms	Yes	Climate Change %	+40
D1 (1km)	0.297	Winter Storms	Yes		

Time Area Diagram

Total Area (ha) 0.348

Time (mins)	Area	Time (mins)	Area
From:	To: (ha)	From:	To: (ha)
0	4 0.174	4	8 0.174

T.R. Collier & Associates Ltd		Page 23
Rochester House 275 Baddow Road Chelmsford CM2 7QA	Stonefield Close Ruislip Tank 1	
Date 30/09/2019 10:26	Designed by CE	
File 4132 Tank 1.SRCX	Checked by TRC	
Micro Drainage		Source Control 2019.1

Model Details

Storage is Online Cover Level (m) 36.000

Complex Structure

Pipe

Diameter (m) 1.100 Length (m) 74.000
Slope (1:X) 9999.000 Invert Level (m) 34.085

Double Pipe

Diameter (m) 1.100 Length (m) 74.000
Slope (1:X) 9999.000 Invert Level (m) 34.085

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0104-5000-1100-5000
Design Head (m) 1.100
Design Flow (l/s) 5.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 104
Invert Level (m) 34.085
Minimum Outlet Pipe Diameter (mm) 150
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.100	5.0
Flush-Flo™	0.323	5.0
Kick-Flo®	0.690	4.0
Mean Flow over Head Range	-	4.4

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	3.5	1.200	5.2	3.000	8.0	7.000	12.0
0.200	4.8	1.400	5.6	3.500	8.6	7.500	12.4
0.300	5.0	1.600	6.0	4.000	9.2	8.000	12.7
0.400	5.0	1.800	6.3	4.500	9.7	8.500	13.1
0.500	4.8	2.000	6.6	5.000	10.2	9.000	13.5
0.600	4.6	2.200	6.9	5.500	10.7	9.500	13.8
0.800	4.3	2.400	7.2	6.000	11.1		
1.000	4.8	2.600	7.5	6.500	11.5		

Rochester House

275 Baddow Road

Chelmsford CM2 7QA

Date 30/09/2019 10:26

File 4132 Tank 1.SRCX

Micro Drainage

Stonefield Close

Ruislip

Tank 1

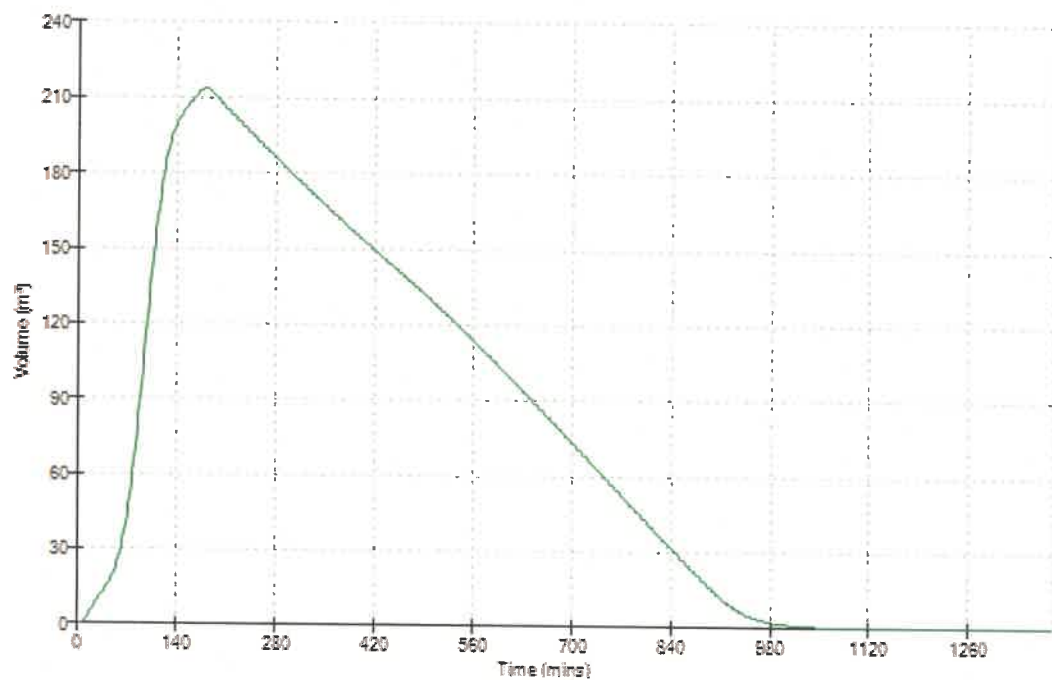
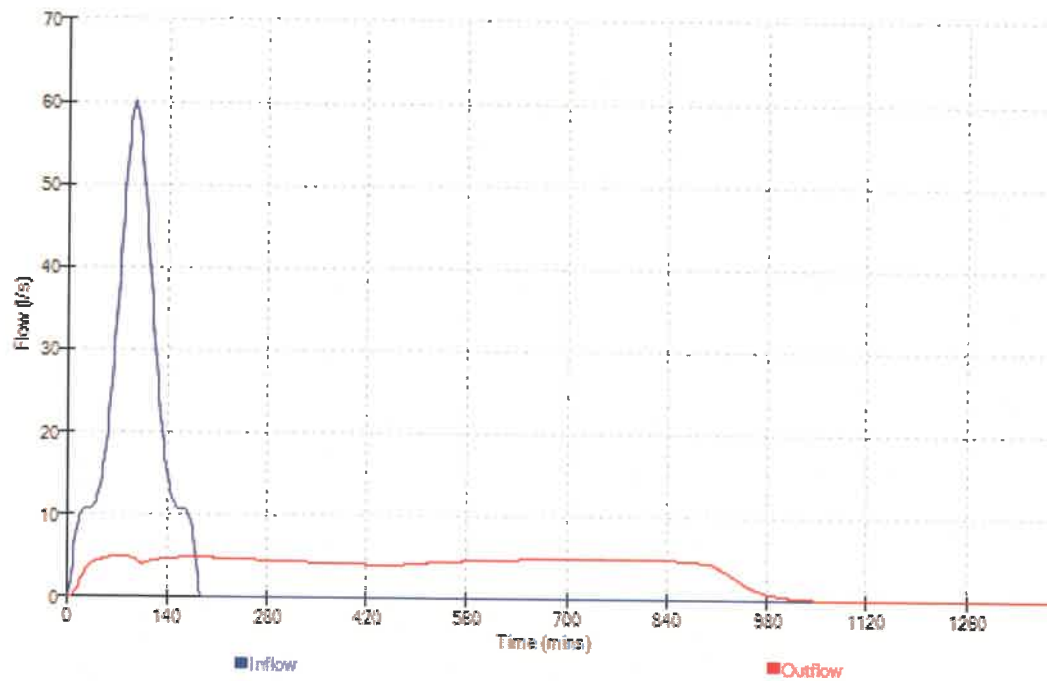
Designed by CE

Checked by TRC

Source Control 2019.1



Event: 180 min Winter



T.R. Collier & Associates Ltd		Page 25
Rochester House 275 Baddow Road Chelmsford CM2 7QA	Stonefield Close Ruislip Tank 2	
Date 30/09/2019 10:28	Designed by CE	
File 4132 Tank 2.SRCX	Checked by TRC	
Micro Drainage		Source Control 2019.1

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 383 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	35.873	0.698	0.0	5.0	5.0	142.0	O K
30 min Summer	35.943	0.768	0.0	5.0	5.0	158.3	O K
60 min Summer	36.011	0.836	0.0	5.0	5.0	173.3	O K
120 min Summer	36.062	0.887	0.0	5.0	5.0	183.7	O K
180 min Summer	36.070	0.895	0.0	5.0	5.0	185.2	O K
240 min Summer	36.059	0.884	0.0	5.0	5.0	183.0	O K
360 min Summer	36.015	0.840	0.0	5.0	5.0	174.1	O K
480 min Summer	35.975	0.800	0.0	5.0	5.0	165.6	O K
600 min Summer	35.941	0.766	0.0	5.0	5.0	158.0	O K
720 min Summer	35.911	0.736	0.0	5.0	5.0	151.0	O K
960 min Summer	35.859	0.684	0.0	5.0	5.0	138.8	O K
1440 min Summer	35.761	0.586	0.0	5.0	5.0	114.8	O K
2160 min Summer	35.638	0.463	0.0	5.0	5.0	84.9	O K
2880 min Summer	35.538	0.363	0.0	5.0	5.0	61.1	O K
4320 min Summer	35.378	0.203	0.0	4.8	4.8	26.9	O K
5760 min Summer	35.296	0.121	0.0	4.4	4.4	12.5	O K
7200 min Summer	35.264	0.089	0.0	3.9	3.9	7.9	O K
8640 min Summer	35.248	0.073	0.0	3.4	3.4	5.9	O K
10080 min Summer	35.237	0.062	0.0	3.0	3.0	4.6	O K
15 min Winter	35.949	0.774	0.0	5.0	5.0	159.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	225.588	0.0	147.2	22
30 min Summer	127.960	0.0	167.0	37
60 min Summer	72.582	0.0	189.5	66
120 min Summer	41.170	0.0	214.9	124
180 min Summer	29.549	0.0	231.4	182
240 min Summer	23.353	0.0	243.8	242
360 min Summer	16.761	0.0	262.5	334
480 min Summer	13.246	0.0	276.6	392
600 min Summer	11.036	0.0	288.0	456
720 min Summer	9.507	0.0	297.8	522
960 min Summer	7.561	0.0	315.8	658
1440 min Summer	5.476	0.0	343.0	912
2160 min Summer	3.965	0.0	372.6	1296
2880 min Summer	3.154	0.0	395.1	1644
4320 min Summer	2.204	0.0	414.1	2296
5760 min Summer	1.709	0.0	428.1	2992
7200 min Summer	1.403	0.0	439.3	3672
8640 min Summer	1.194	0.0	448.7	4400
10080 min Summer	1.042	0.0	456.9	5120
15 min Winter	225.588	0.0	164.9	22

T.R. Collier & Associates Ltd		Page 26
Rochester House 275 Baddow Road Chelmsford CM2 7QA	Stonefield Close Ruislip Tank 2	
Date 30/09/2019 10:28	Designed by CE	
File 4132 Tank 2.SRCX	Checked by TRC	
Micro Drainage		Source Control 2019.1

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	36.035	0.860	0.0	5.0	5.0	178.3	O K
60 min Winter	36.129	0.954	0.0	5.0	5.0	196.0	O K
120 min Winter	36.223	1.048	0.0	5.0	5.0	209.4	O K
180 min Winter	36.259	1.084	0.0	5.0	5.0	212.6	O K
240 min Winter	36.246	1.071	0.0	5.0	5.0	211.7	O K
360 min Winter	36.181	1.006	0.0	5.0	5.0	204.1	O K
480 min Winter	36.115	0.940	0.0	5.0	5.0	193.5	O K
600 min Winter	36.064	0.889	0.0	5.0	5.0	184.0	O K
720 min Winter	36.020	0.845	0.0	5.0	5.0	175.2	O K
960 min Winter	35.947	0.772	0.0	5.0	5.0	159.3	O K
1440 min Winter	35.794	0.619	0.0	5.0	5.0	122.9	O K
2160 min Winter	35.603	0.428	0.0	5.0	5.0	76.4	O K
2880 min Winter	35.460	0.285	0.0	5.0	5.0	43.6	O K
4320 min Winter	35.287	0.112	0.0	4.4	4.4	11.2	O K
5760 min Winter	35.251	0.076	0.0	3.5	3.5	6.3	O K
7200 min Winter	35.235	0.060	0.0	2.9	2.9	4.4	O K
8640 min Winter	35.226	0.051	0.0	2.5	2.5	3.4	O K
10080 min Winter	35.220	0.045	0.0	2.2	2.2	2.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	127.960	0.0	187.0	36
60 min Winter	72.582	0.0	212.2	64
120 min Winter	41.170	0.0	240.7	122
180 min Winter	29.549	0.0	259.1	180
240 min Winter	23.353	0.0	273.1	236
360 min Winter	16.761	0.0	294.0	346
480 min Winter	13.246	0.0	309.8	444
600 min Winter	11.036	0.0	322.6	476
720 min Winter	9.507	0.0	333.5	554
960 min Winter	7.561	0.0	353.7	712
1440 min Winter	5.476	0.0	384.2	996
2160 min Winter	3.965	0.0	417.3	1364
2880 min Winter	3.154	0.0	442.5	1704
4320 min Winter	2.204	0.0	463.8	2292
5760 min Winter	1.709	0.0	479.5	2936
7200 min Winter	1.403	0.0	492.1	3608
8640 min Winter	1.194	0.0	502.6	4384
10080 min Winter	1.042	0.0	511.7	5048

T.R. Collier & Associates Ltd		Page 27
Rochester House	Stonefield Close	
275 Baddow Road	Ruislip	
Chelmsford CM2 7QA	Tank 2	
Date 30/09/2019 10:28	Designed by CE	
File 4132 Tank 2.SRCX	Checked by TRC	
Micro Drainage	Source Control 2019.1	

Rainfall Details

Rainfall Model	FEH	D2 (1km)	0.319	Cv (Summer)	0.750
Return Period (years)	100	D3 (1km)	0.231	Cv (Winter)	0.840
FEH Rainfall Version	1999	E (1km)	0.307	Shortest Storm (mins)	15
Site Location		F (1km)	2.536	Longest Storm (mins)	10080
C (1km)	-0.025	Summer Storms	Yes	Climate Change %	+40
D1 (1km)	0.297	Winter Storms	Yes		

Time Area Diagram

Total Area (ha) 0.348

Time (mins)	Area	Time (mins)	Area
From:	To: (ha)	From:	To: (ha)
0	4 0.174	4	8 0.174

T.R. Collier & Associates Ltd		Page 28
Rochester House	Stonefield Close	
275 Baddow Road	Ruislip	
Chelmsford CM2 7QA	Tank 2	
Date 30/09/2019 10:28	Designed by CE	
File 4132 Tank 2.SRCX	Checked by TRC	
Micro Drainage	Source Control 2019.1	

Model Details

Storage is Online Cover Level (m) 36.825

Complex Structure

Double Pipe

Diameter (m) 1.100 Length (m) 55.000
Slope (1:X) 9999.000 Invert Level (m) 35.175

Double Pipe

Diameter (m) 1.100 Length (m) 55.000
Slope (1:X) 9999.000 Invert Level (m) 35.175

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0103-5000-1150-5000
Design Head (m) 1.150
Design Flow (l/s) 5.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 103
Invert Level (m) 35.150
Minimum Outlet Pipe Diameter (mm) 150
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.150	5.0
Flush-Flo™	0.340	5.0
Kick-Flo®	0.717	4.0
Mean Flow over Head Range	-	4.4

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	3.5	1.200	5.1	3.000	7.8	7.000	11.7
0.200	4.7	1.400	5.5	3.500	8.4	7.500	12.1
0.300	5.0	1.600	5.8	4.000	9.0	8.000	12.5
0.400	5.0	1.800	6.2	4.500	9.5	8.500	12.8
0.500	4.8	2.000	6.5	5.000	10.0	9.000	13.2
0.600	4.6	2.200	6.8	5.500	10.4	9.500	13.5
0.800	4.2	2.400	7.1	6.000	10.9		
1.000	4.7	2.600	7.3	6.500	11.3		

Rochester House

275 Baddow Road

Chelmsford CM2 7QA

Date 30/09/2019 10:28

File 4132 Tank 2.SRCX

Stonefield Close

Ruislip

Tank 2

Designed by CE

Checked by TRC

Micro Drainage

Source Control 2019.1

Event: 180 min Winter