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Unit 6 Neepsend Triangle Business 1 Burton Road Sheffield S3 8BW	Washington Road, Goldthorpe, Barnsley - Rev D 37a Attenuation Calculations	
Date 05/07/2017	Designed by S. Griffiths	
File 37A ATTENUATION CALCS.SRCX	Checked by F. Raja	
XP Solutions	Source Control 2017.1	

Summary of Results for 30 year Return Period

Half Drain Time : 50 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	29.233	0.133	0.0	0.6	0.6	2.3	O K
30 min Summer	29.266	0.166	0.0	0.7	0.7	2.8	O K
60 min Summer	29.285	0.185	0.0	0.7	0.7	3.2	O K
120 min Summer	29.287	0.187	0.0	0.7	0.7	3.2	O K
180 min Summer	29.280	0.180	0.0	0.7	0.7	3.1	O K
240 min Summer	29.269	0.169	0.0	0.7	0.7	2.9	O K
360 min Summer	29.249	0.149	0.0	0.6	0.6	2.5	O K
480 min Summer	29.232	0.132	0.0	0.6	0.6	2.3	O K
600 min Summer	29.217	0.117	0.0	0.6	0.6	2.0	O K
720 min Summer	29.206	0.106	0.0	0.5	0.5	1.8	O K
960 min Summer	29.188	0.088	0.0	0.5	0.5	1.5	O K
1440 min Summer	29.165	0.065	0.0	0.4	0.4	1.1	O K
2160 min Summer	29.147	0.047	0.0	0.3	0.3	0.8	O K
2880 min Summer	29.139	0.039	0.0	0.3	0.3	0.7	O K
4320 min Summer	29.132	0.032	0.0	0.2	0.2	0.5	O K
5760 min Summer	29.128	0.028	0.0	0.2	0.2	0.5	O K
7200 min Summer	29.125	0.025	0.0	0.1	0.1	0.4	O K
8640 min Summer	29.123	0.023	0.0	0.1	0.1	0.4	O K
10080 min Summer	29.121	0.021	0.0	0.1	0.1	0.4	O K
15 min Winter	29.250	0.150	0.0	0.6	0.6	2.6	O K
30 min Winter	29.287	0.187	0.0	0.7	0.7	3.2	O K
60 min Winter	29.308	0.208	0.0	0.8	0.8	3.6	O K
120 min Winter	29.306	0.206	0.0	0.8	0.8	3.5	O K
180 min Winter	29.292	0.192	0.0	0.7	0.7	3.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	70.524	0.0	2.8	24
30 min Summer	46.405	0.0	3.6	35
60 min Summer	29.238	0.0	4.6	54
120 min Summer	17.893	0.0	5.6	88
180 min Summer	13.284	0.0	6.3	120
240 min Summer	10.706	0.0	6.7	154
360 min Summer	7.867	0.0	7.4	218
480 min Summer	6.321	0.0	8.0	282
600 min Summer	5.332	0.0	8.4	344
720 min Summer	4.637	0.0	8.8	404
960 min Summer	3.719	0.0	9.4	524
1440 min Summer	2.722	0.0	10.3	762
2160 min Summer	1.989	0.0	11.3	1116
2880 min Summer	1.591	0.0	12.0	1472
4320 min Summer	1.160	0.0	13.1	2208
5760 min Summer	0.927	0.0	14.0	2936
7200 min Summer	0.778	0.0	14.7	3624
8640 min Summer	0.675	0.0	15.3	4392
10080 min Summer	0.598	0.0	15.8	5120
15 min Winter	70.524	0.0	3.1	25
30 min Winter	46.405	0.0	4.1	35
60 min Winter	29.238	0.0	5.1	56
120 min Winter	17.893	0.0	6.3	92
180 min Winter	13.284	0.0	7.0	128

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Summary of Results for 30 year Return Period

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
240 min Winter	29.276	0.176	0.0	0.7	0.7	3.0	O K
360 min Winter	29.246	0.146	0.0	0.6	0.6	2.5	O K
480 min Winter	29.223	0.123	0.0	0.6	0.6	2.1	O K
600 min Winter	29.205	0.105	0.0	0.5	0.5	1.8	O K
720 min Winter	29.191	0.091	0.0	0.5	0.5	1.5	O K
960 min Winter	29.171	0.071	0.0	0.4	0.4	1.2	O K
1440 min Winter	29.149	0.049	0.0	0.3	0.3	0.8	O K
2160 min Winter	29.137	0.037	0.0	0.2	0.2	0.6	O K
2880 min Winter	29.132	0.032	0.0	0.2	0.2	0.5	O K
4320 min Winter	29.126	0.026	0.0	0.1	0.1	0.4	O K
5760 min Winter	29.123	0.023	0.0	0.1	0.1	0.4	O K
7200 min Winter	29.120	0.020	0.0	0.1	0.1	0.3	O K
8640 min Winter	29.118	0.018	0.0	0.1	0.1	0.3	O K
10080 min Winter	29.117	0.017	0.0	0.1	0.1	0.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
240 min Winter	10.706	0.0	7.5	164
360 min Winter	7.867	0.0	8.3	230
480 min Winter	6.321	0.0	8.9	294
600 min Winter	5.332	0.0	9.4	356
720 min Winter	4.637	0.0	9.8	416
960 min Winter	3.719	0.0	10.5	534
1440 min Winter	2.722	0.0	11.5	768
2160 min Winter	1.989	0.0	12.6	1116
2880 min Winter	1.591	0.0	13.5	1476
4320 min Winter	1.160	0.0	14.7	2160
5760 min Winter	0.927	0.0	15.7	2944
7200 min Winter	0.778	0.0	16.5	3544
8640 min Winter	0.675	0.0	17.1	4416
10080 min Winter	0.598	0.0	17.7	5184

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.376	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.021

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To:	(ha)	From: To:	(ha)	From: To:	(ha)
0 5	0.007	5 10	0.007	10 15	0.007

Model Details

Storage is Online Cover Level (m) 30.100

Cellular Storage Structure

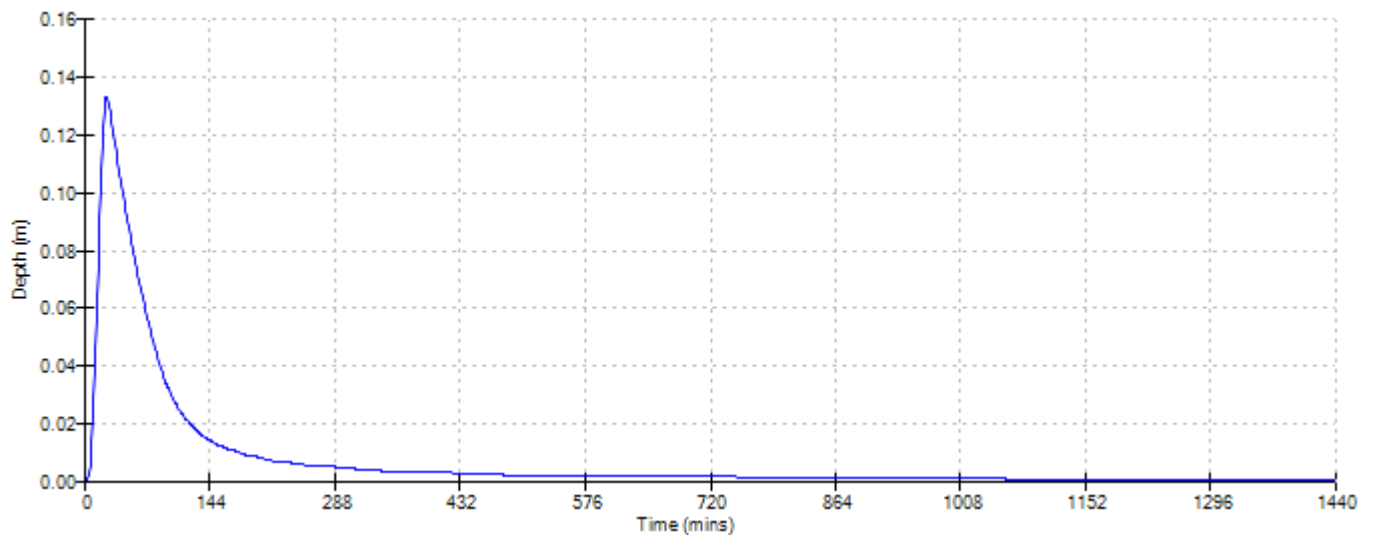
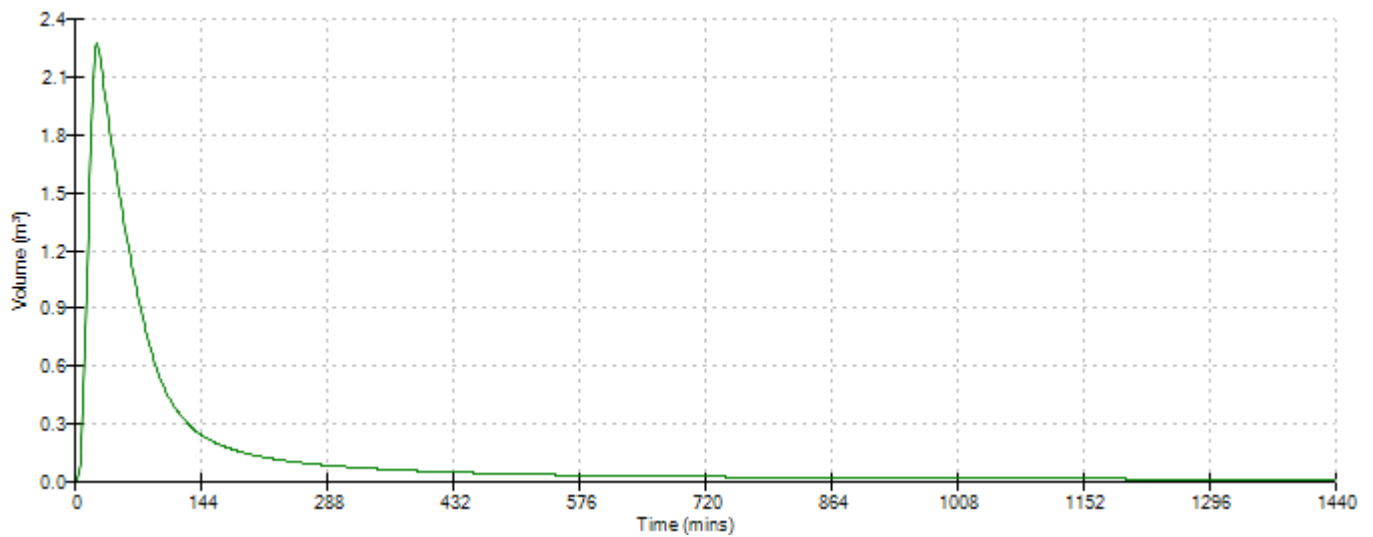
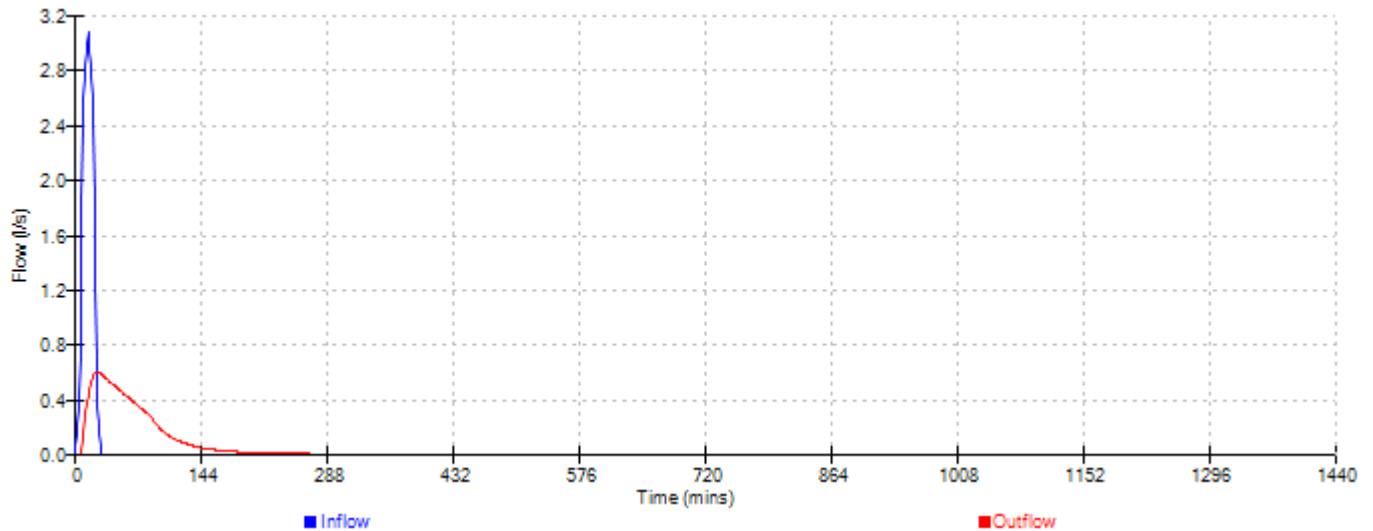
Invert Level (m) 29.100 Safety Factor 1.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	18.0	18.0	0.400	18.0	25.2	0.401	0.0	25.2

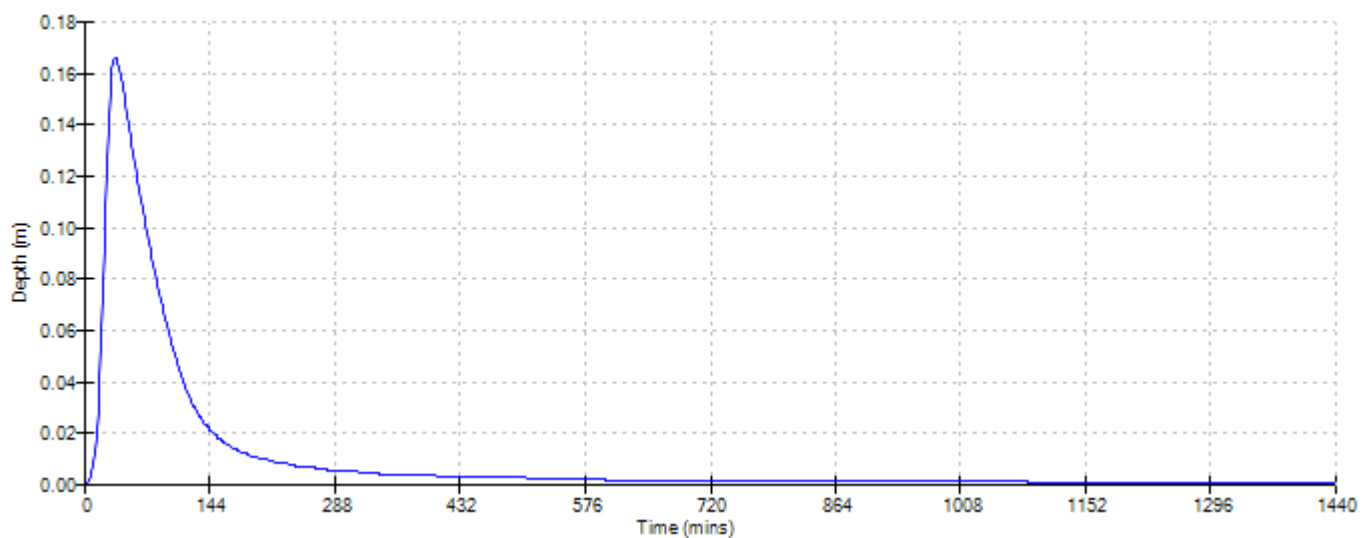
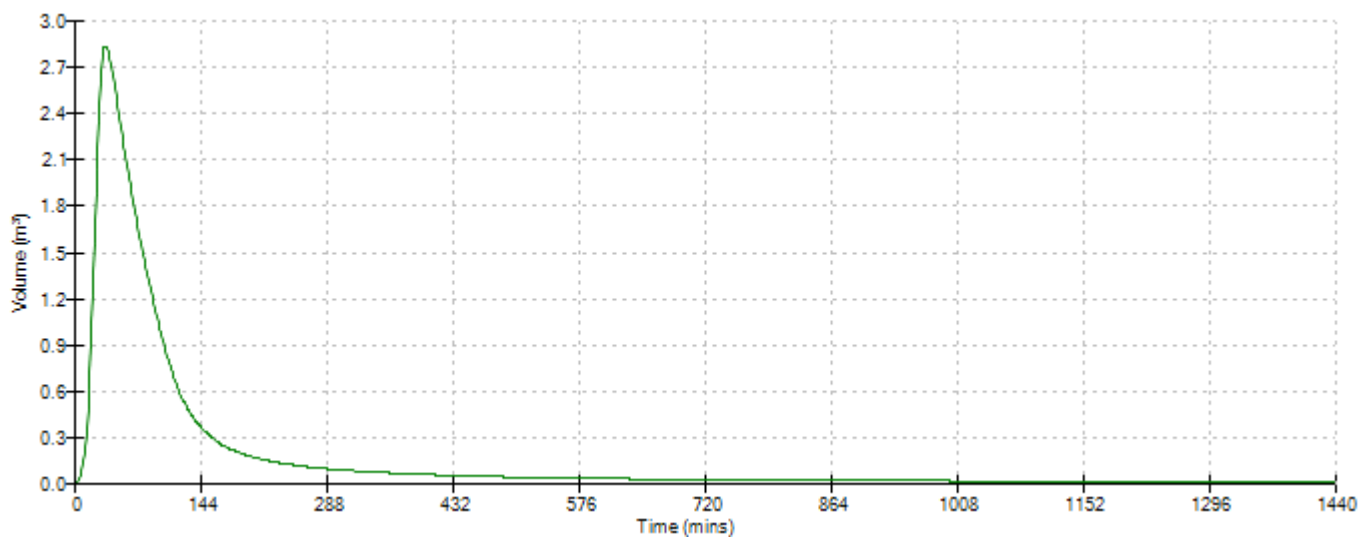
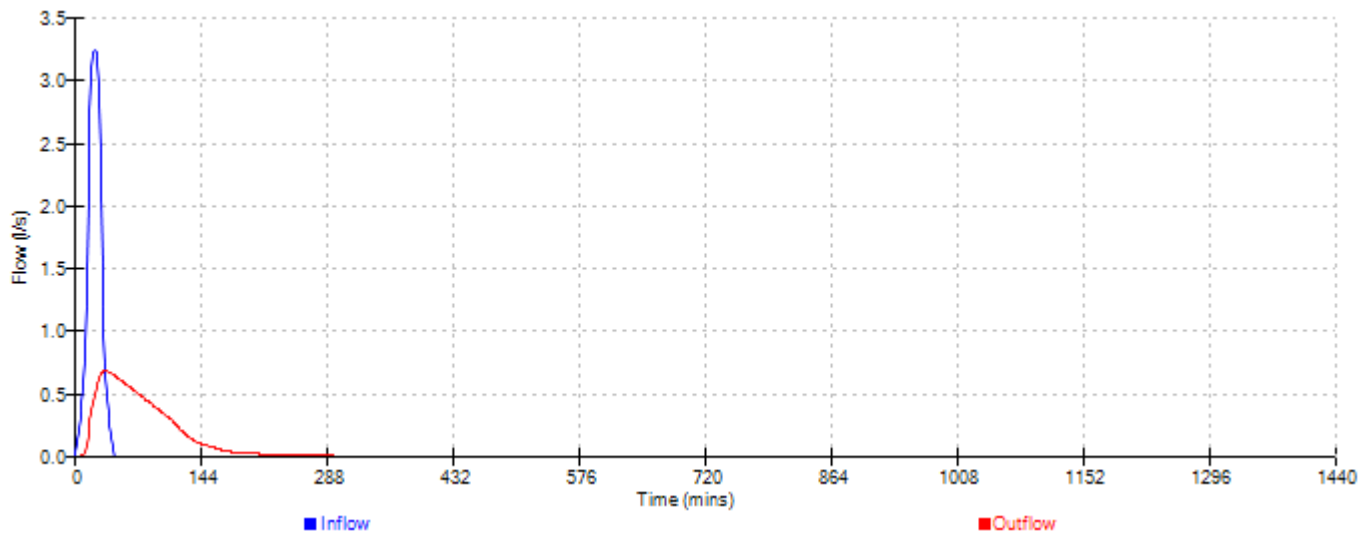
Orifice Outflow Control

Diameter (m) 0.029 Discharge Coefficient 0.600 Invert Level (m) 29.100

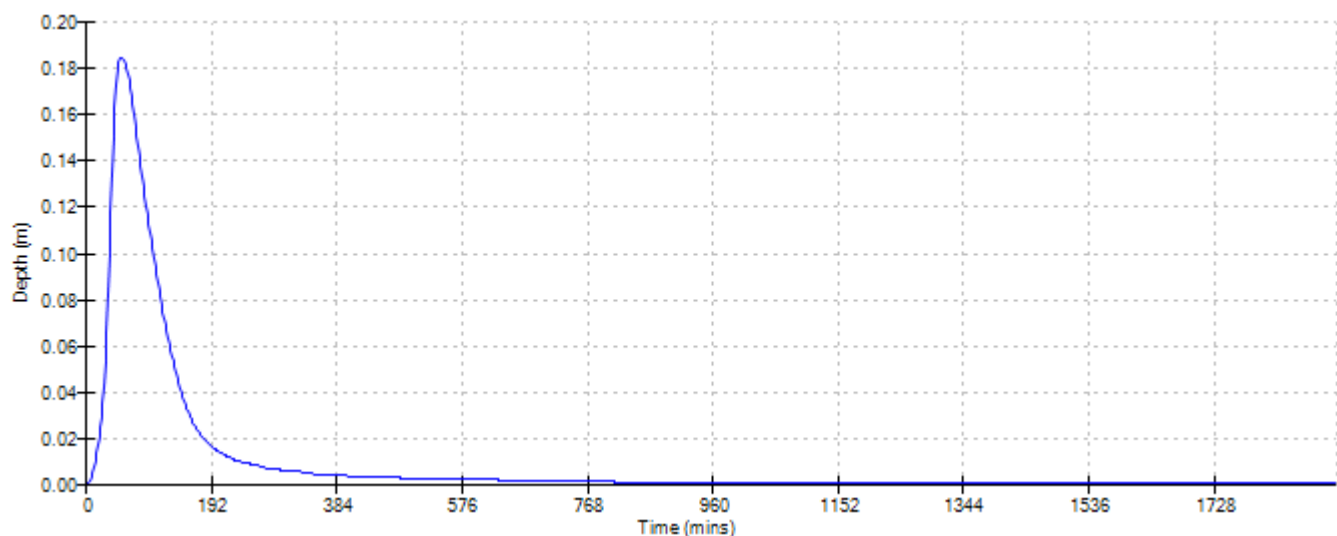
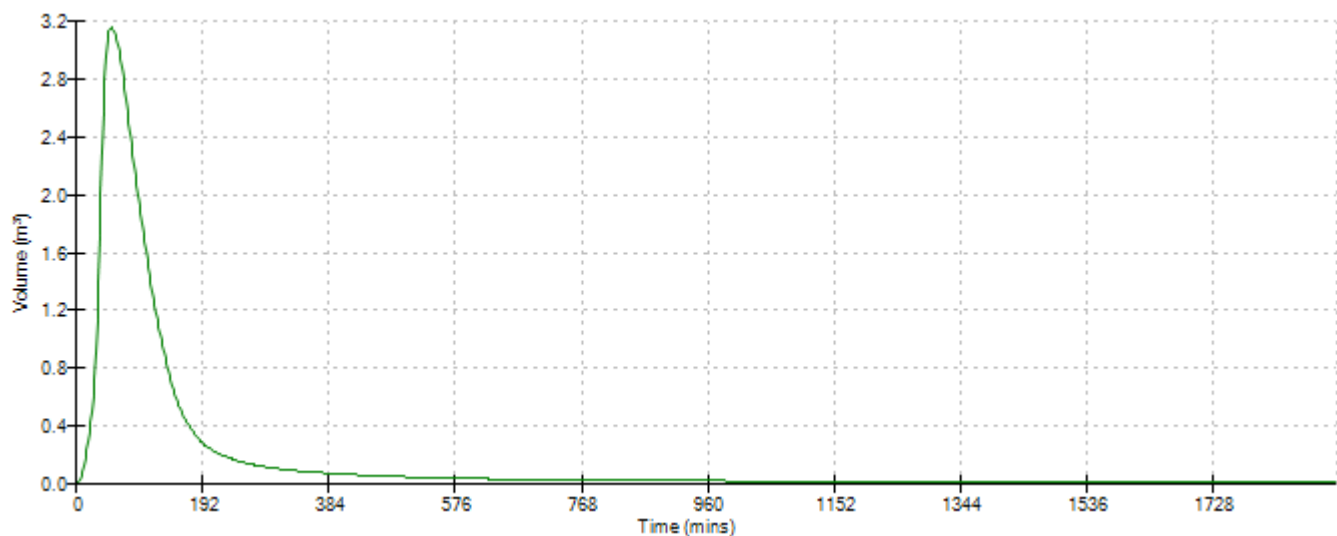
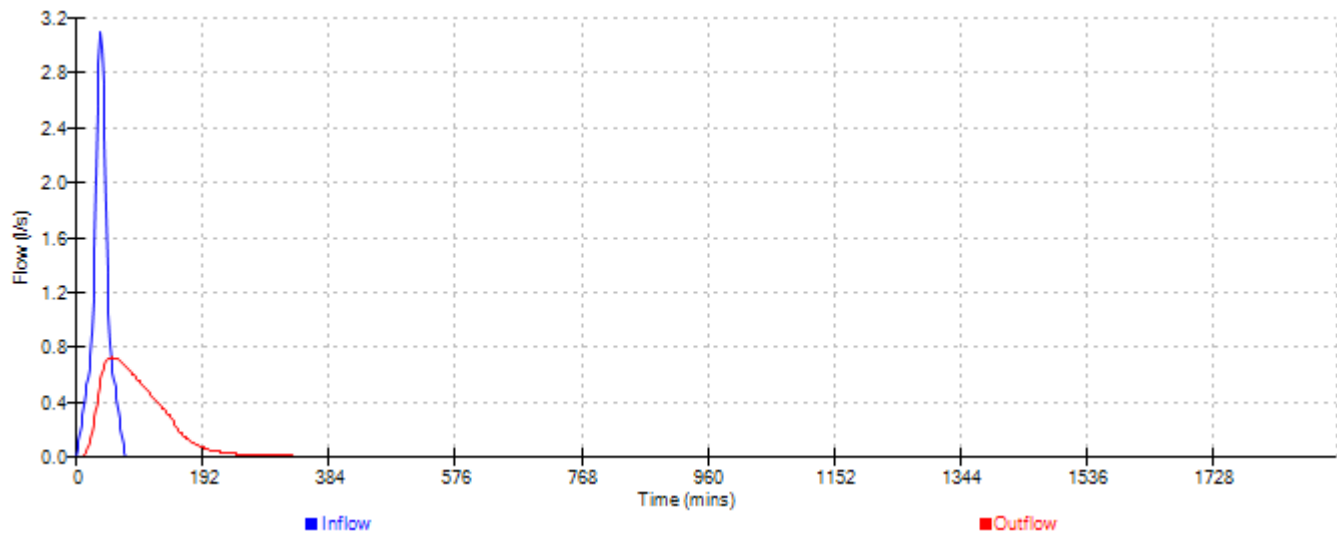
Event: 15 min Summer



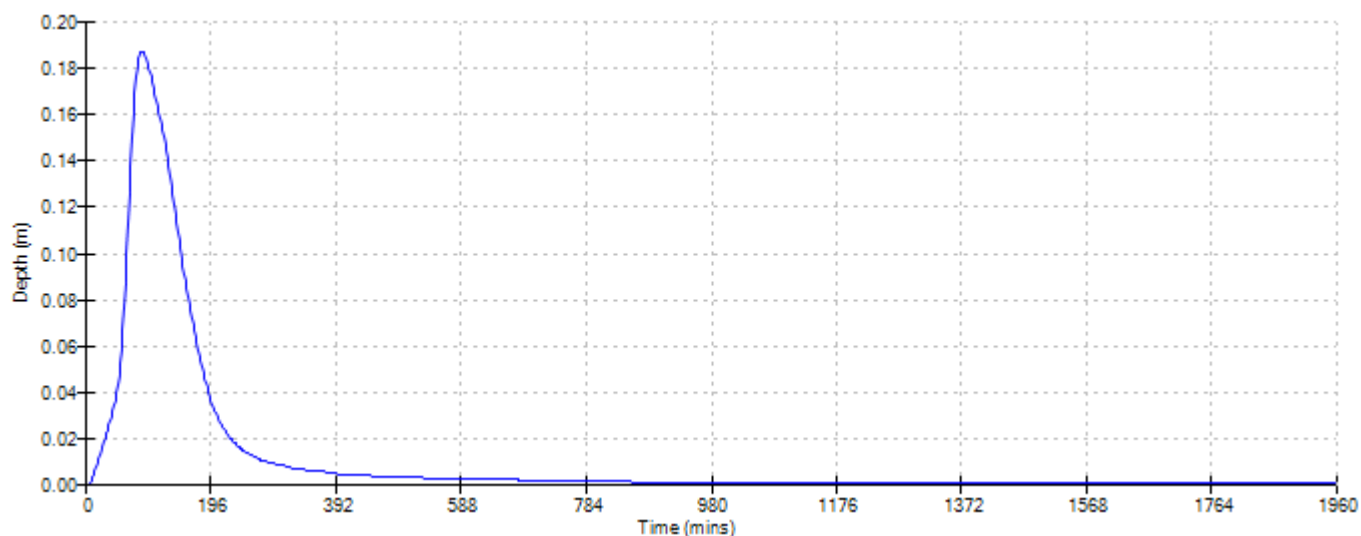
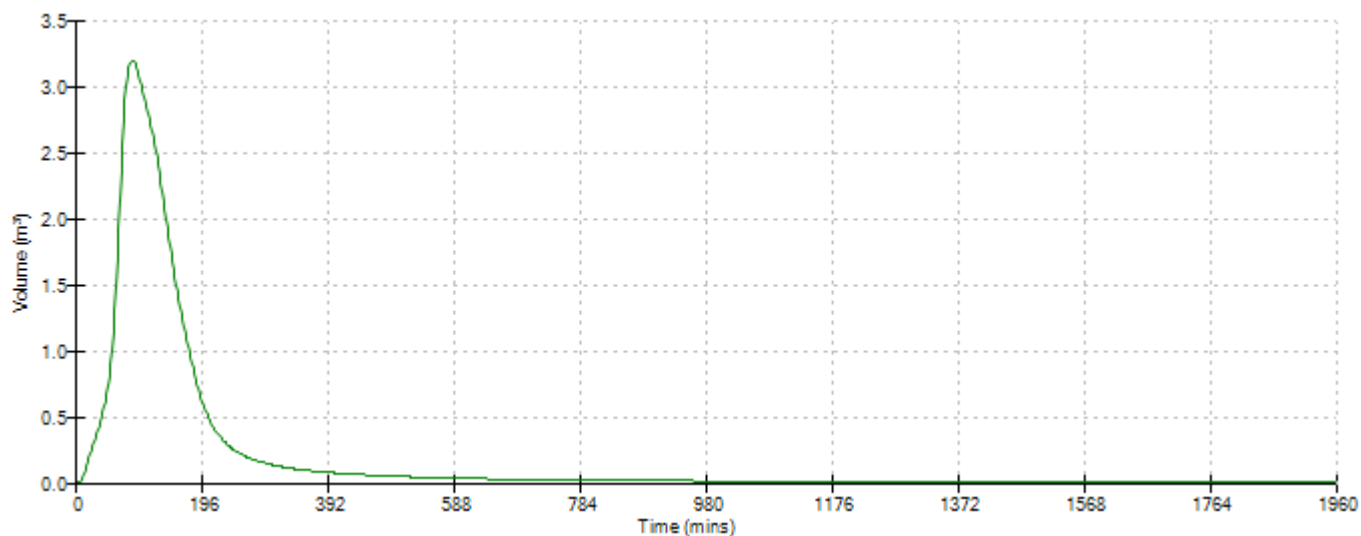
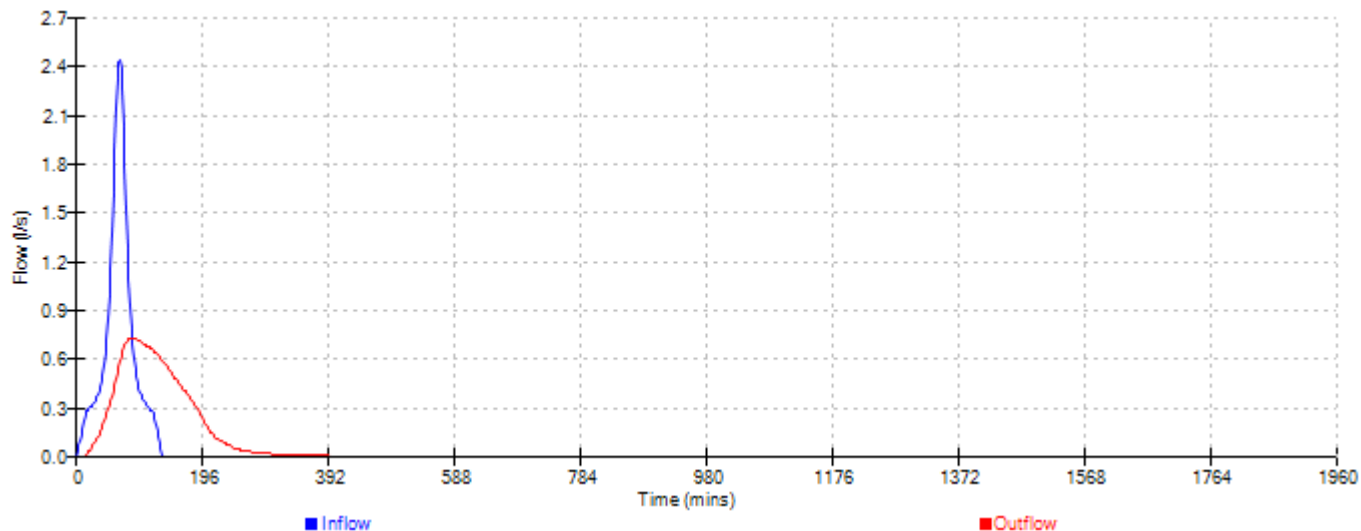
Event: 30 min Summer



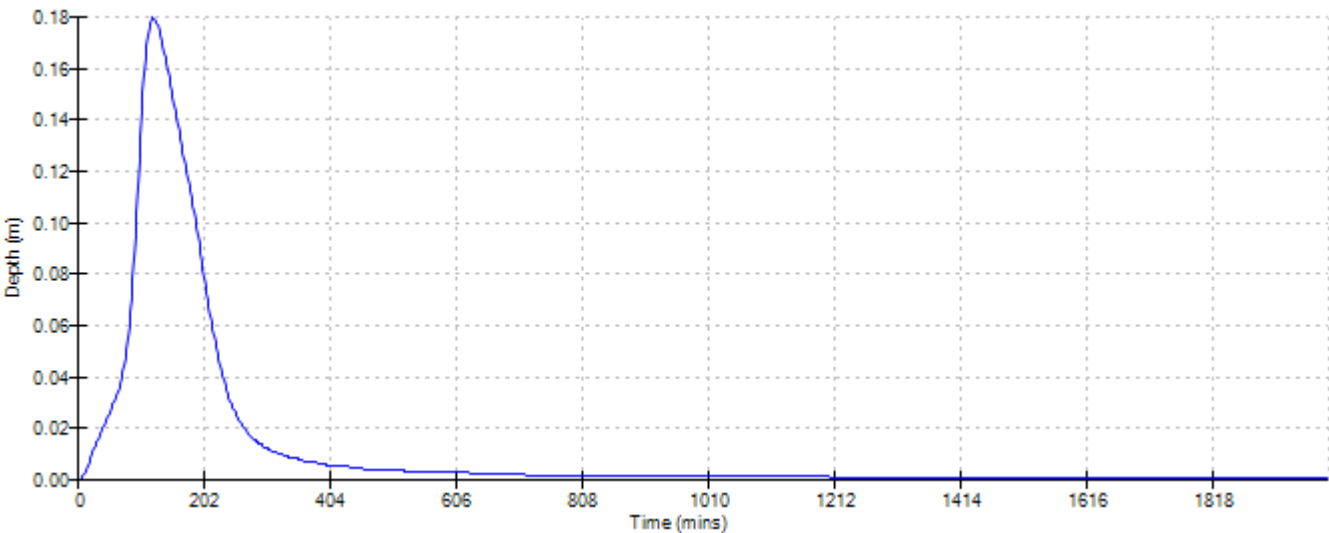
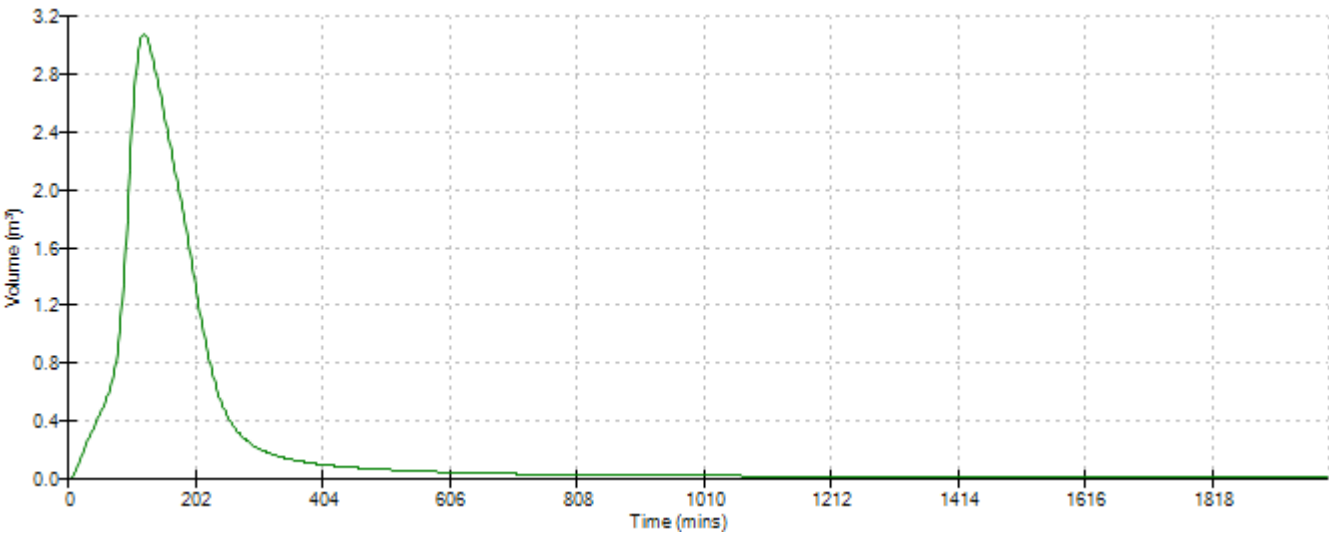
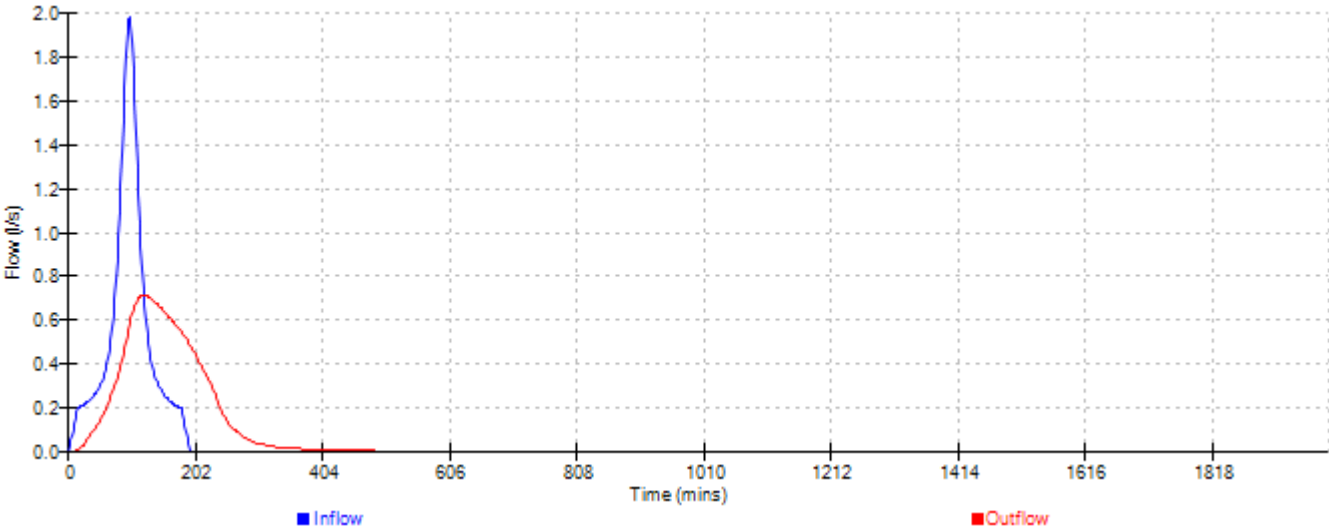
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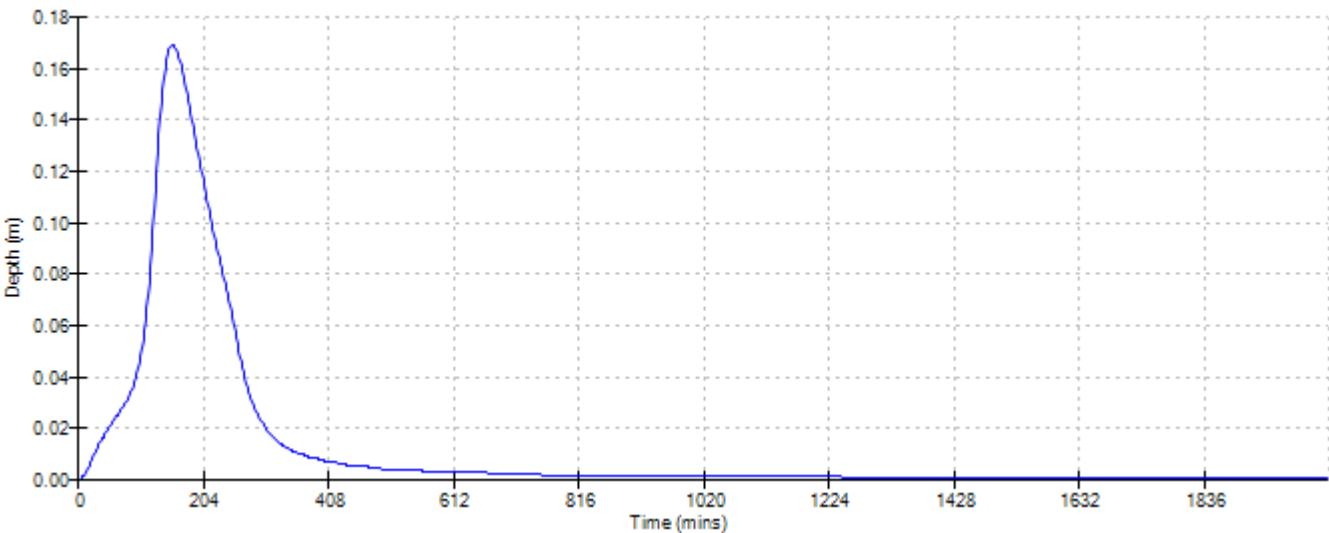
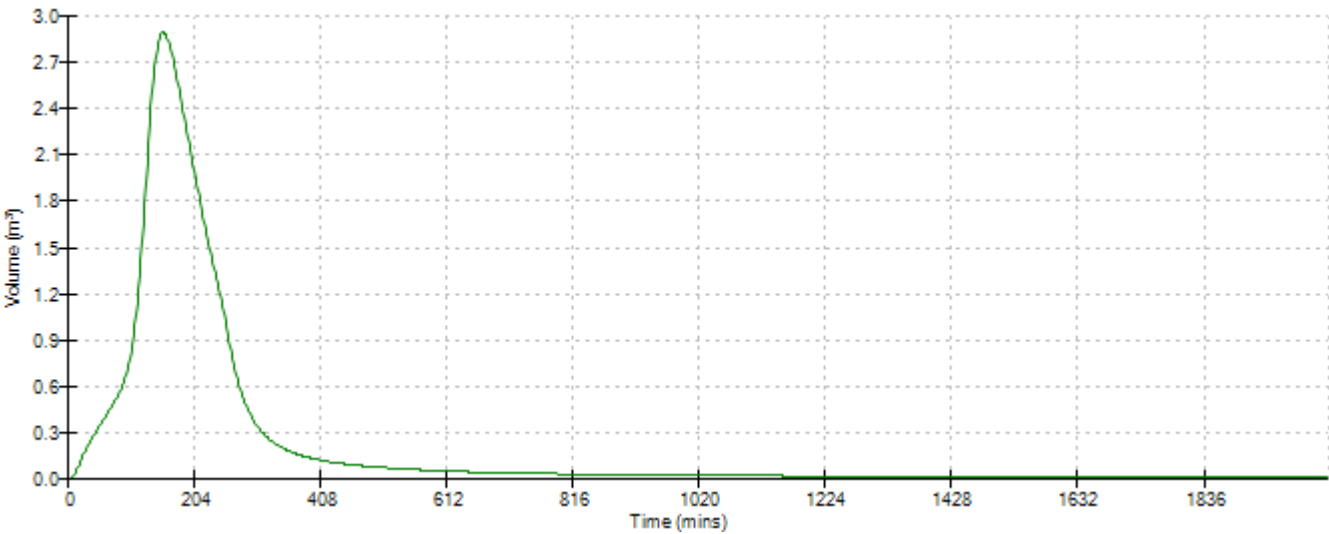
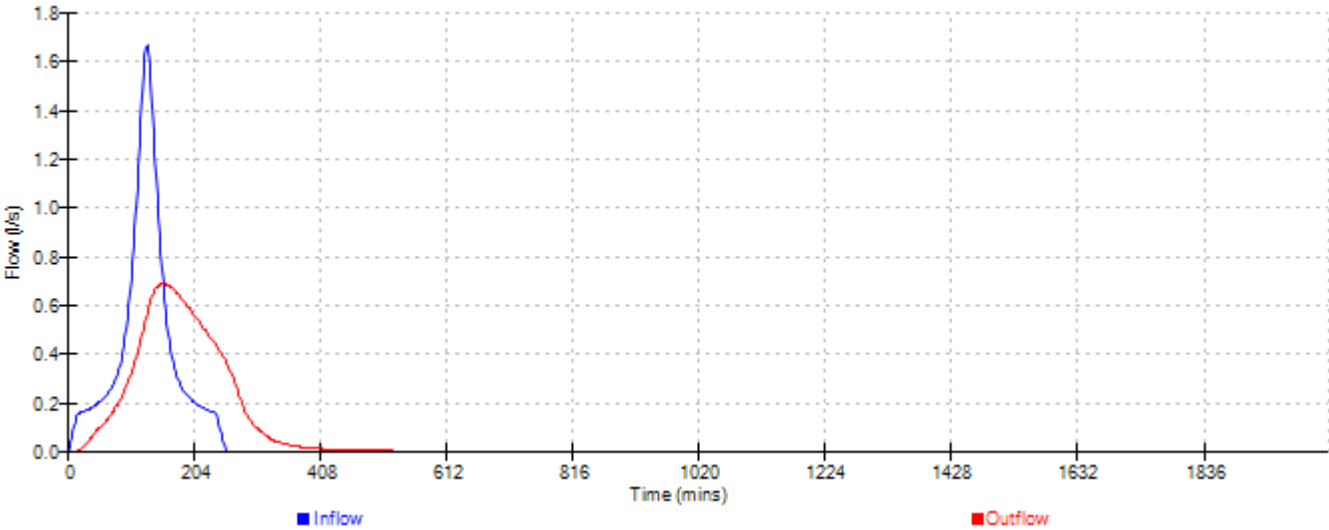
Event: 120 min Summer



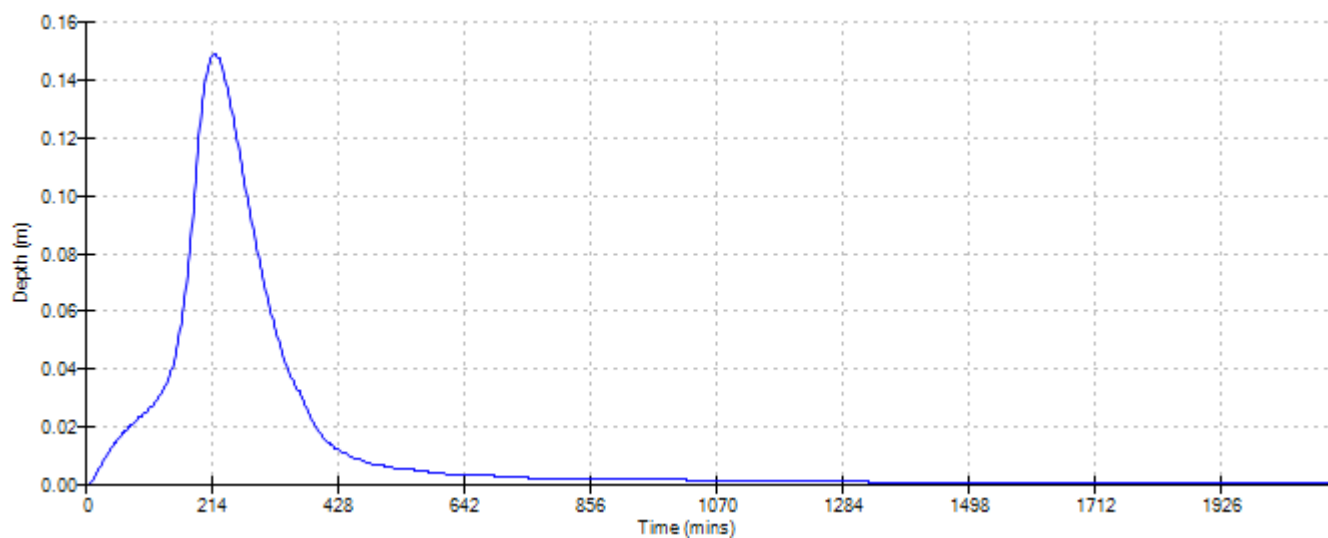
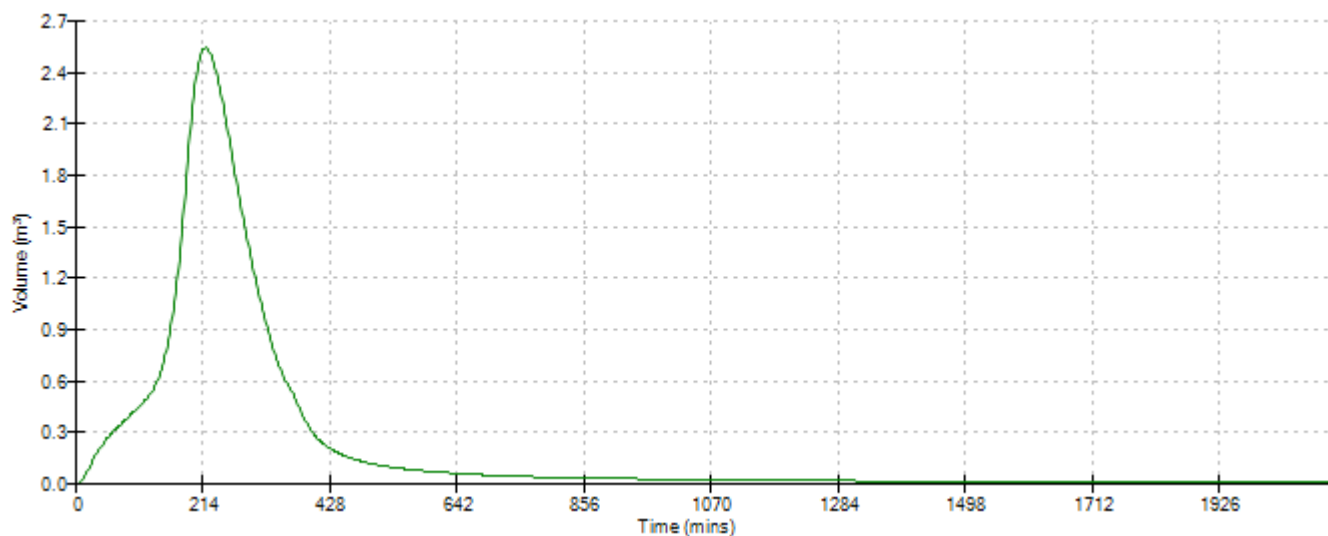
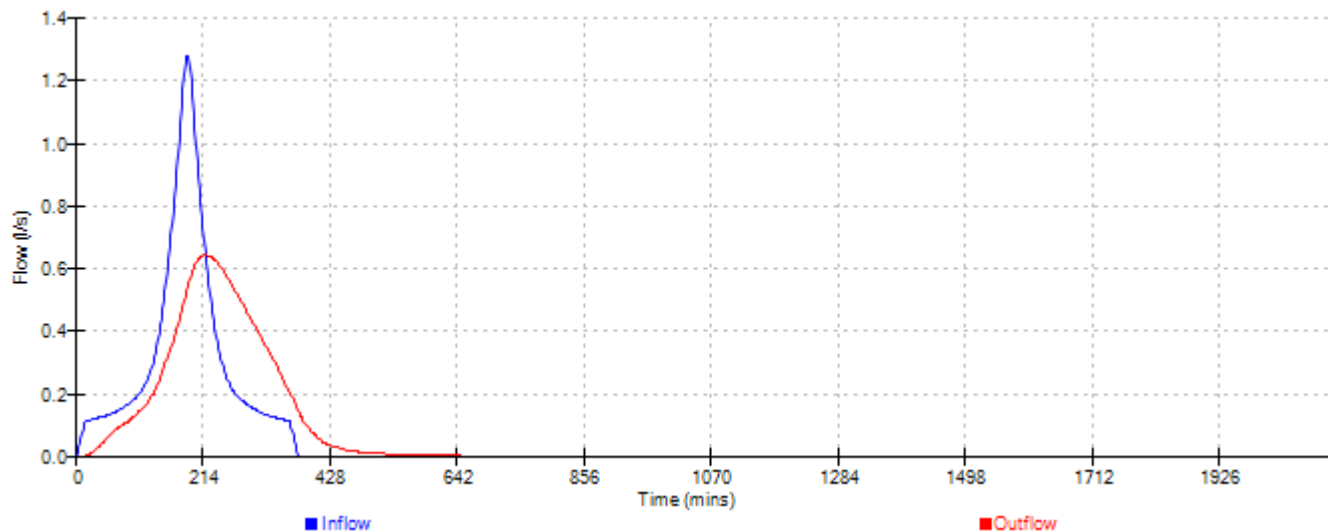
Event: 180 min Summer



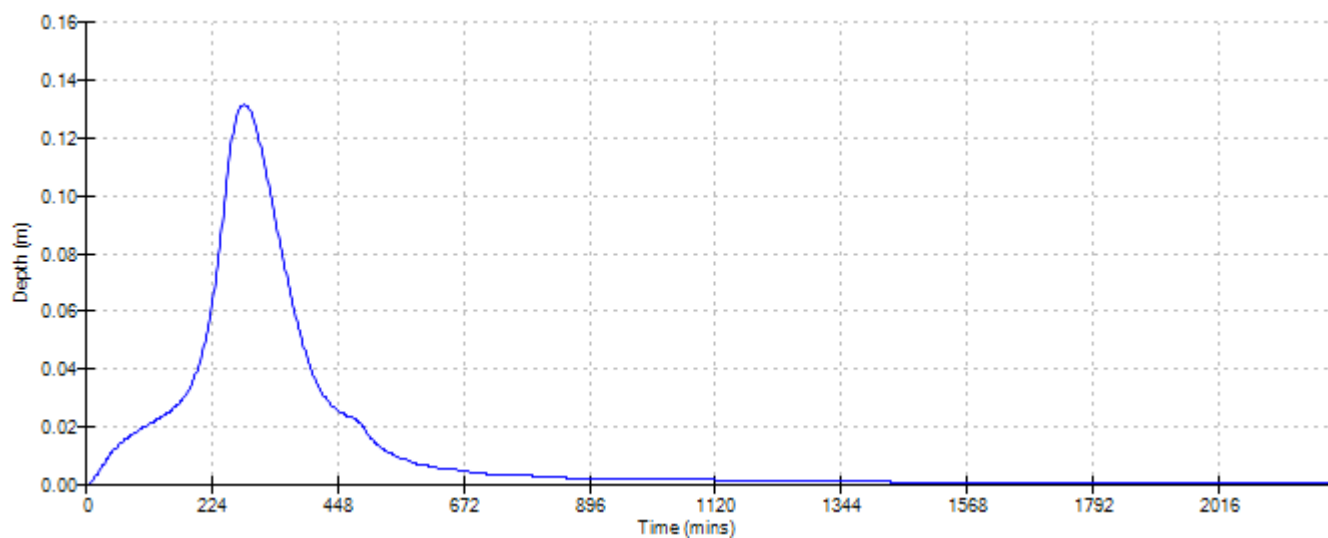
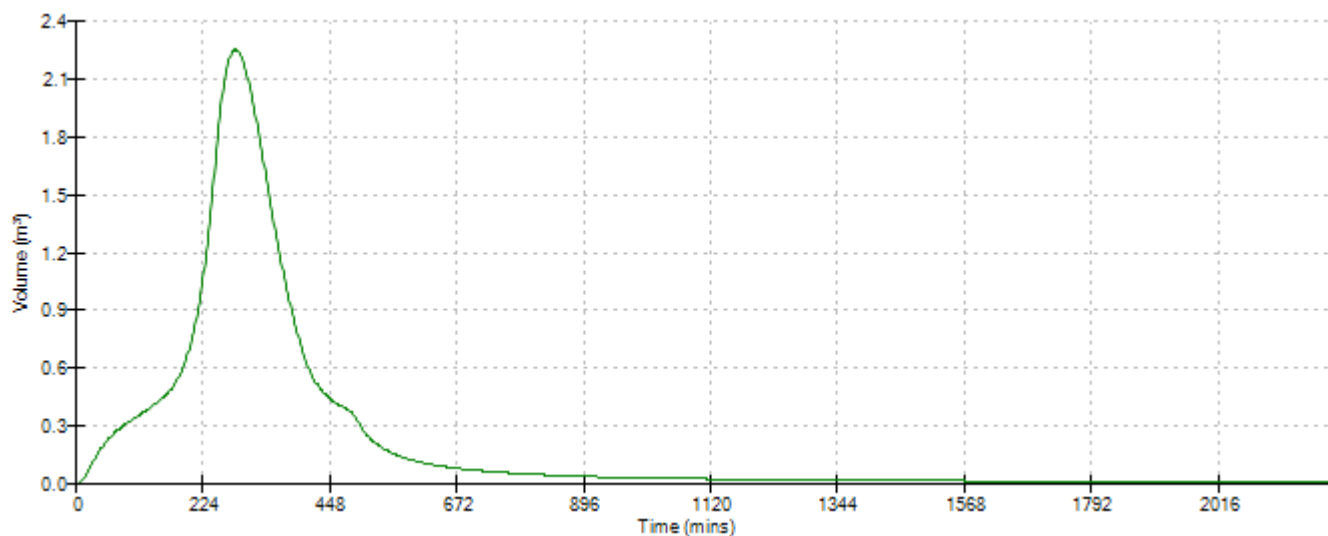
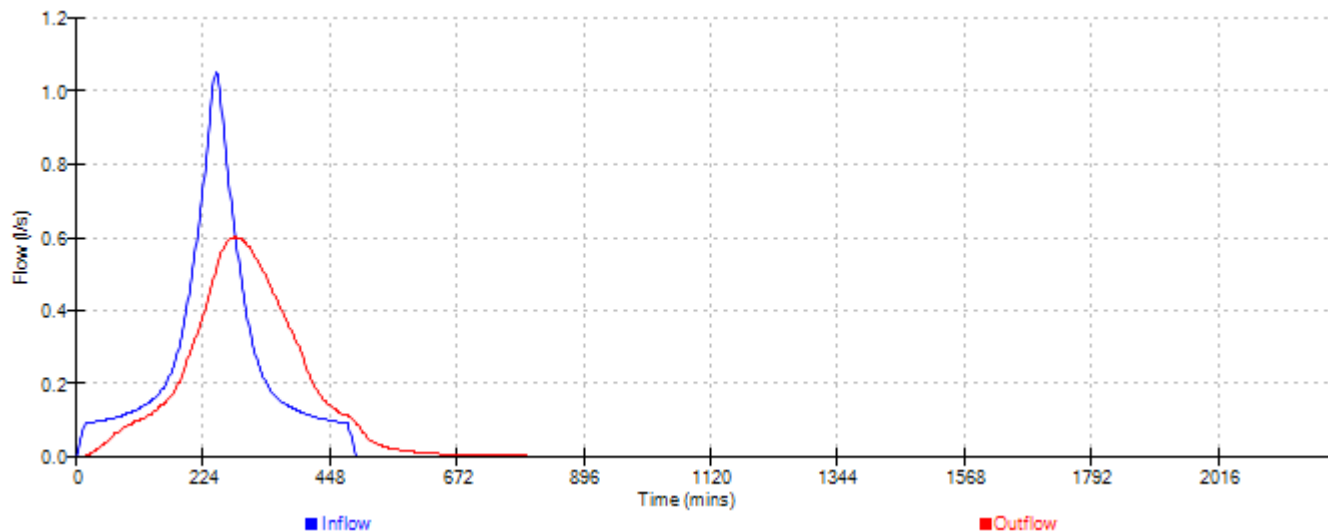
Event: 240 min Summer



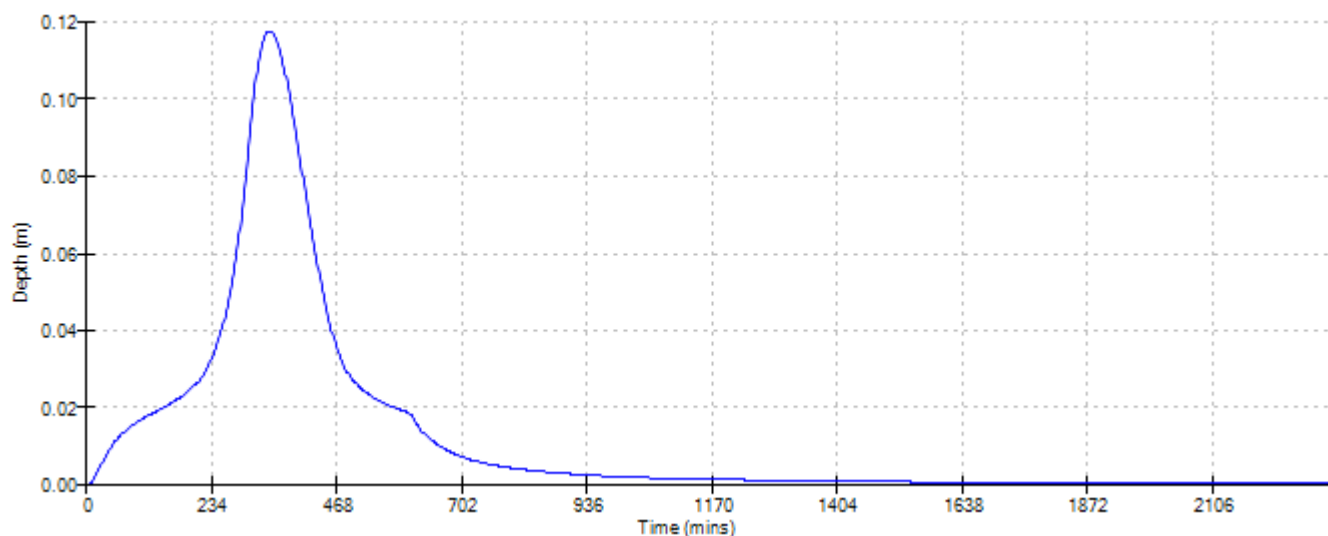
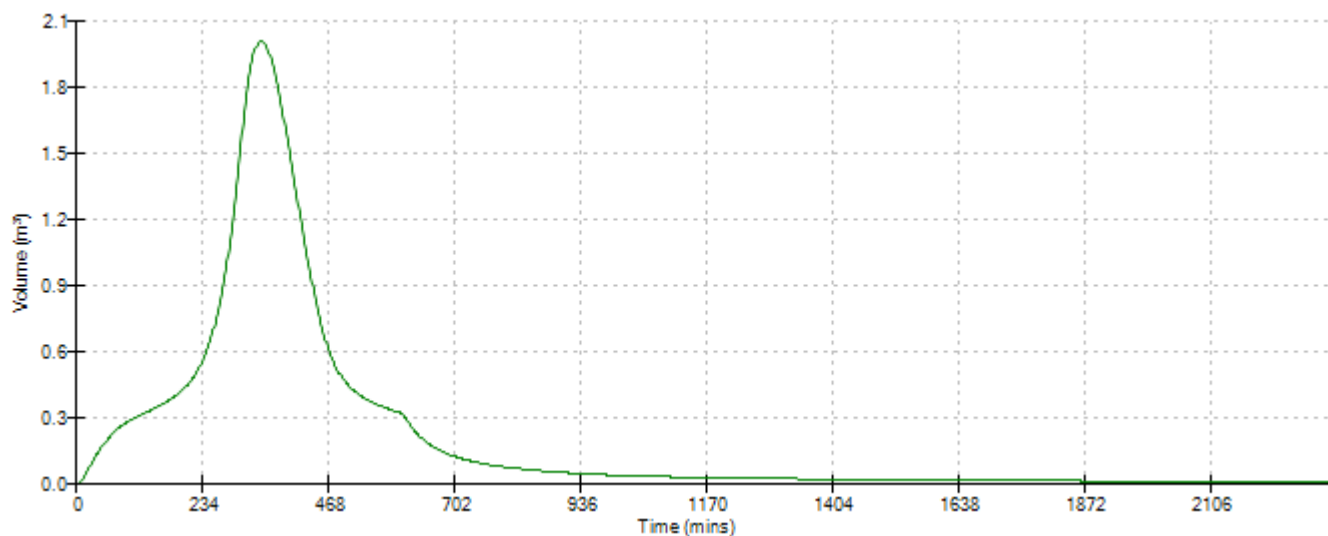
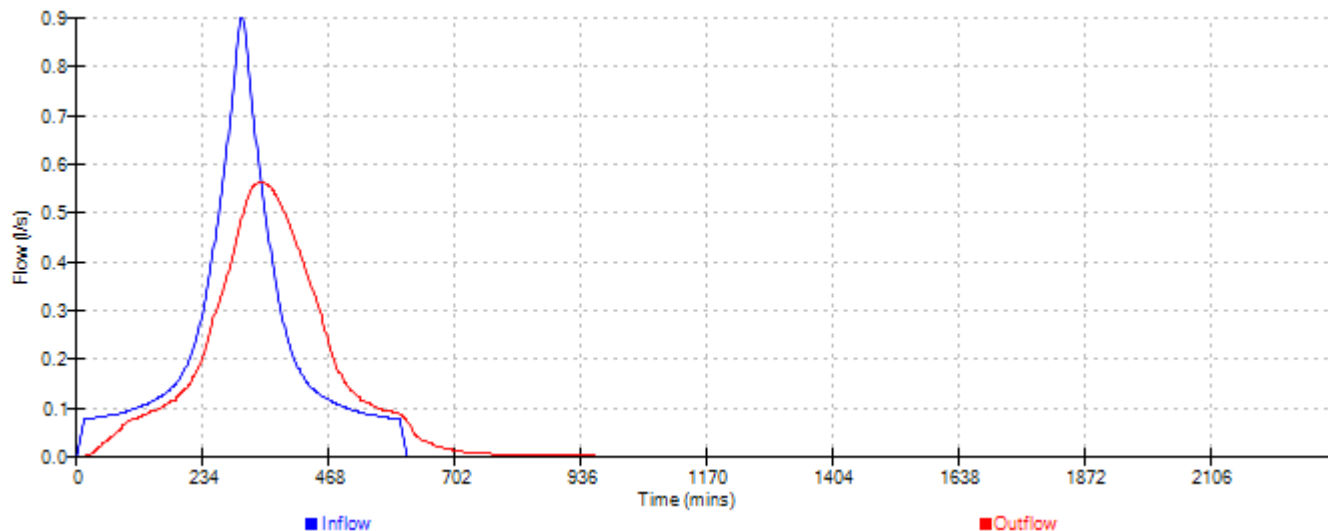
Event: 360 min Summer



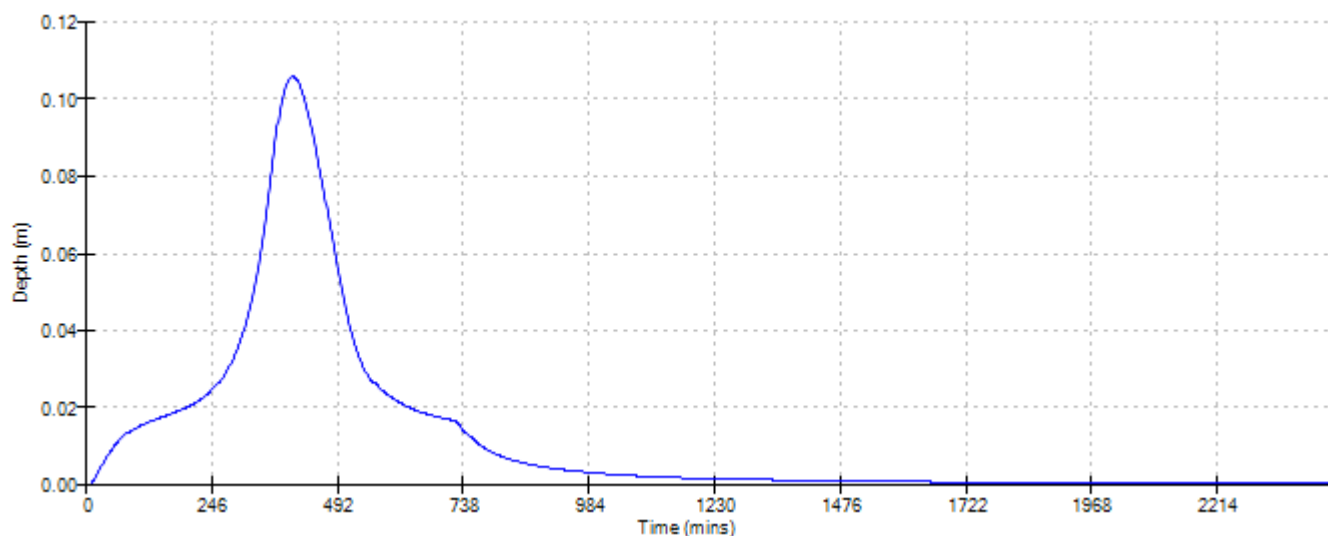
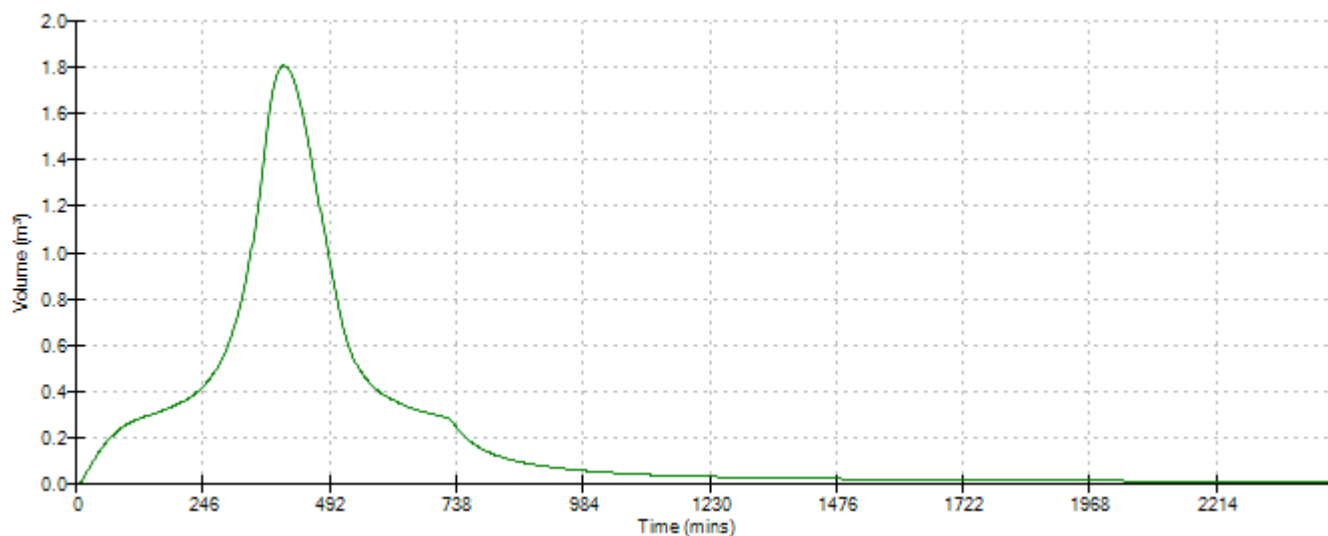
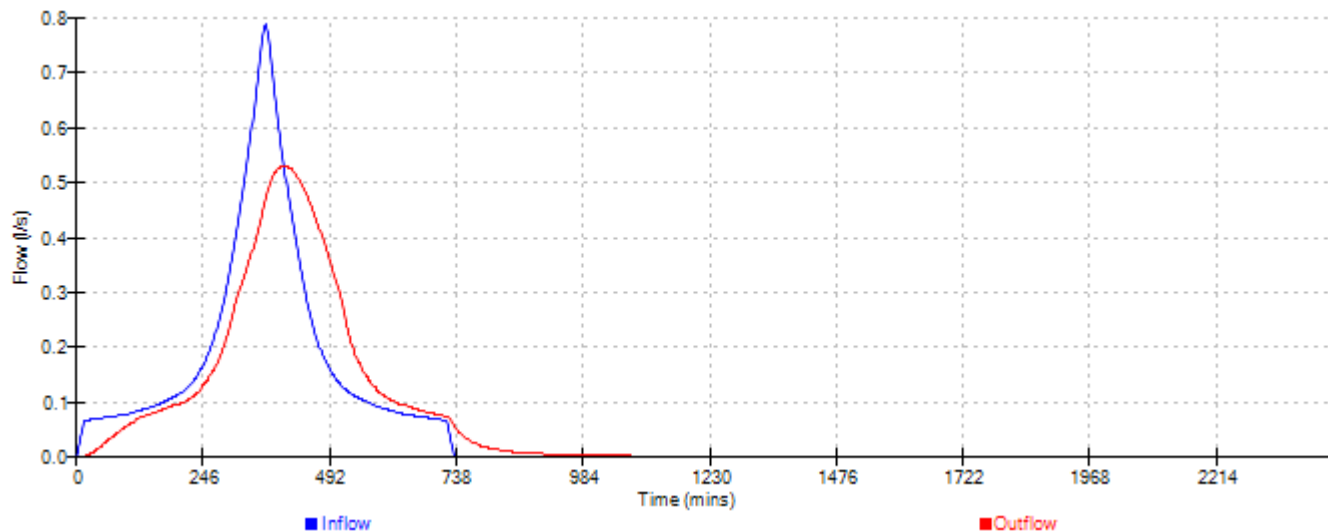
Event: 480 min Summer



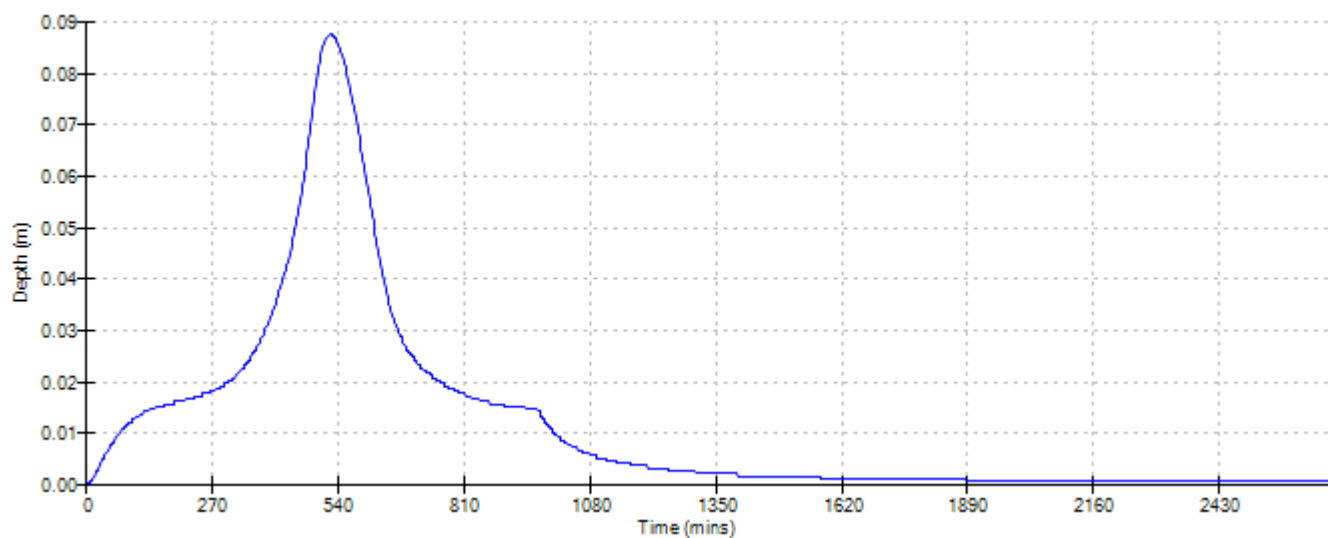
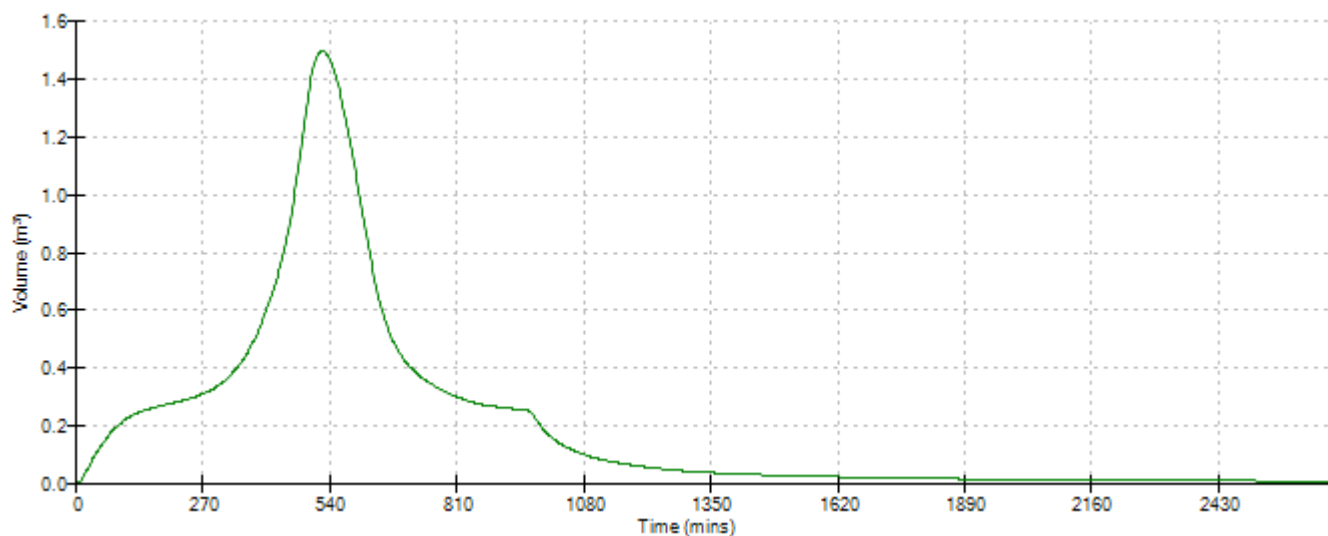
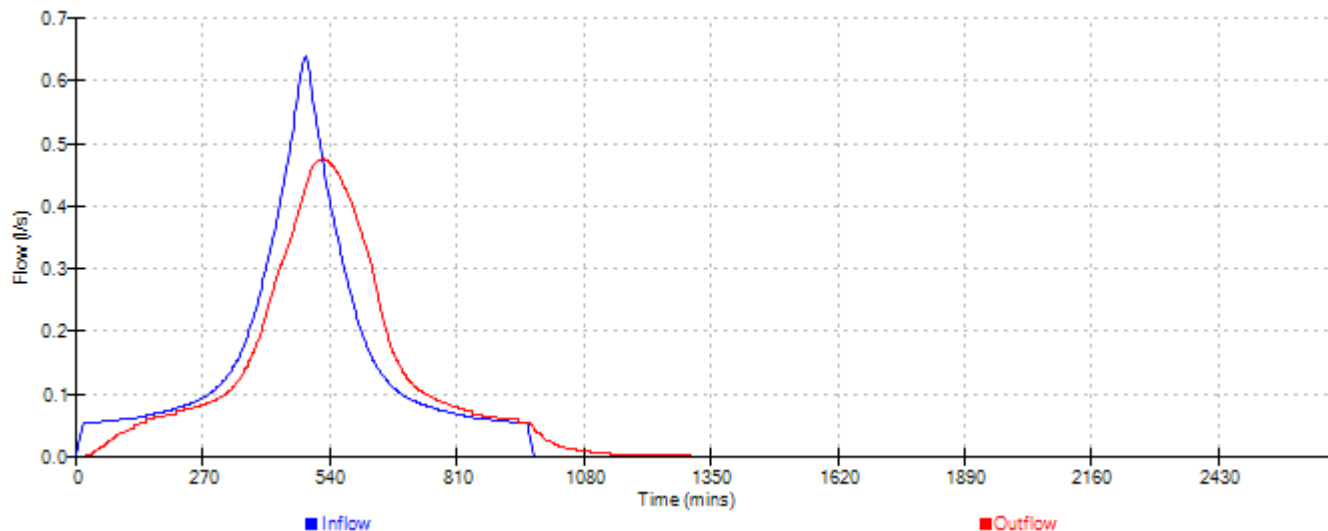
Event: 600 min Summer



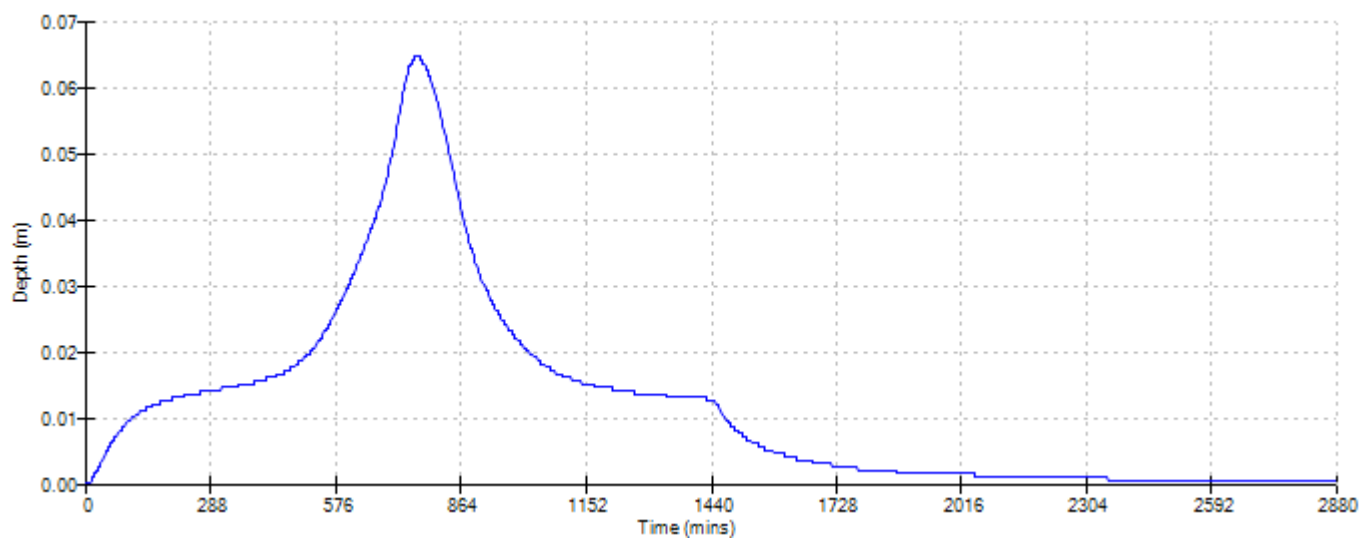
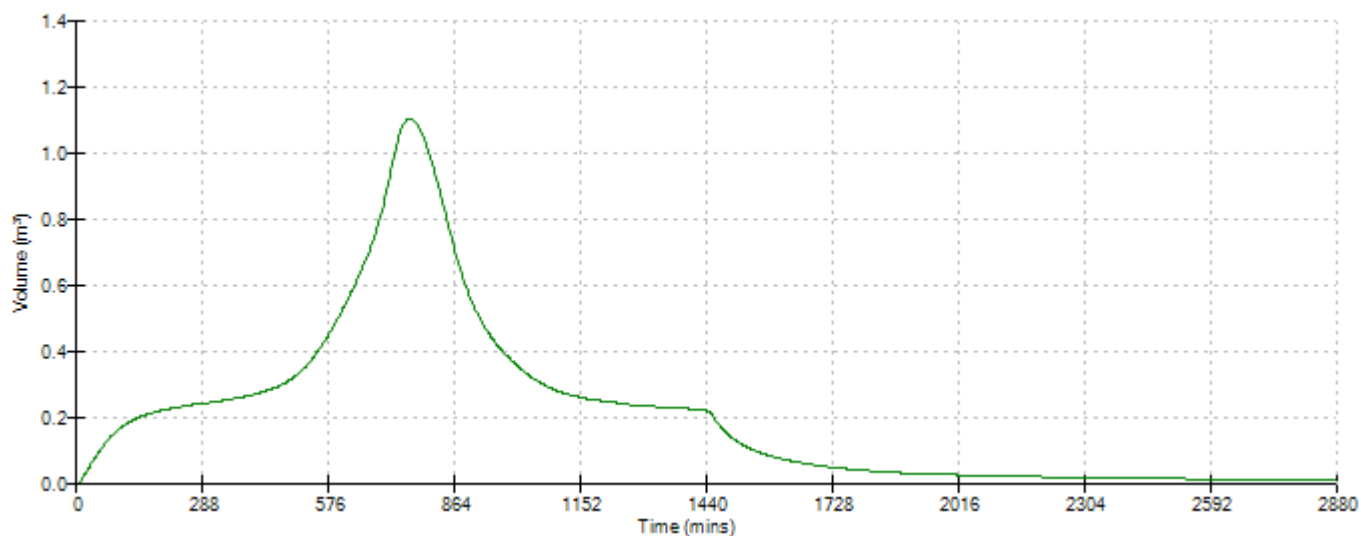
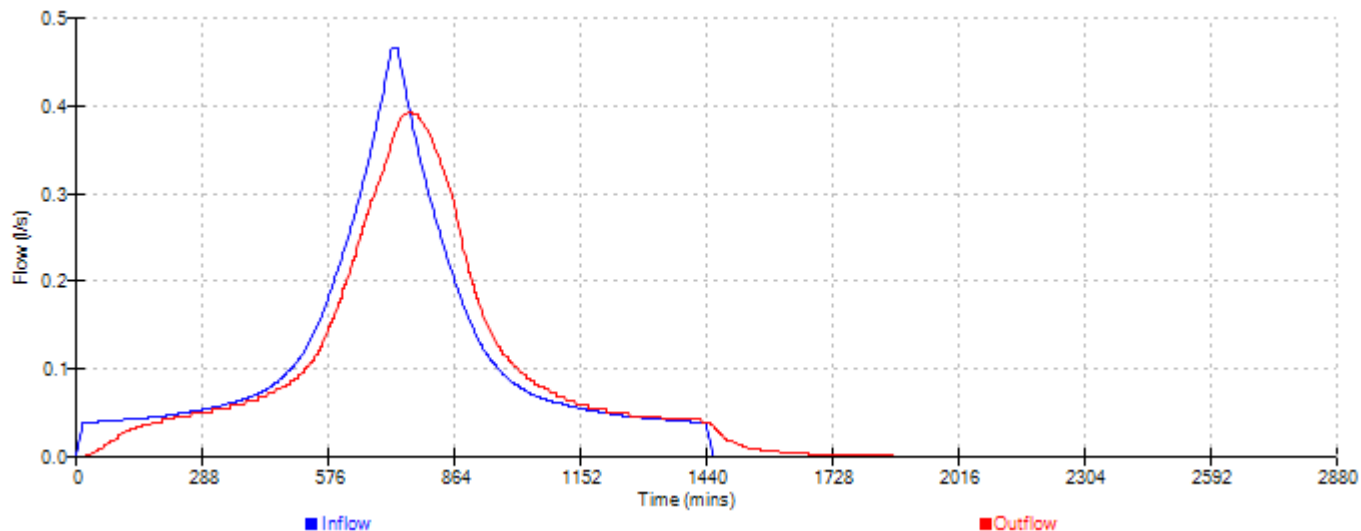
Event: 720 min Summer



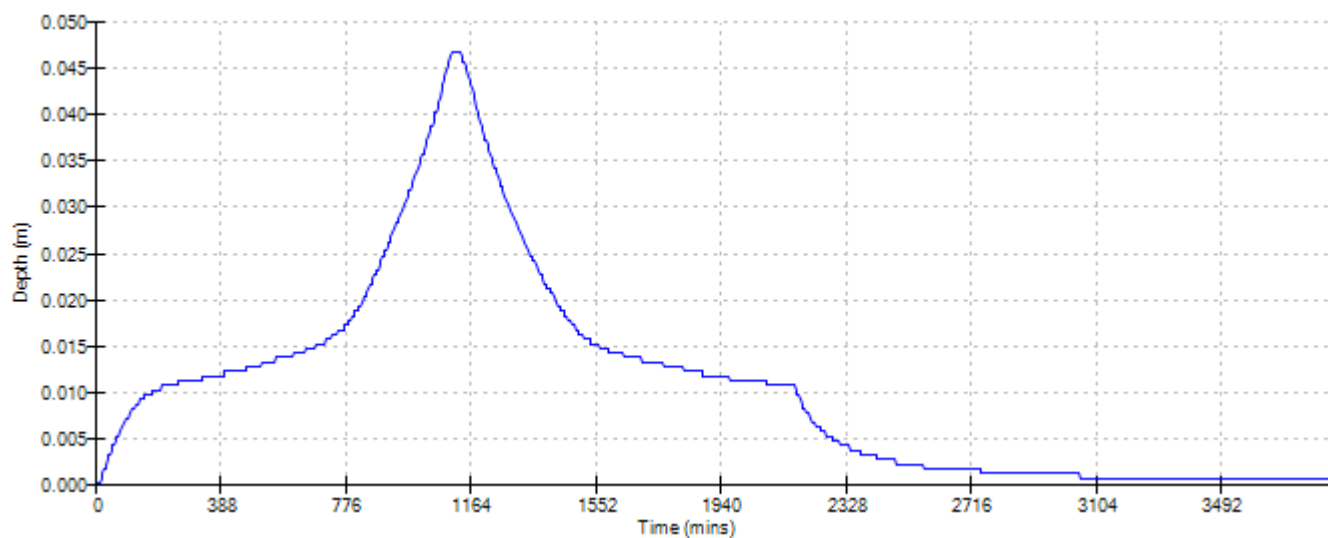
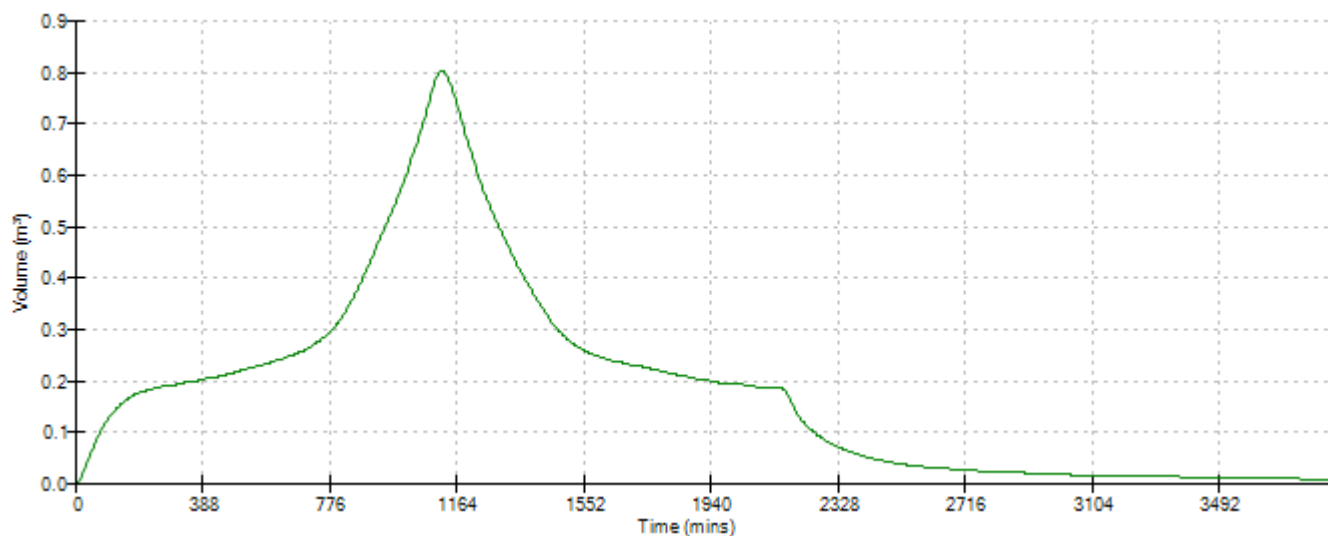
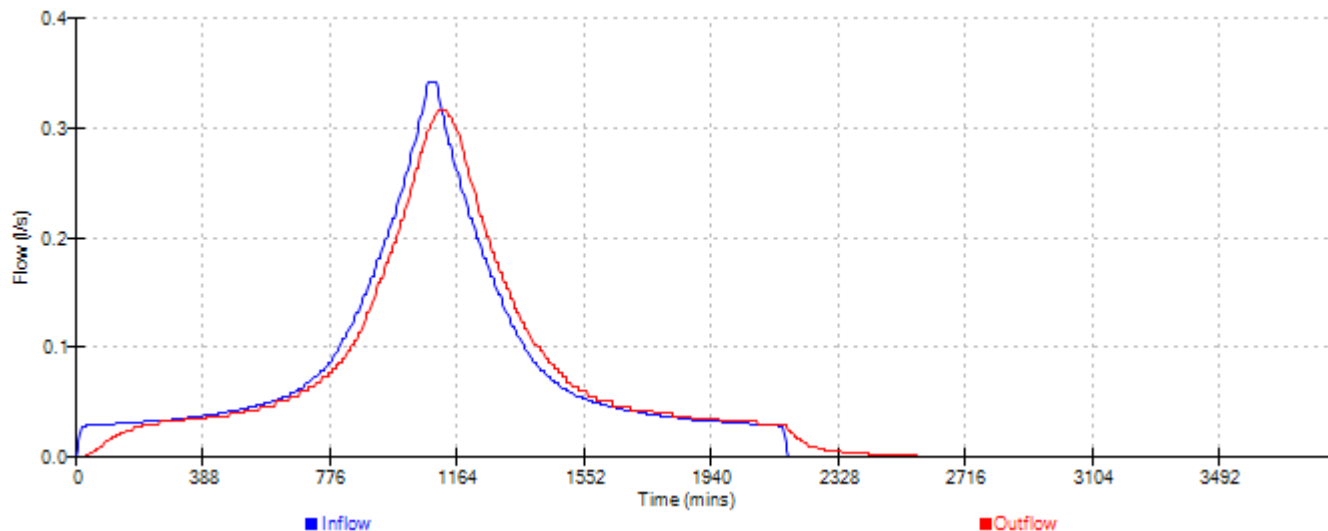
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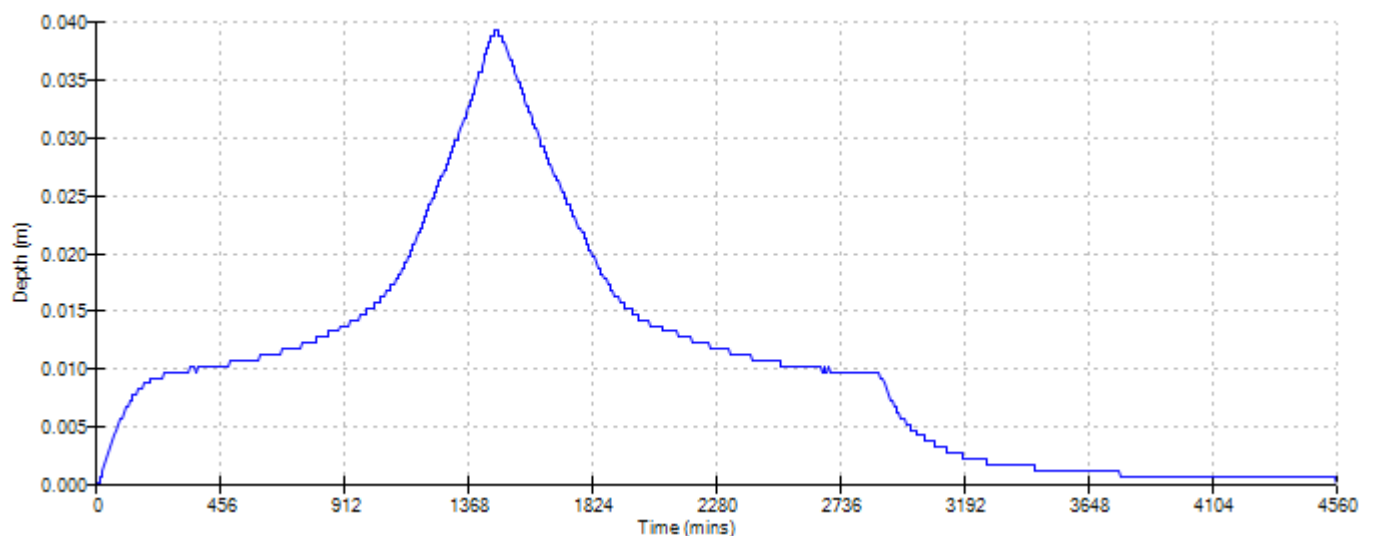
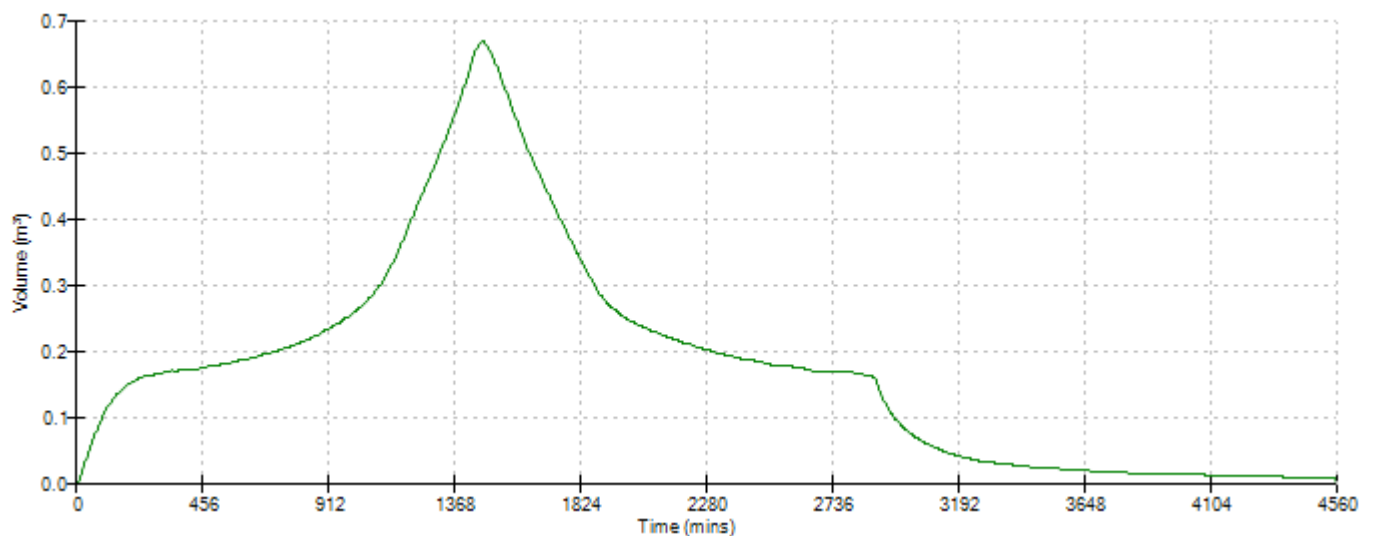
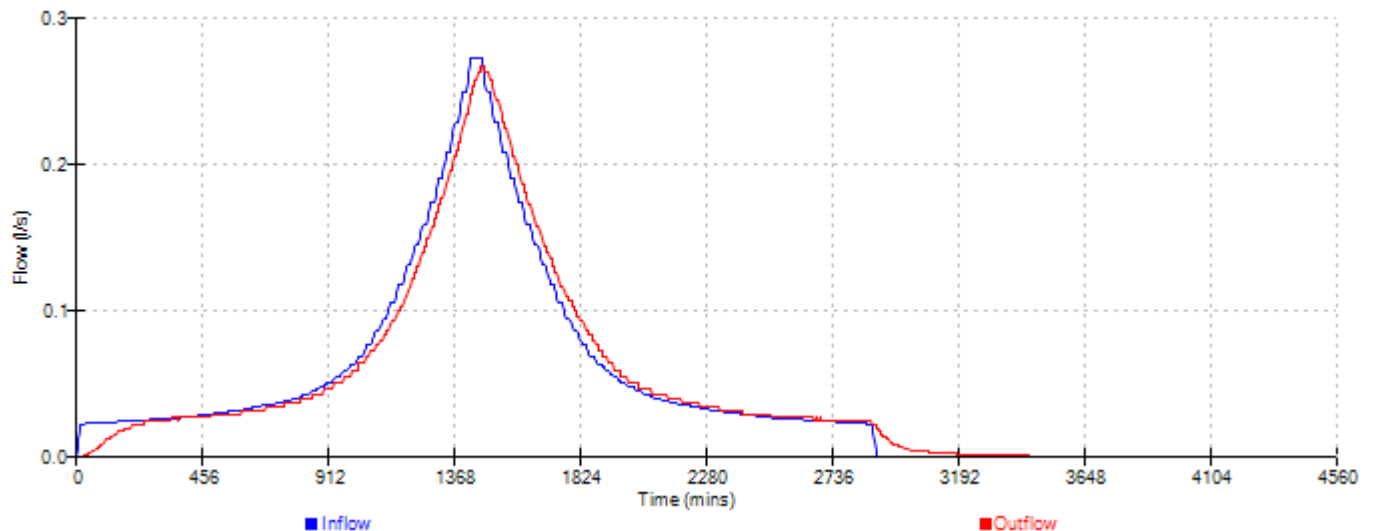
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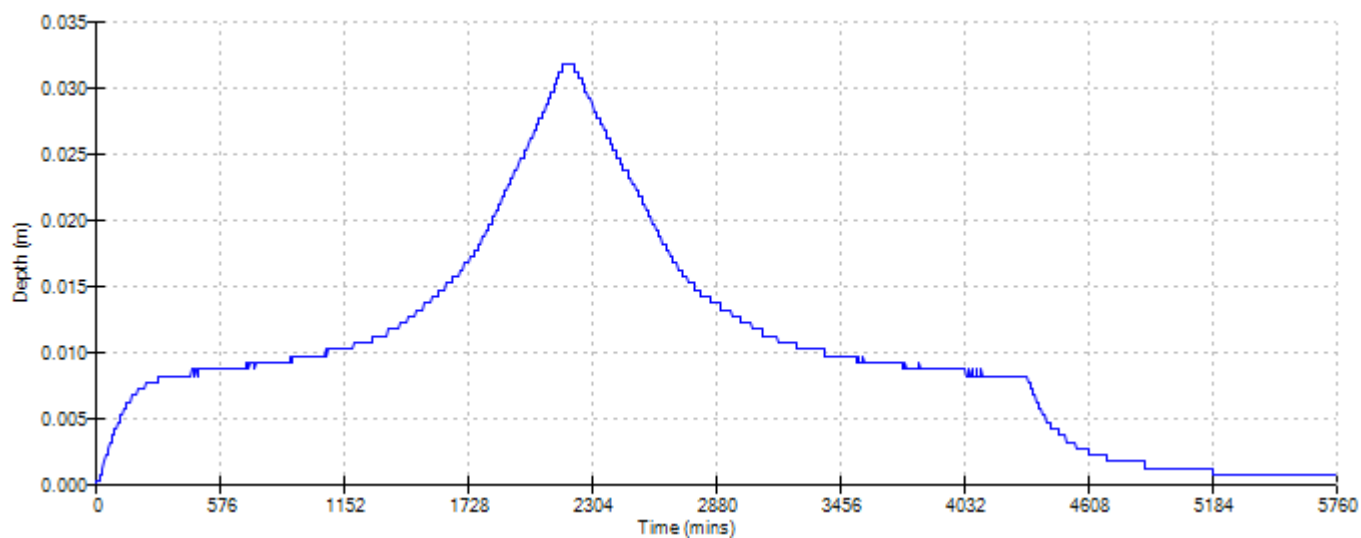
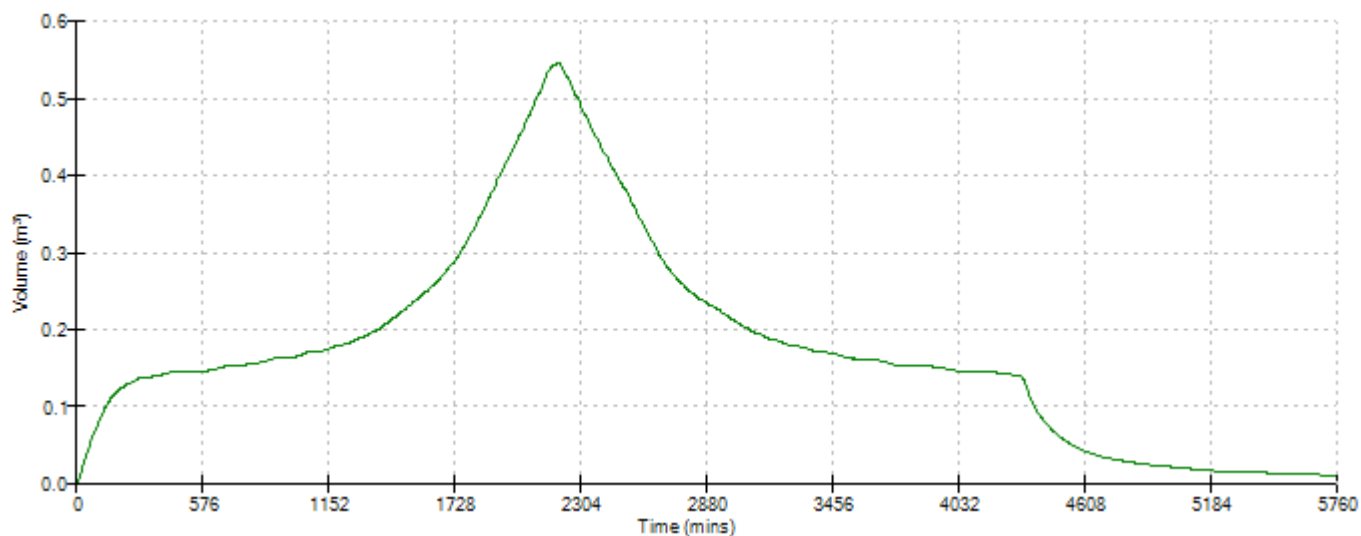
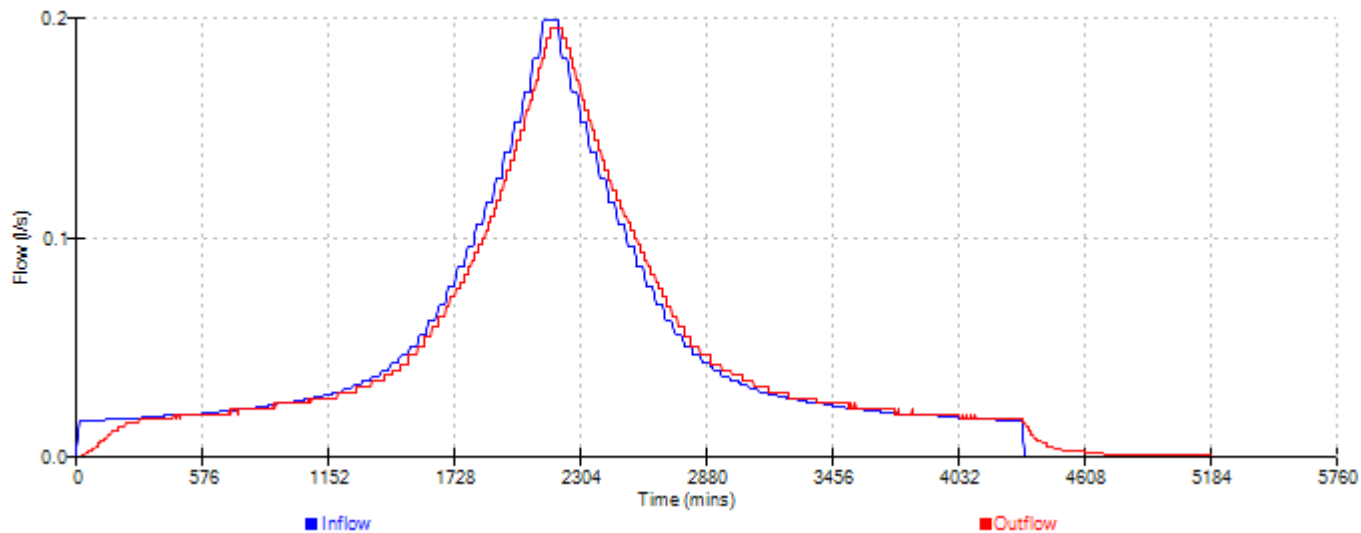
Event: 2160 min Summer



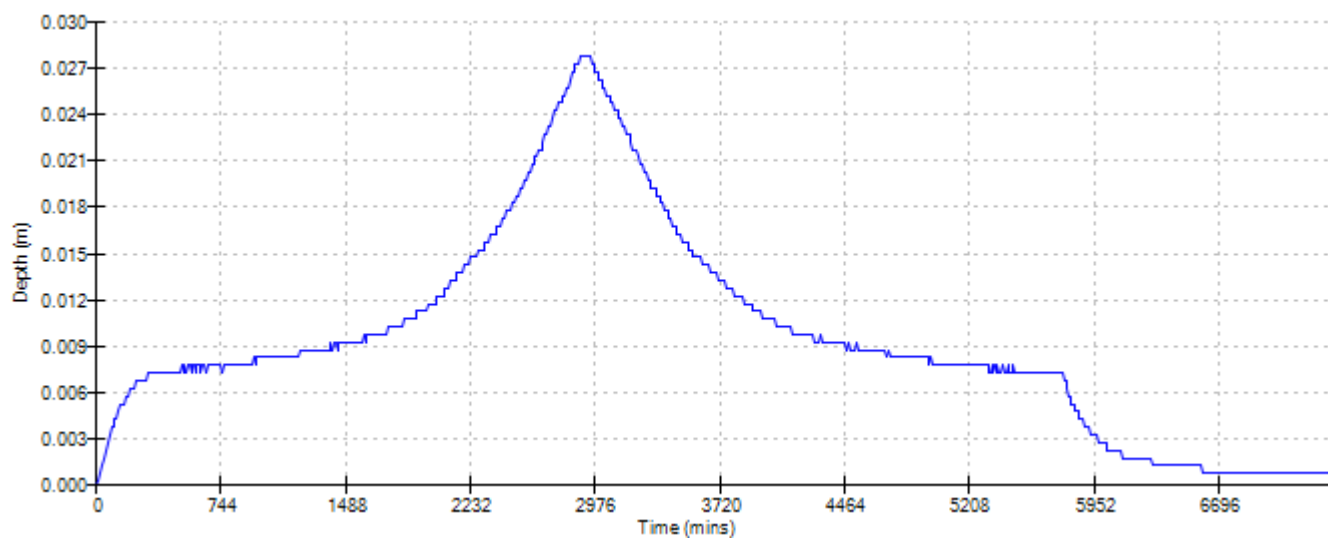
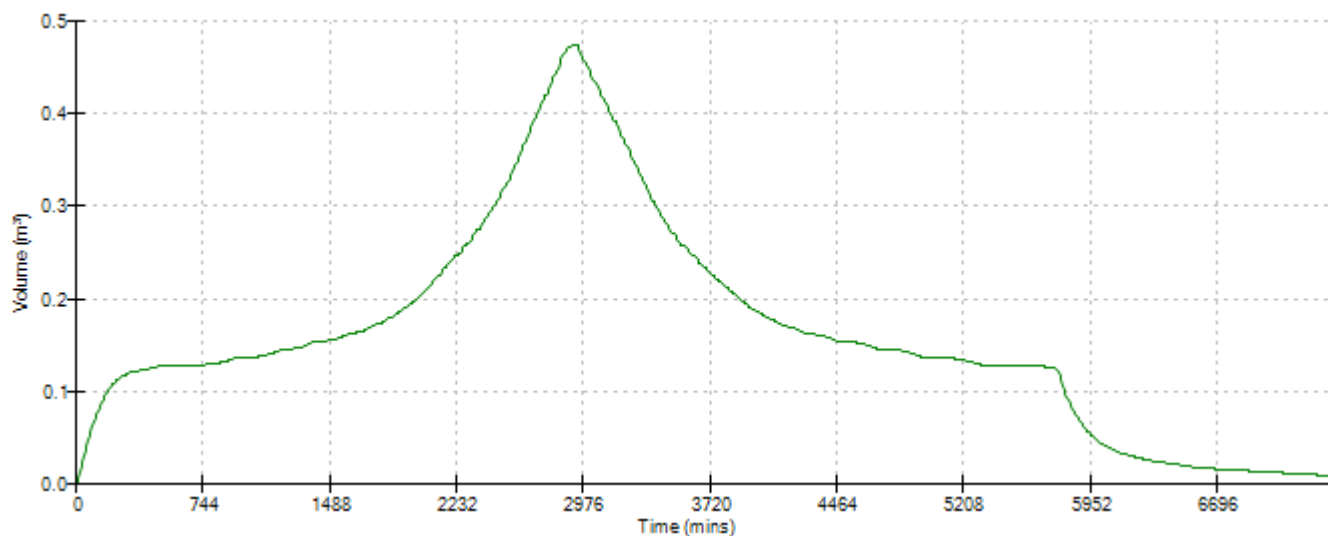
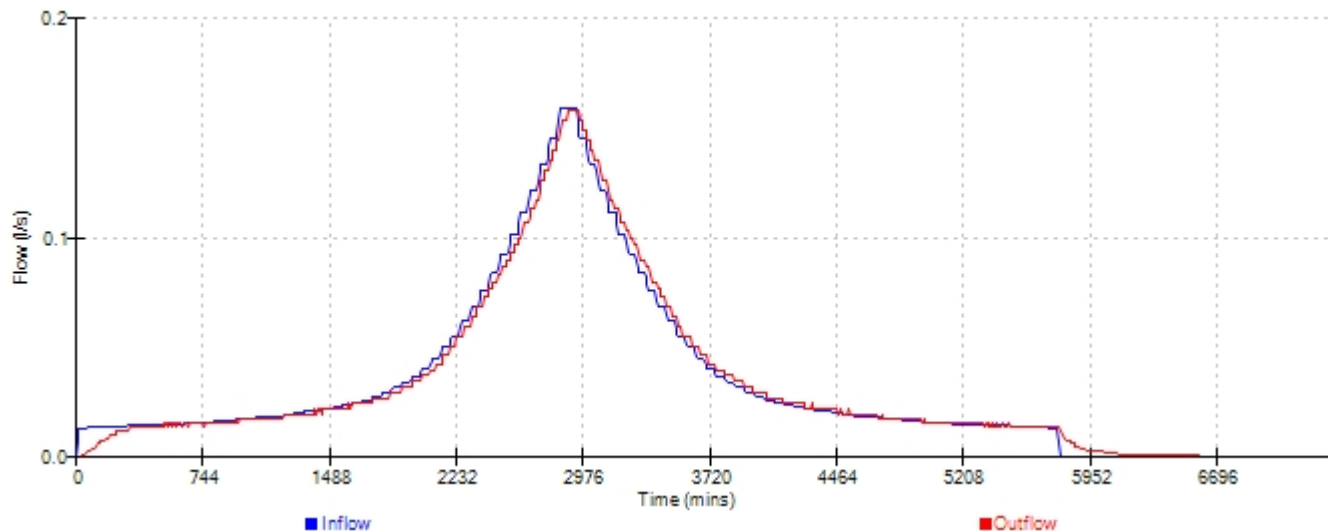
Event: 2880 min Summer



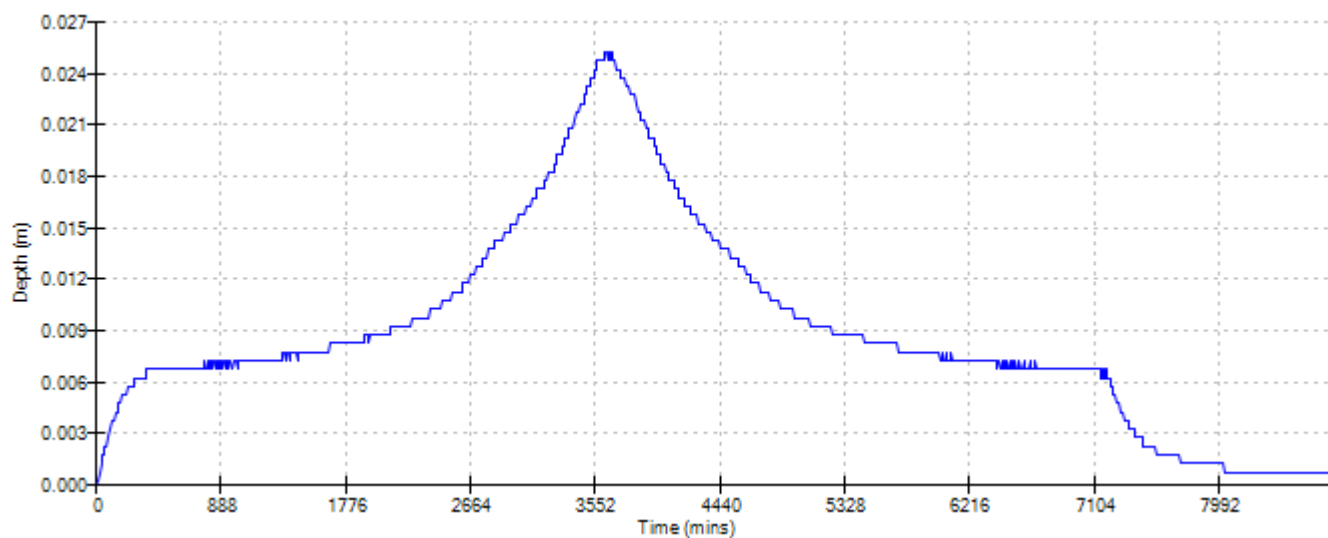
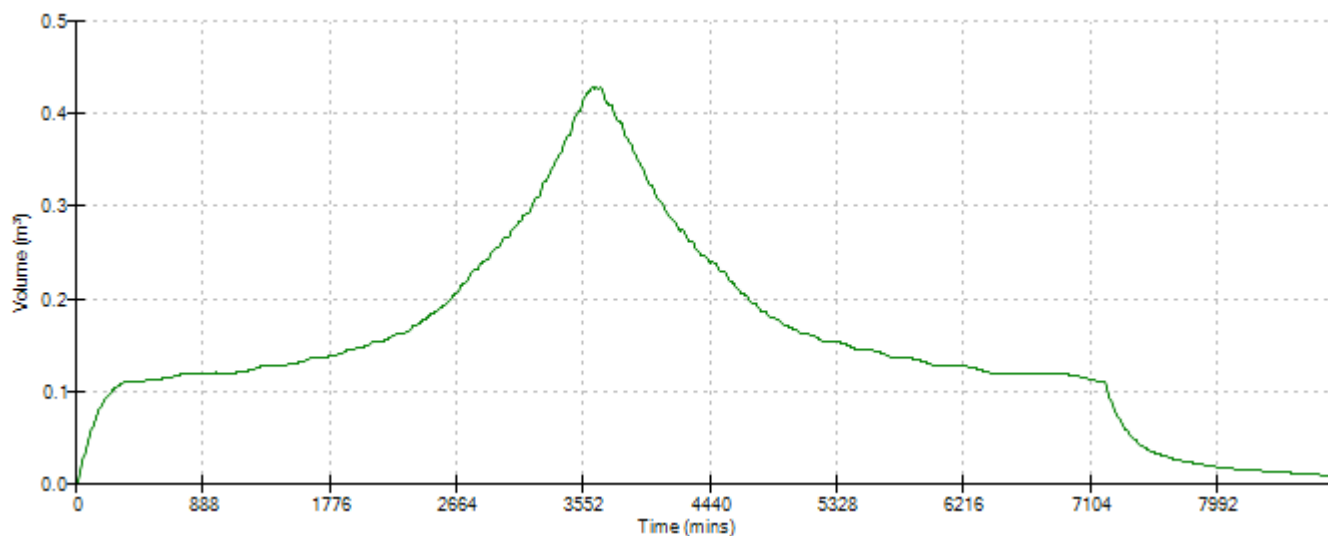
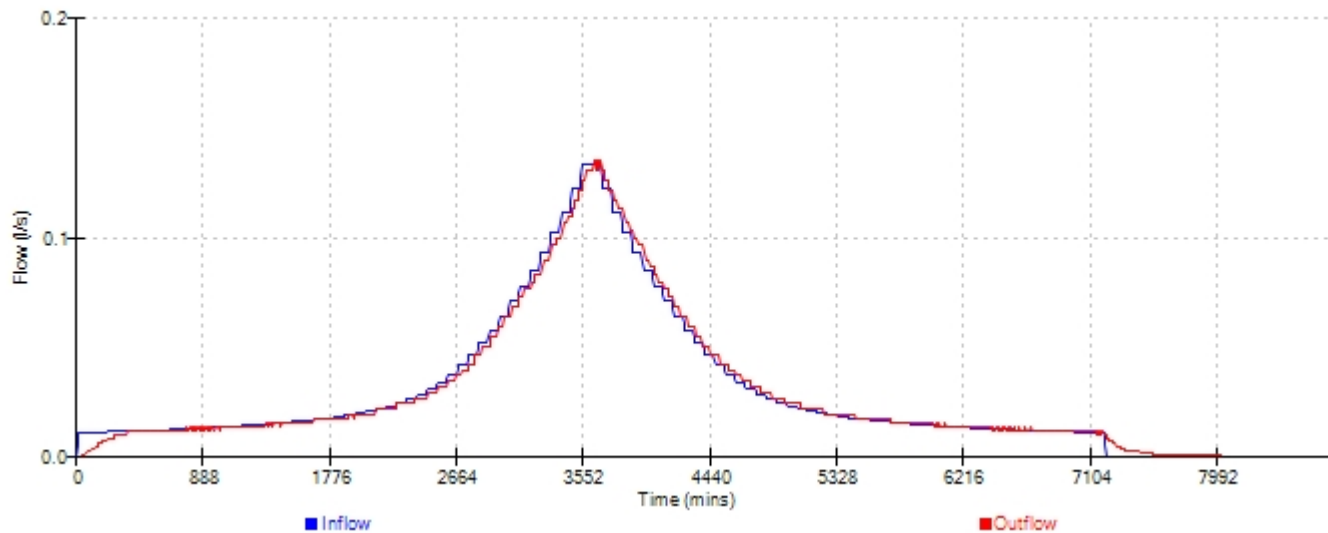
Event: 4320 min Summer



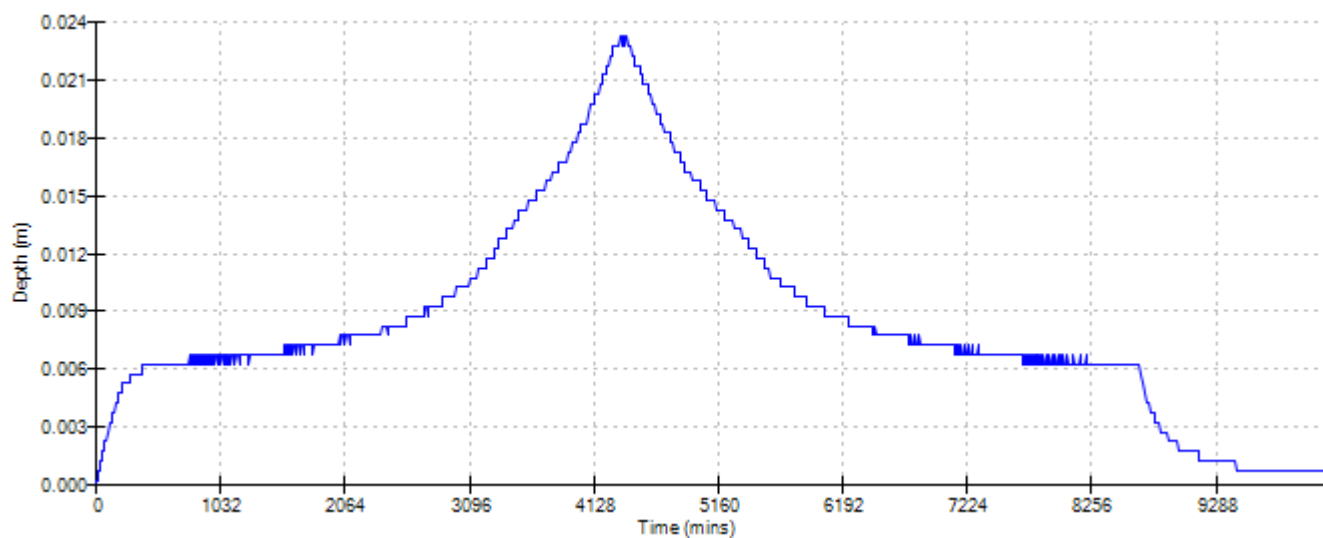
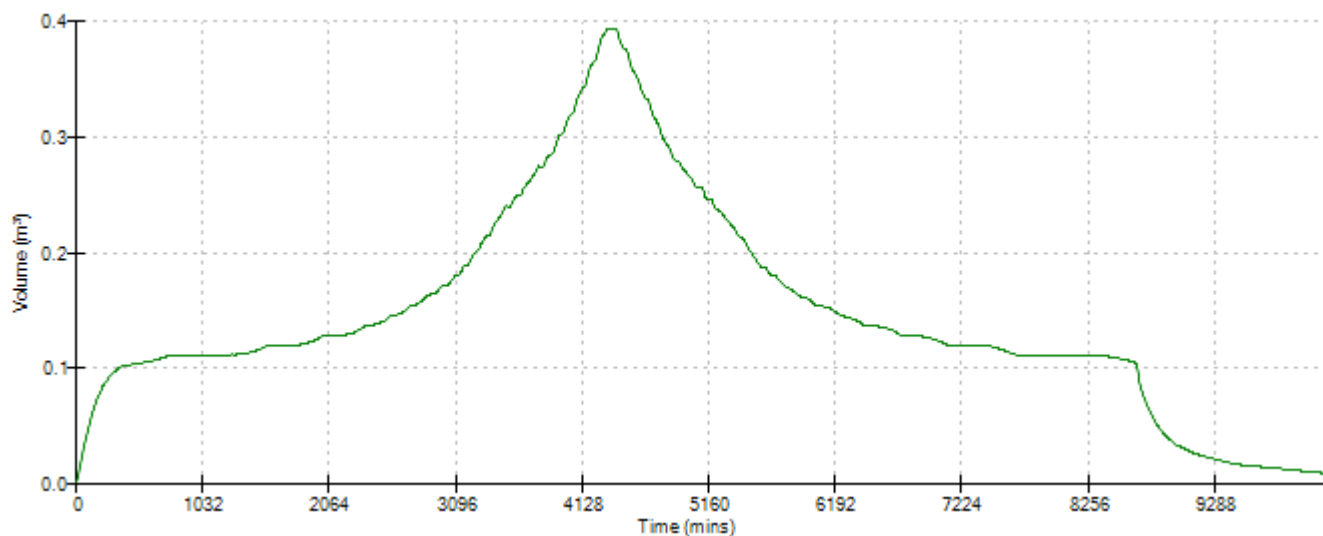
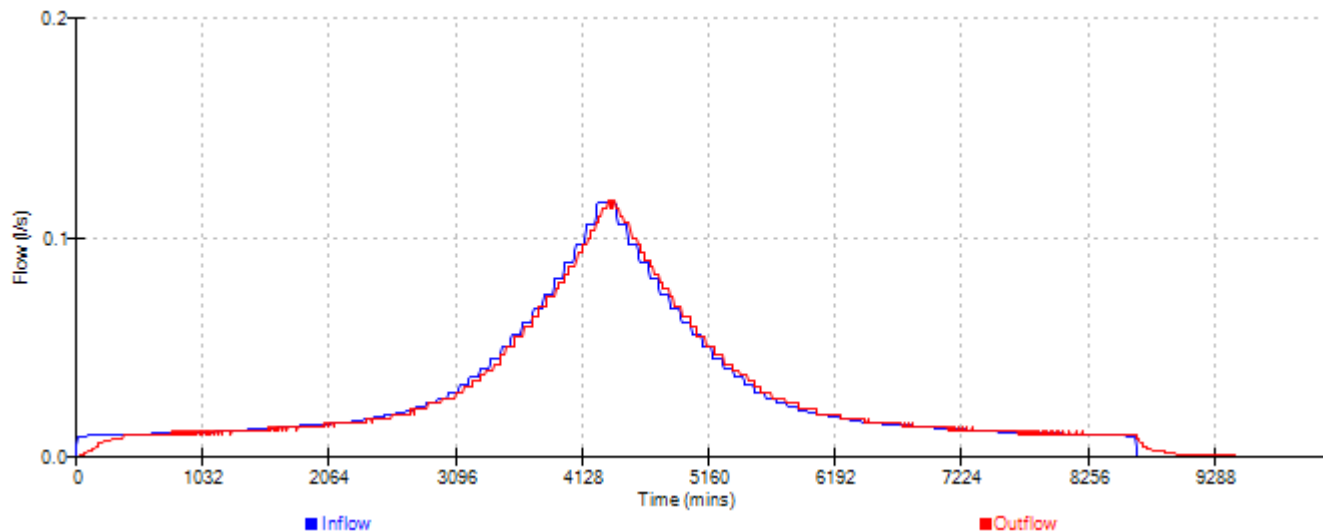
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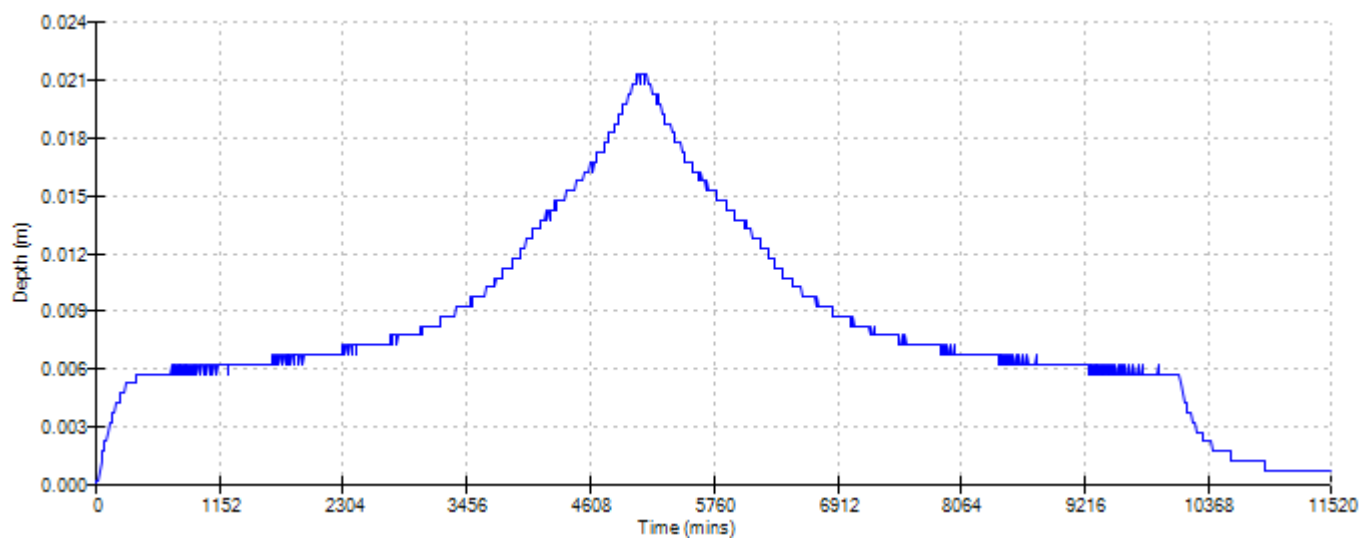
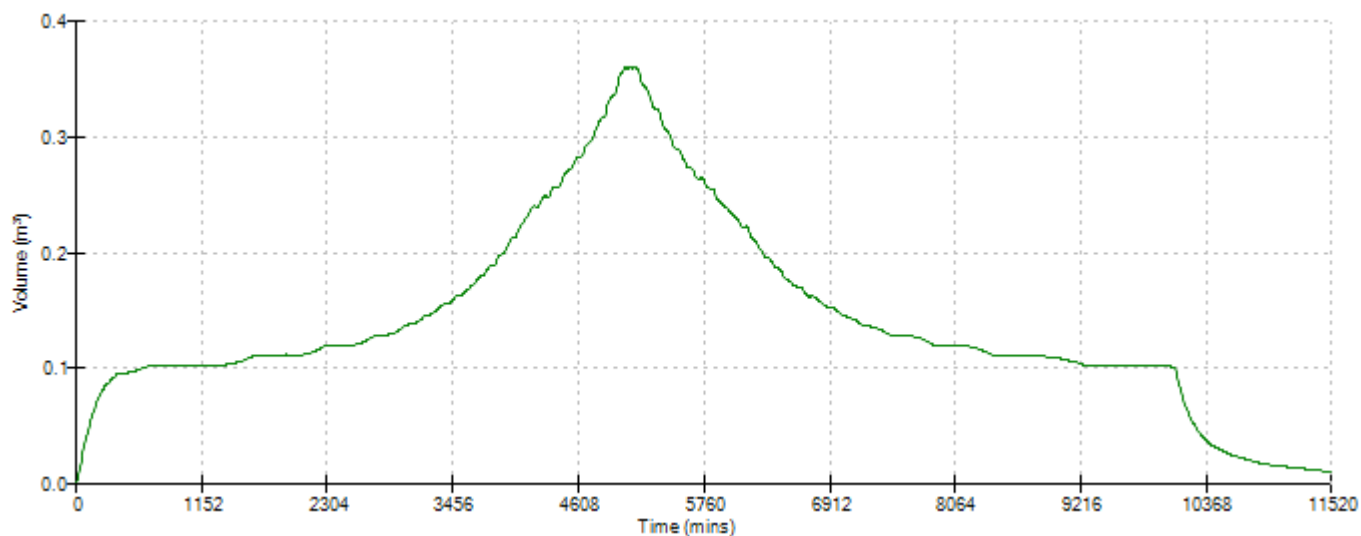
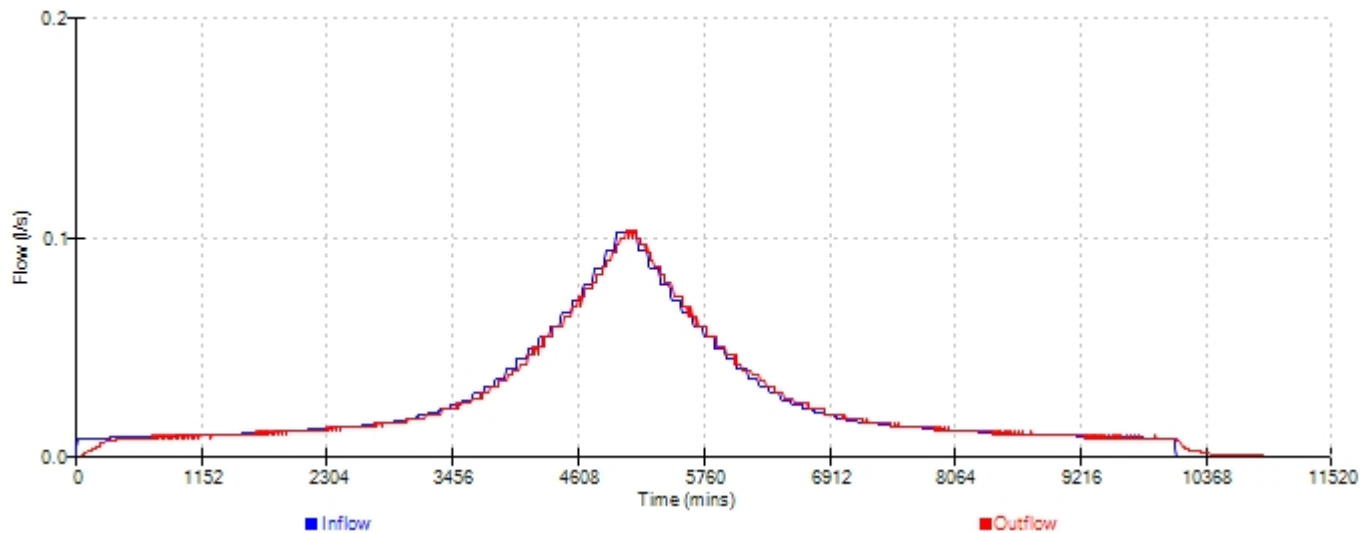
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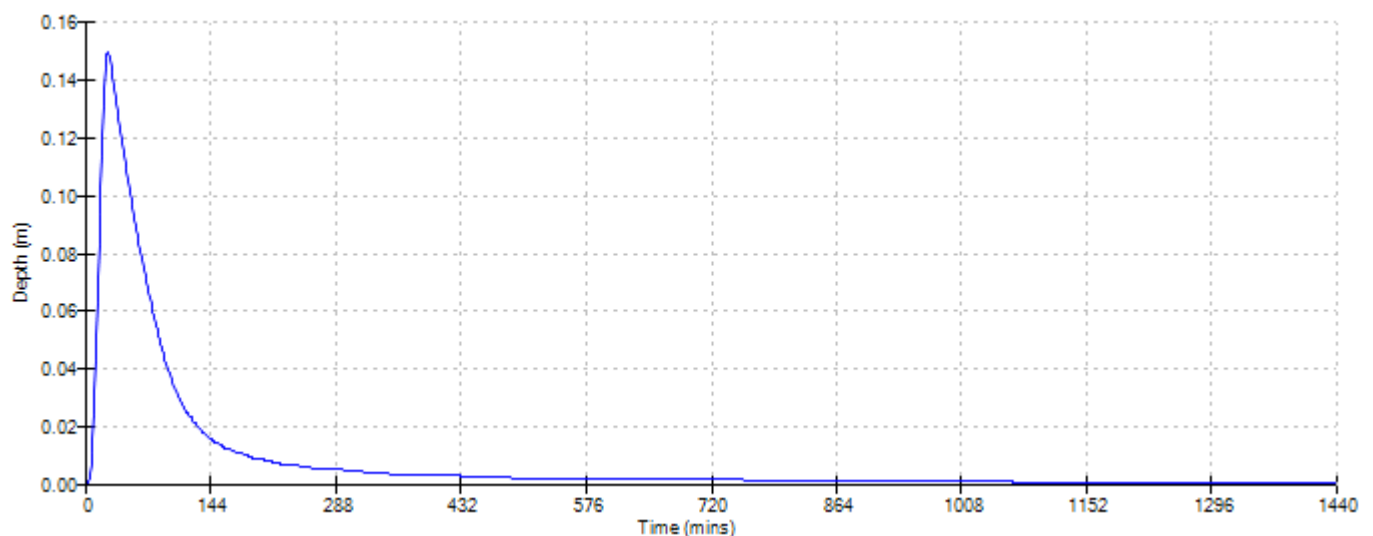
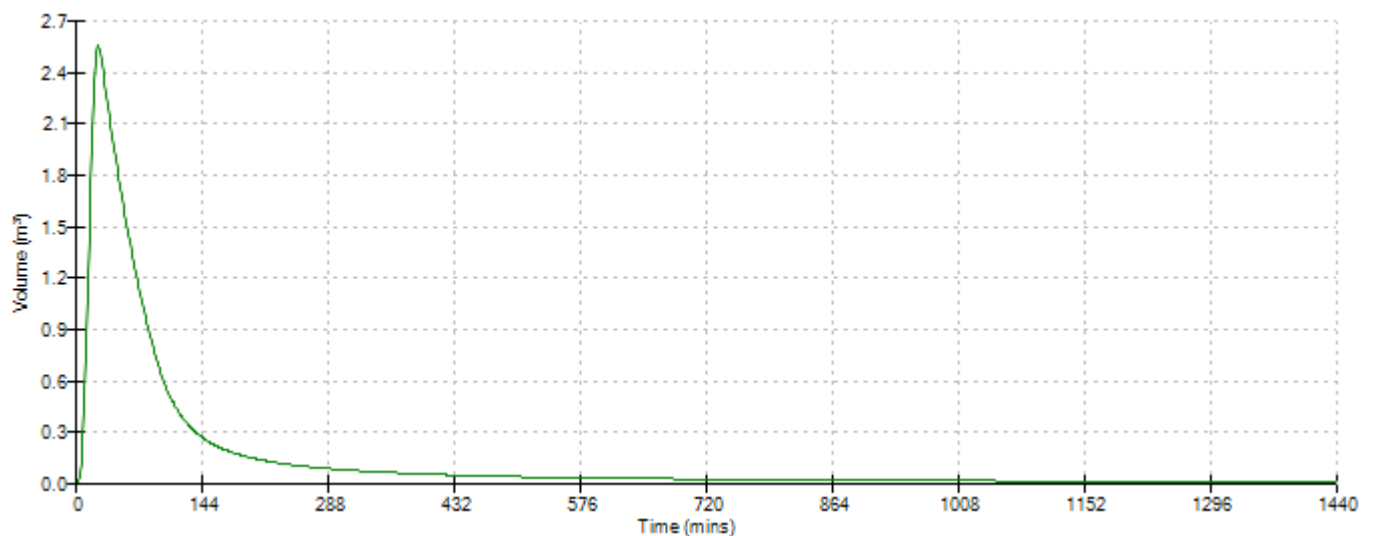
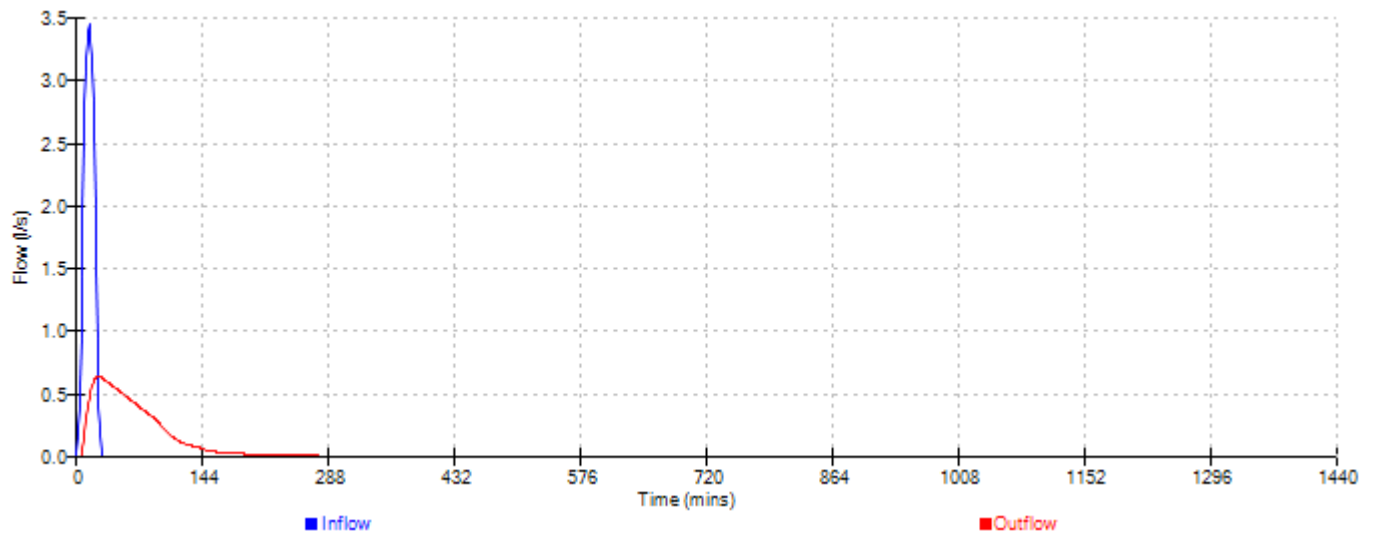
Event: 8640 min Summer



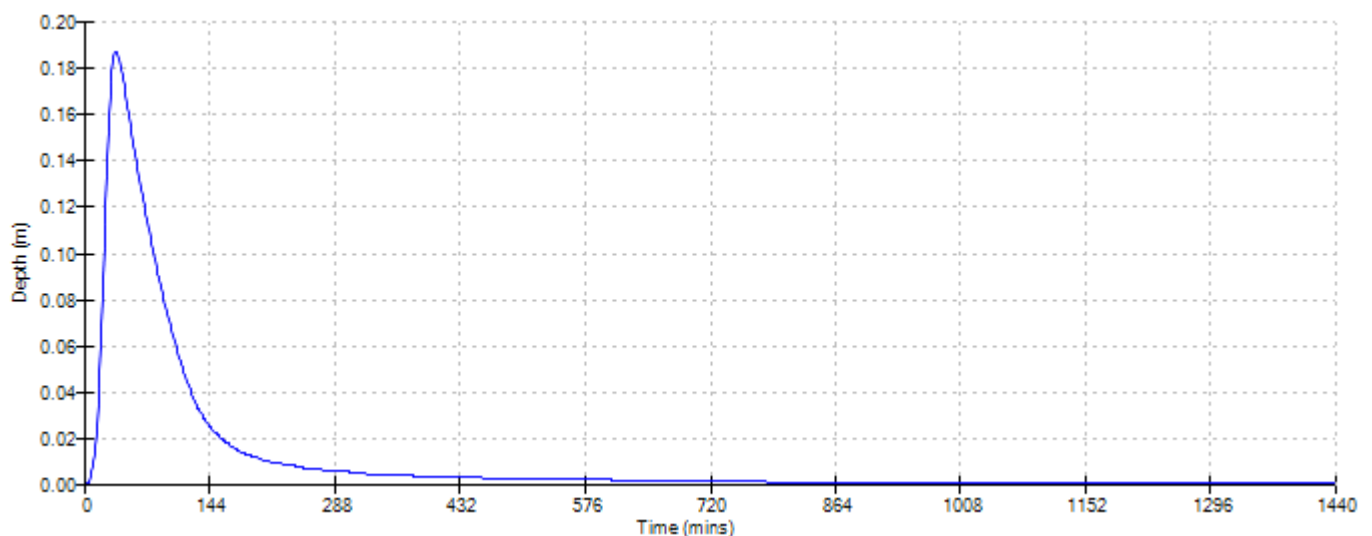
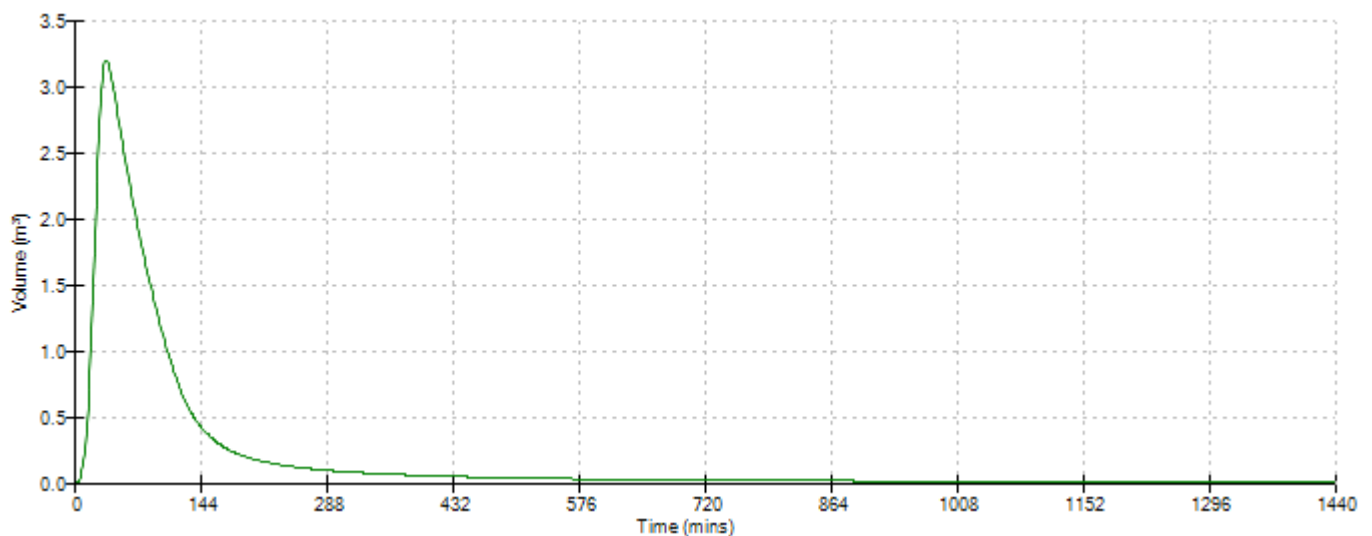
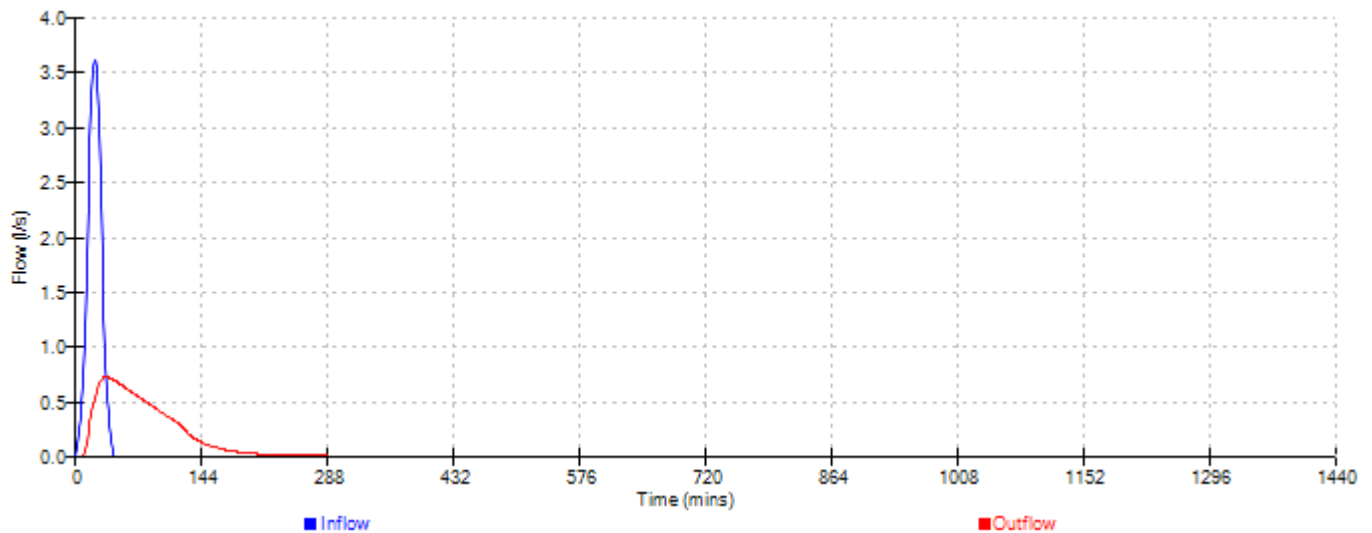
Event: 10080 min Summer

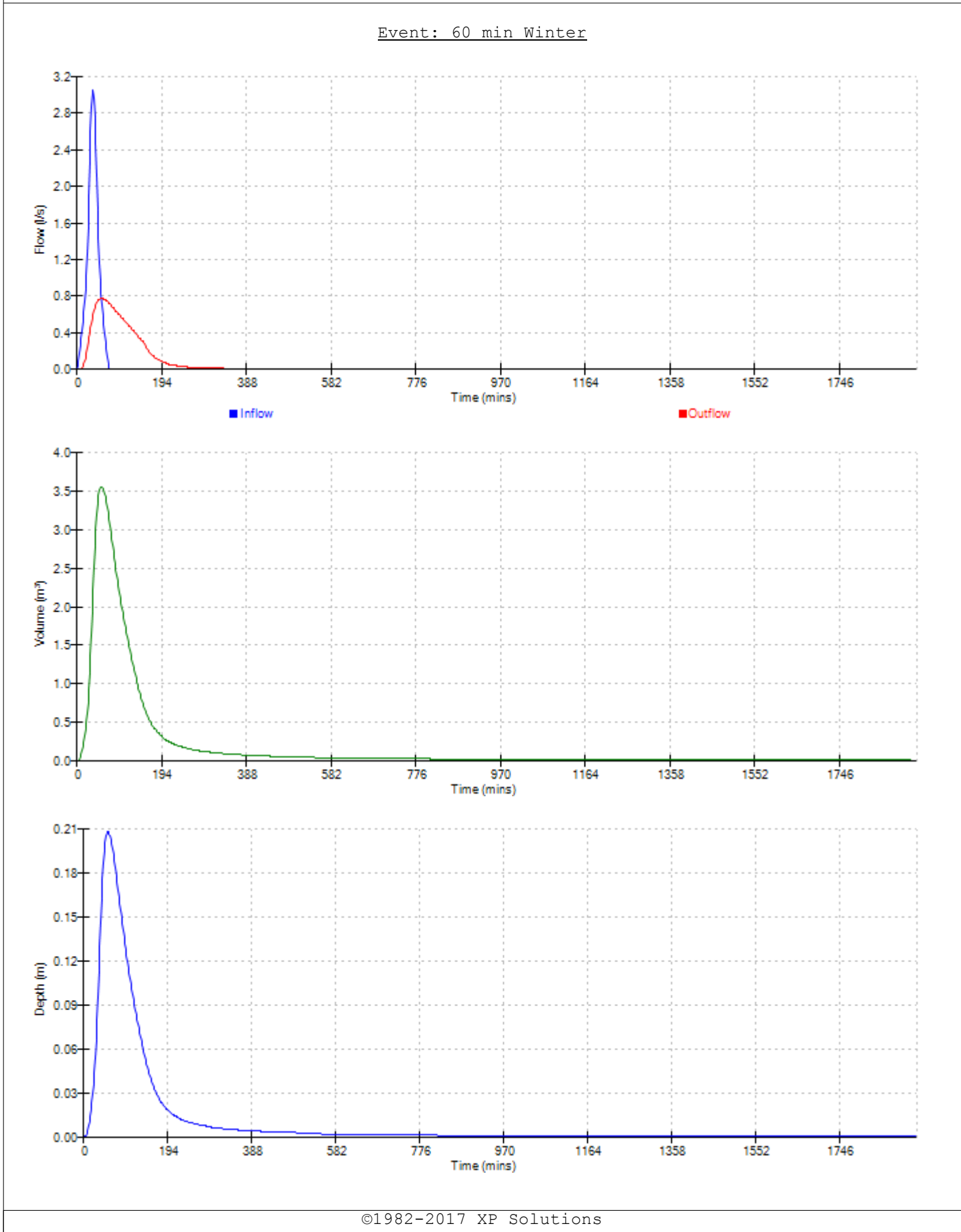


Event: 15 min Winter

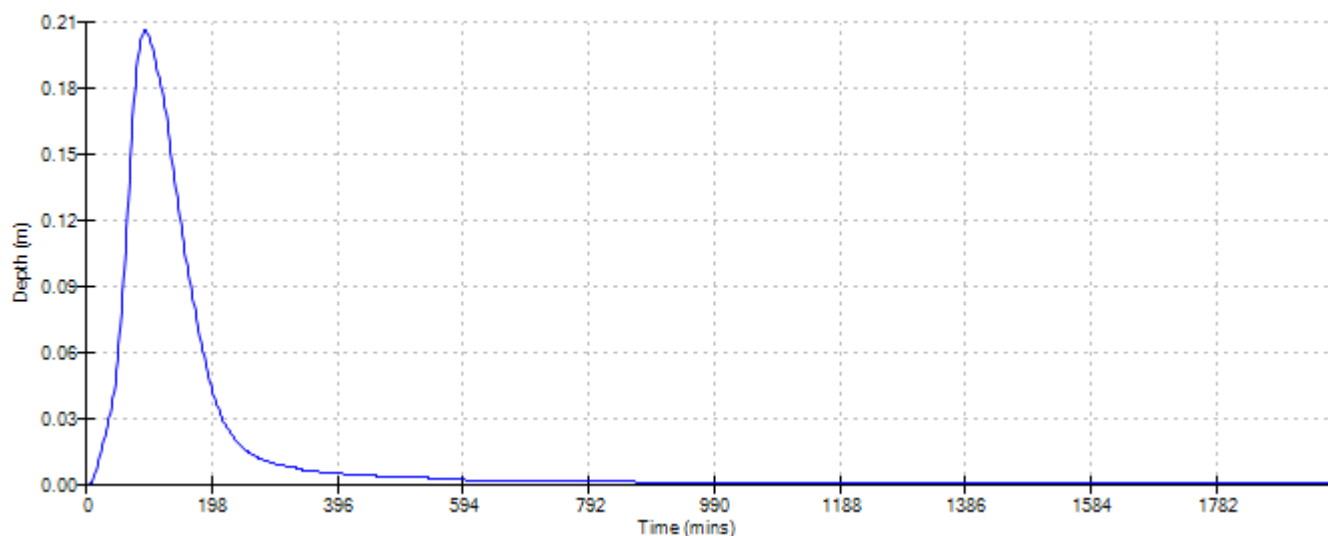
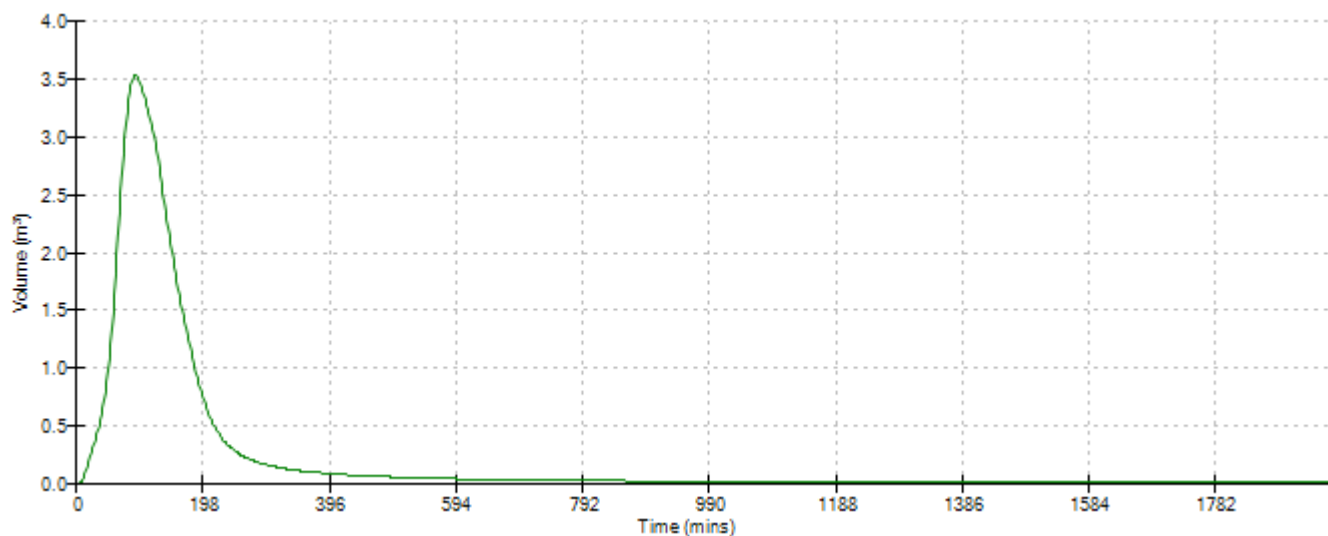
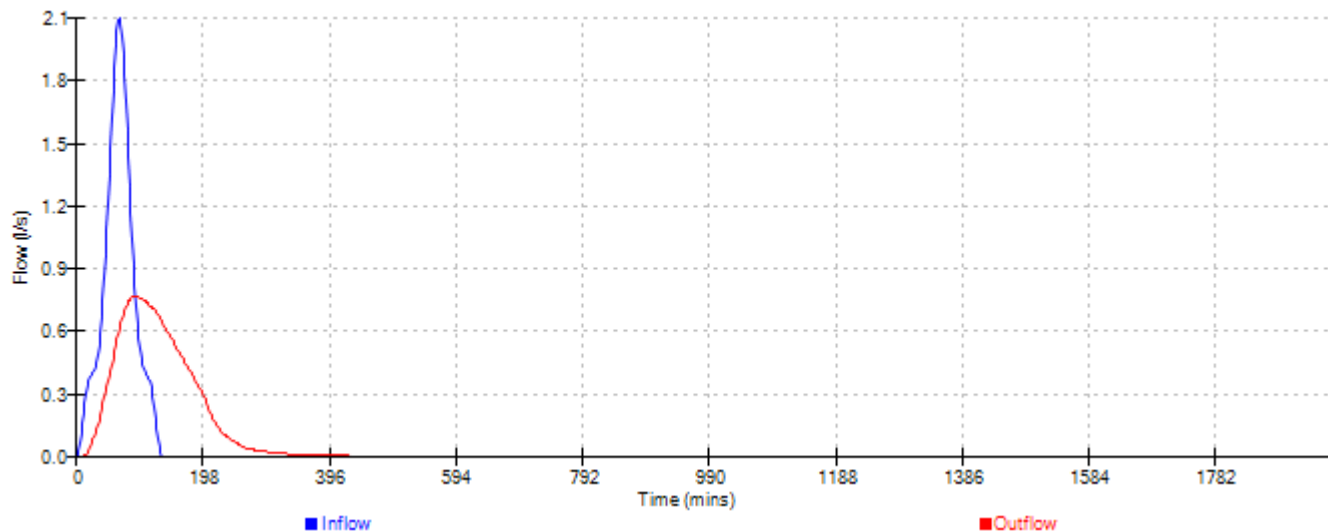


Event: 30 min Winter

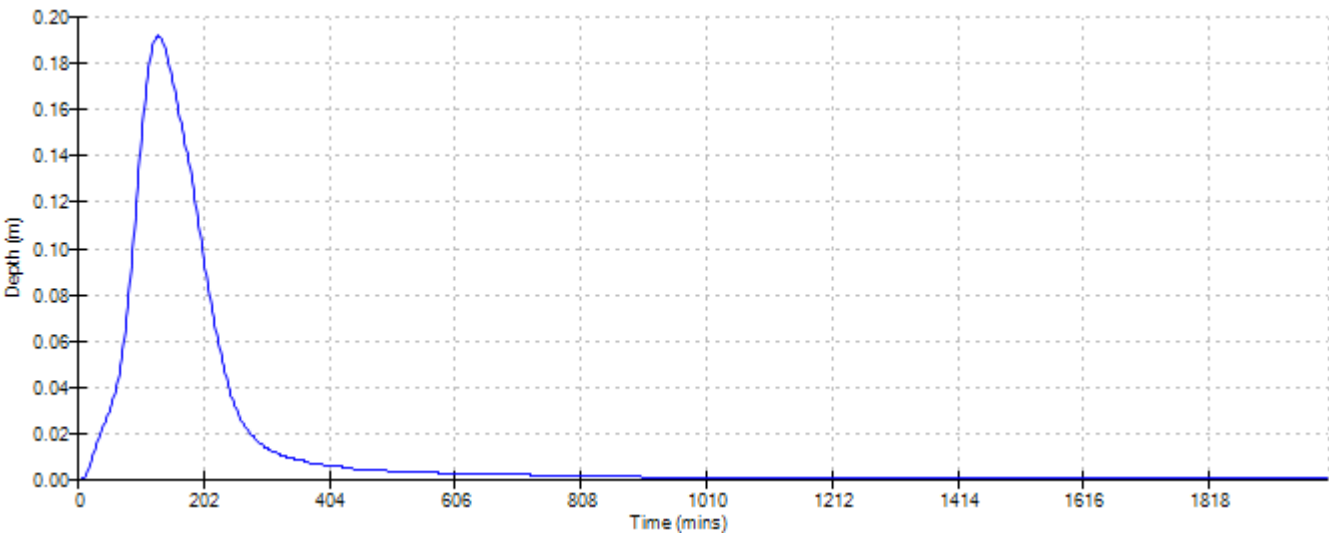
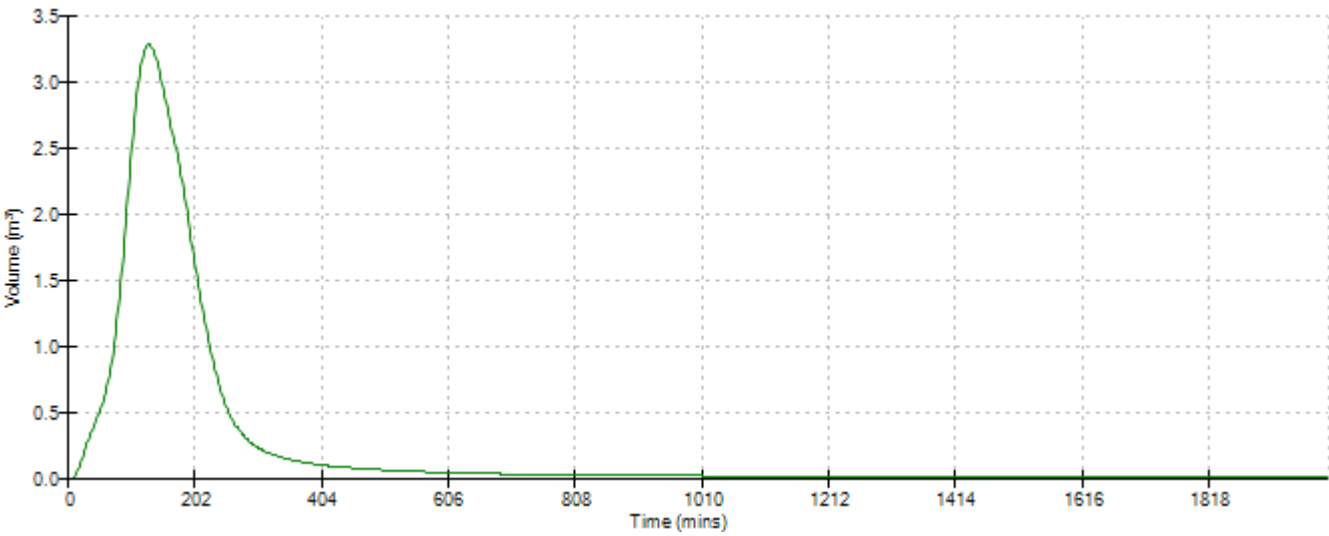
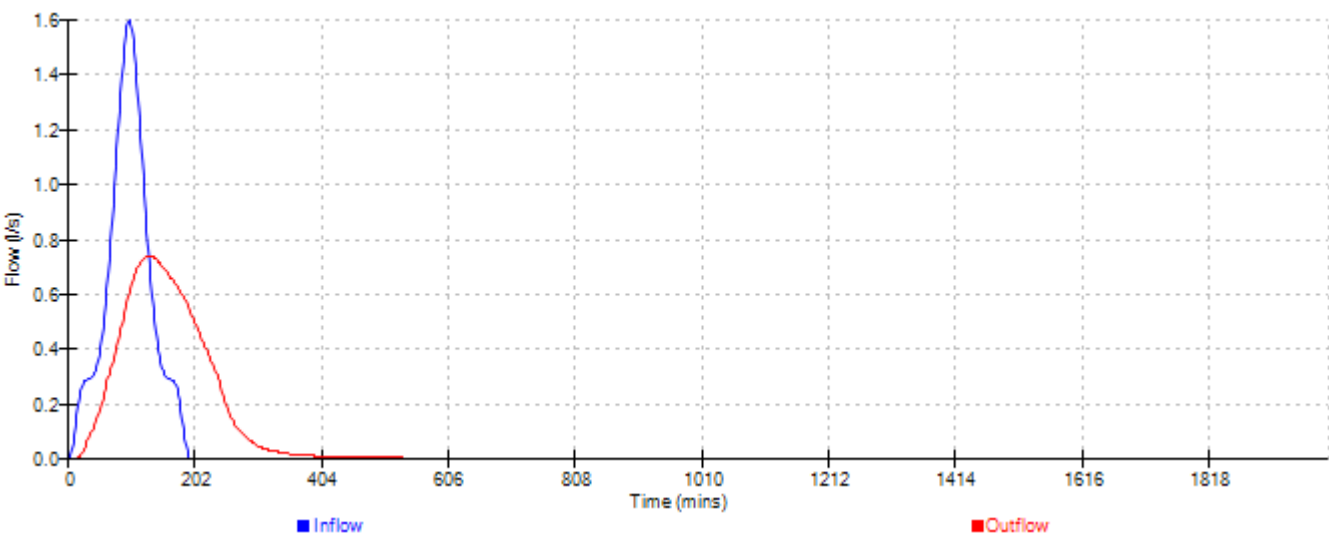




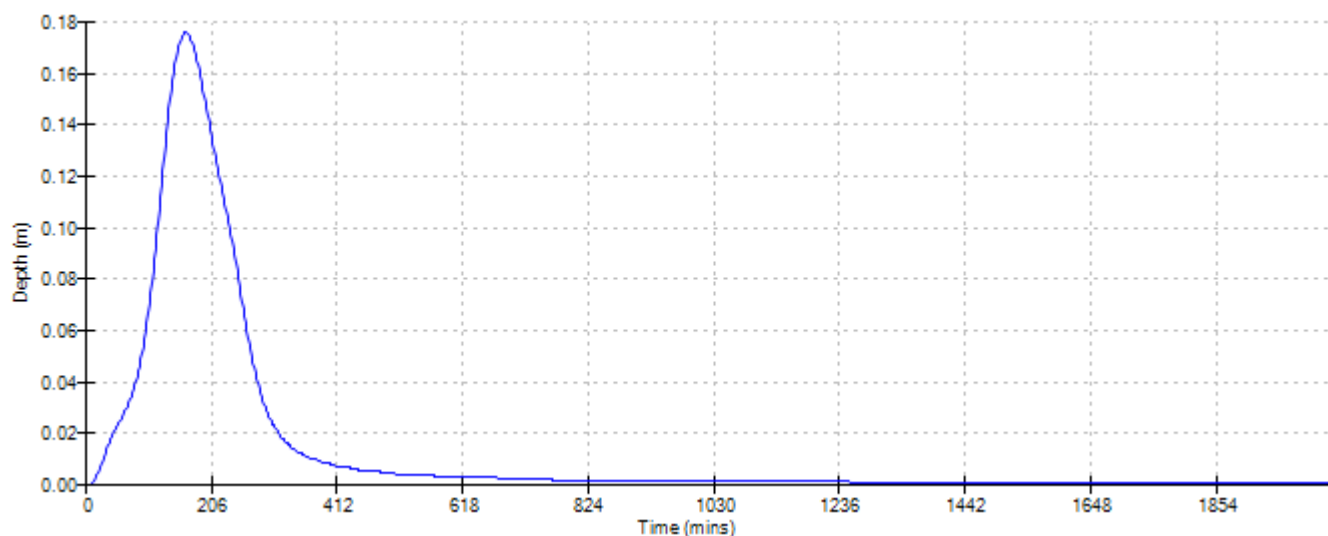
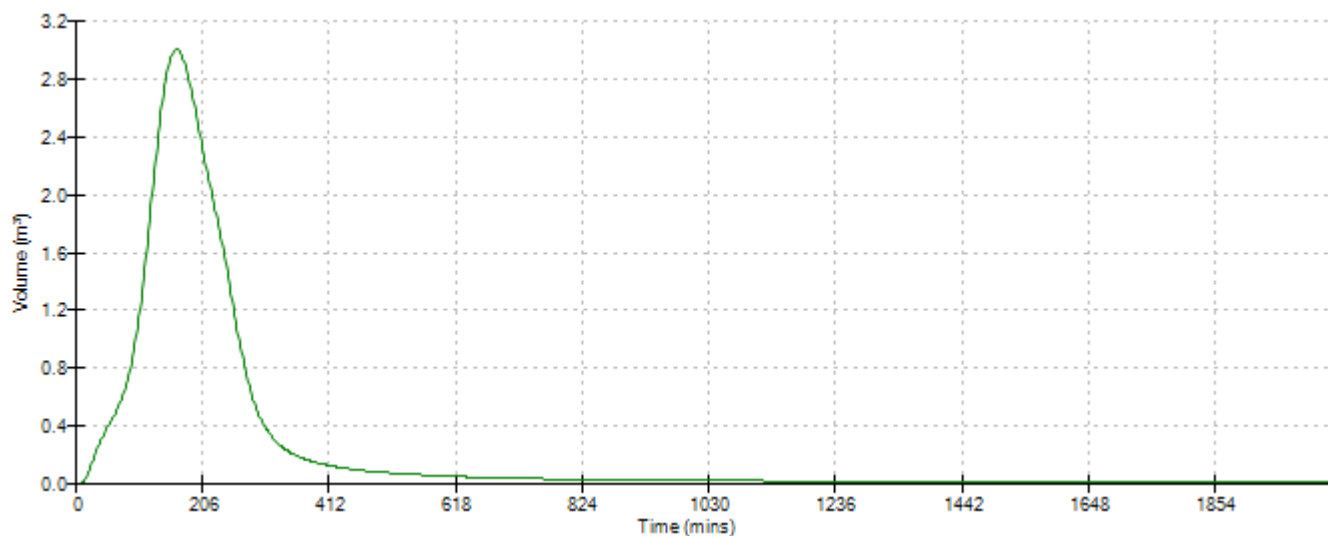
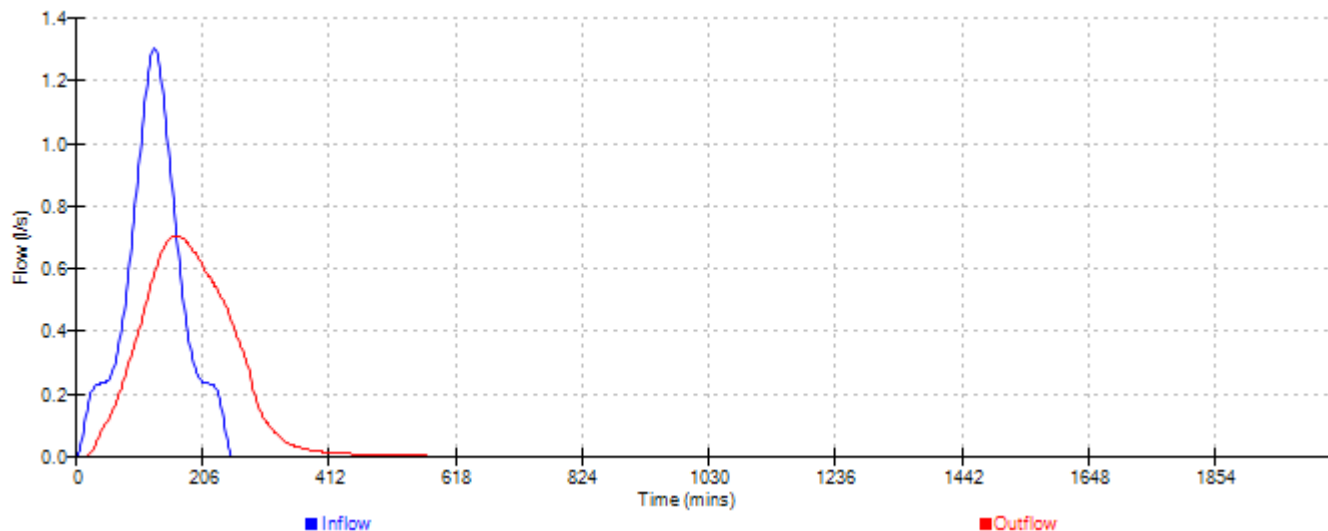
Event: 120 min Winter



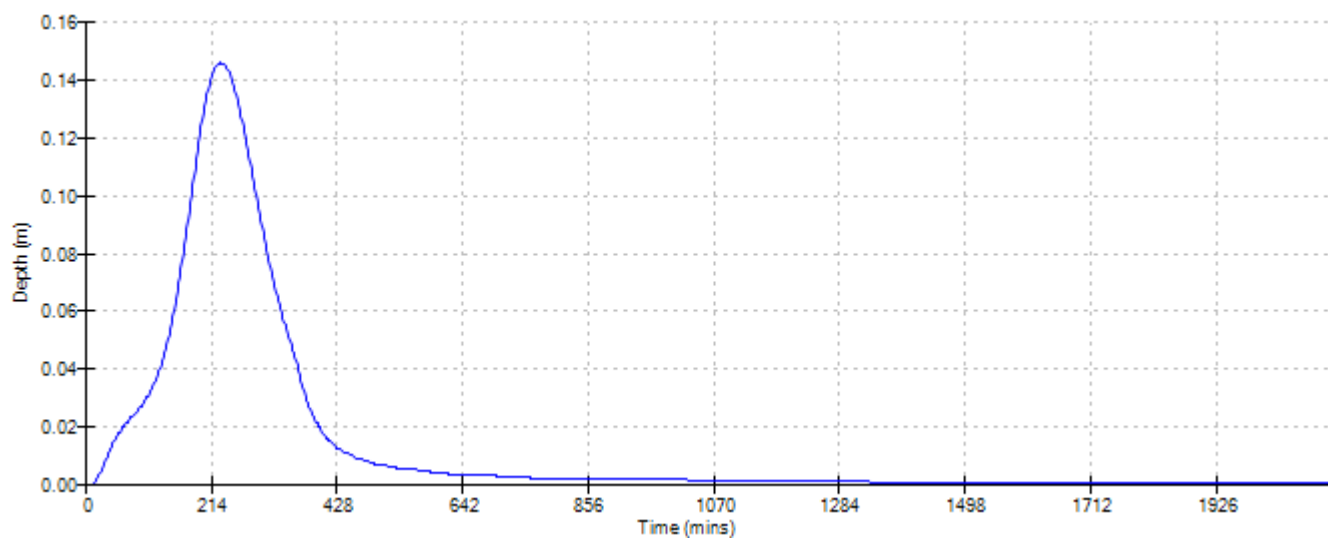
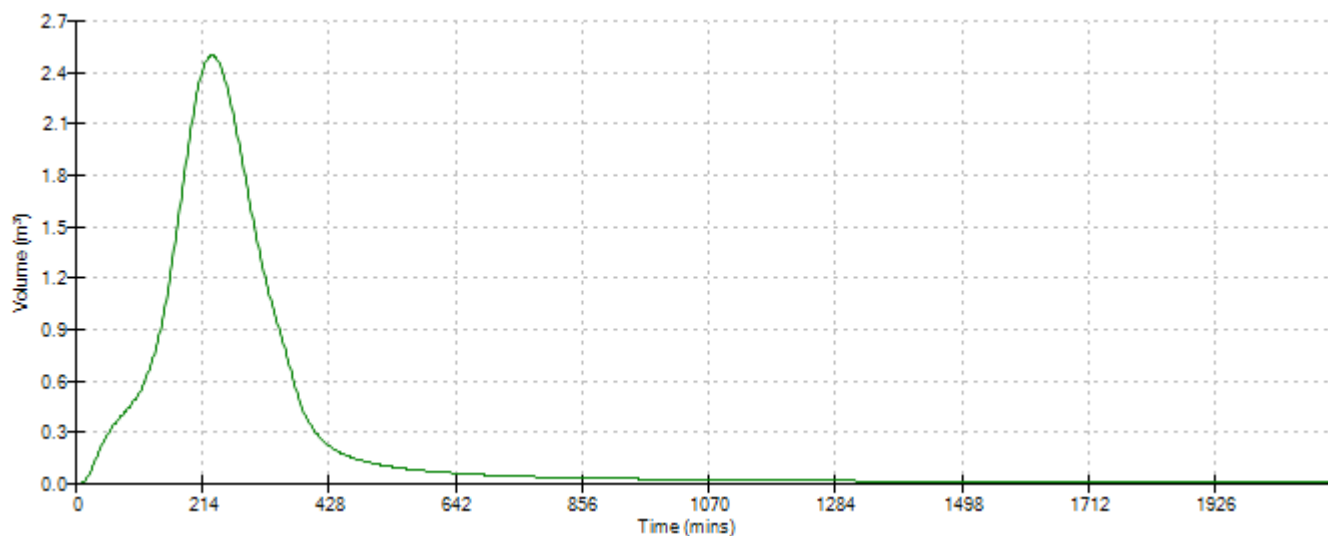
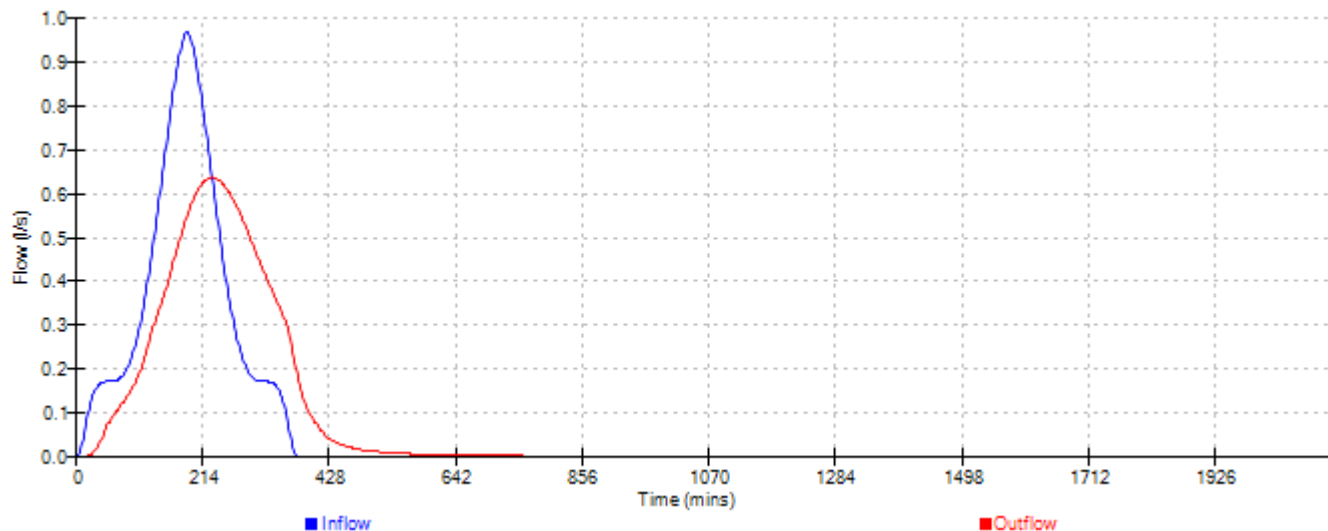
Event: 180 min Winter



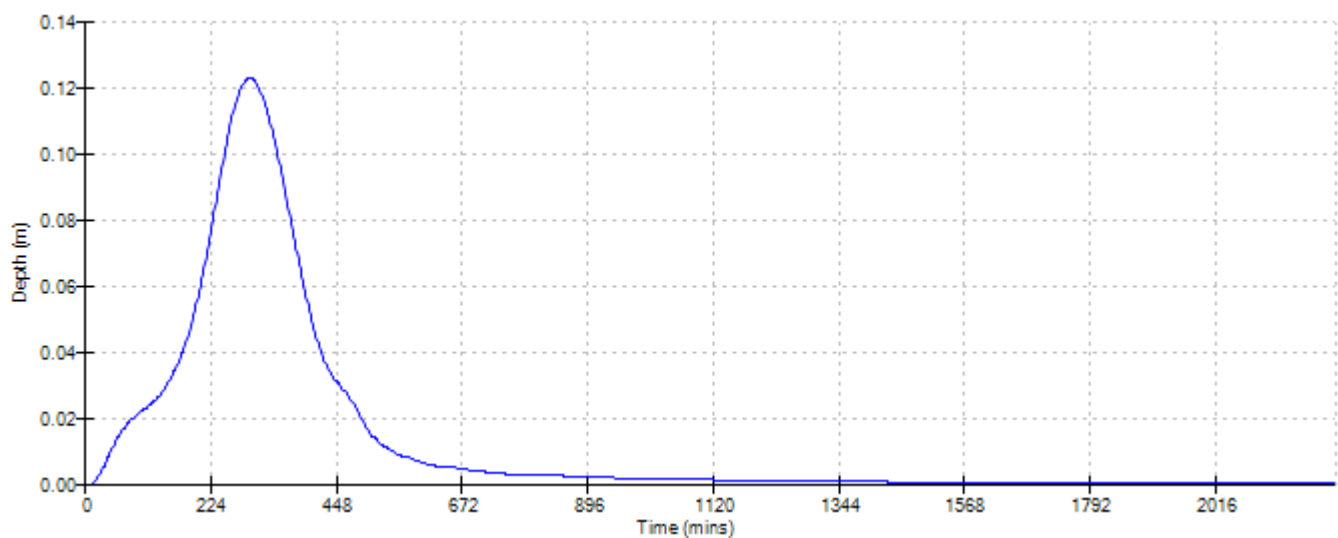
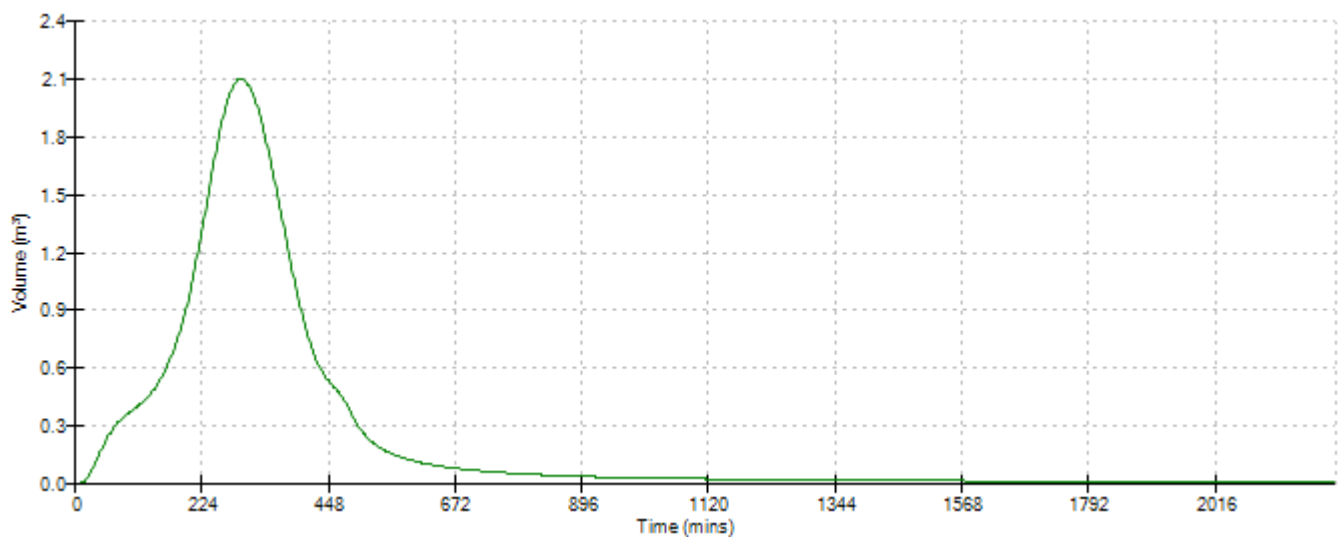
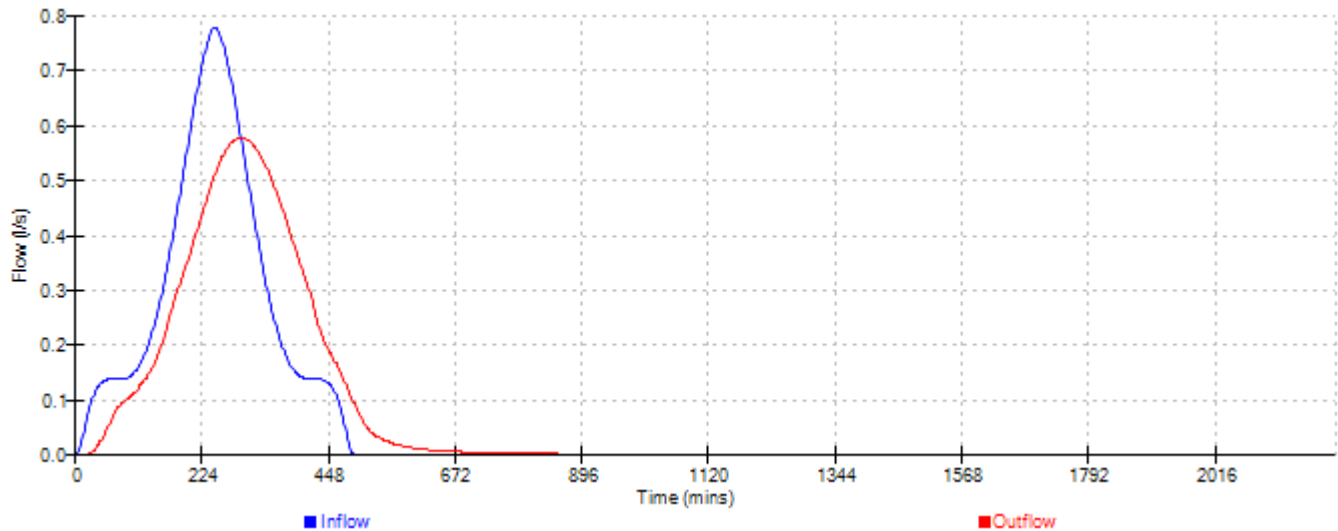
Event: 240 min Winter



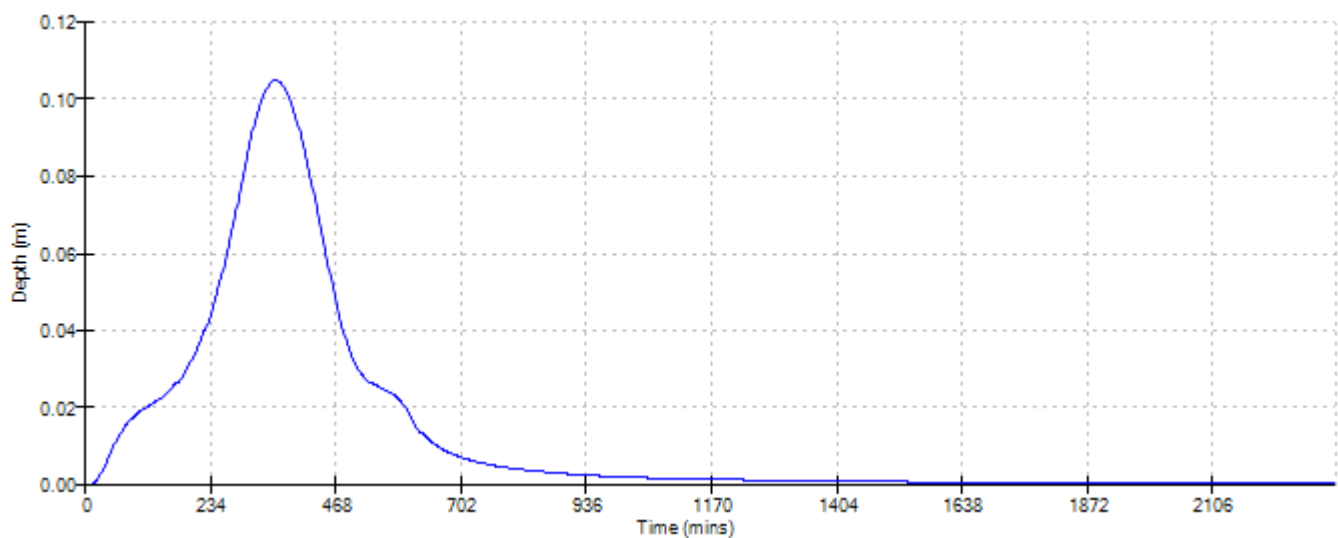
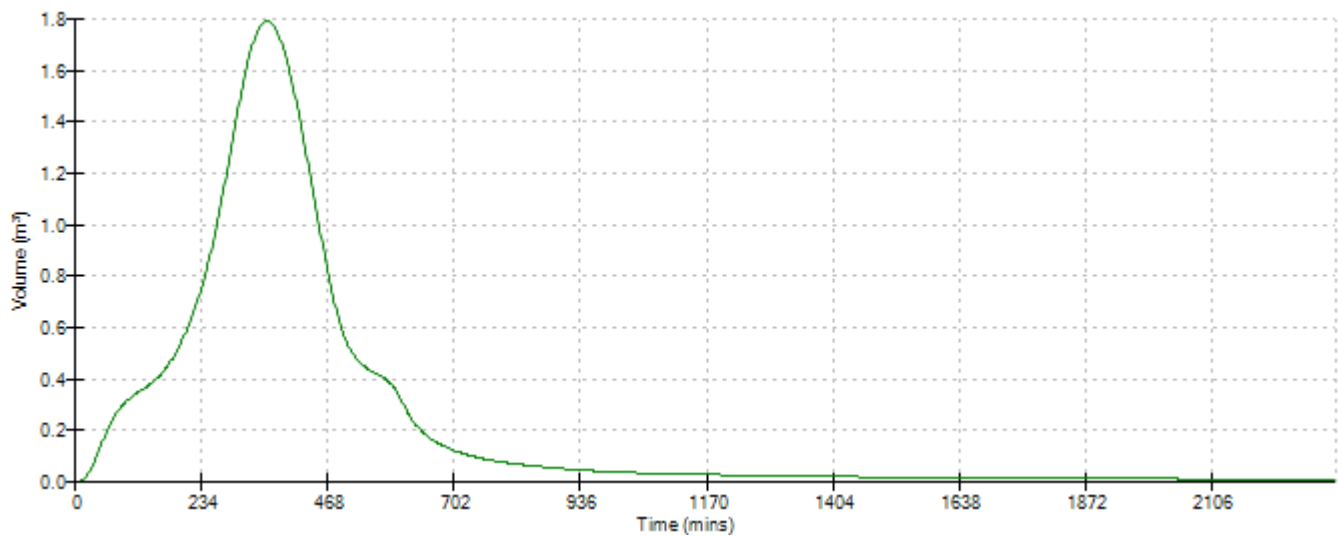
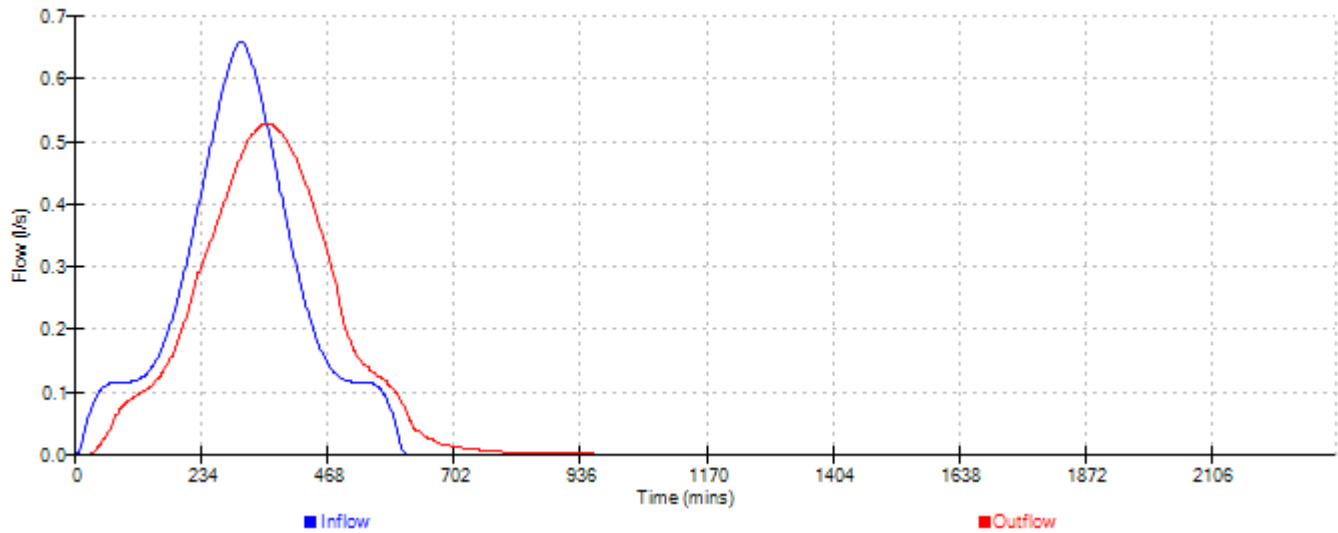
Event: 360 min Winter



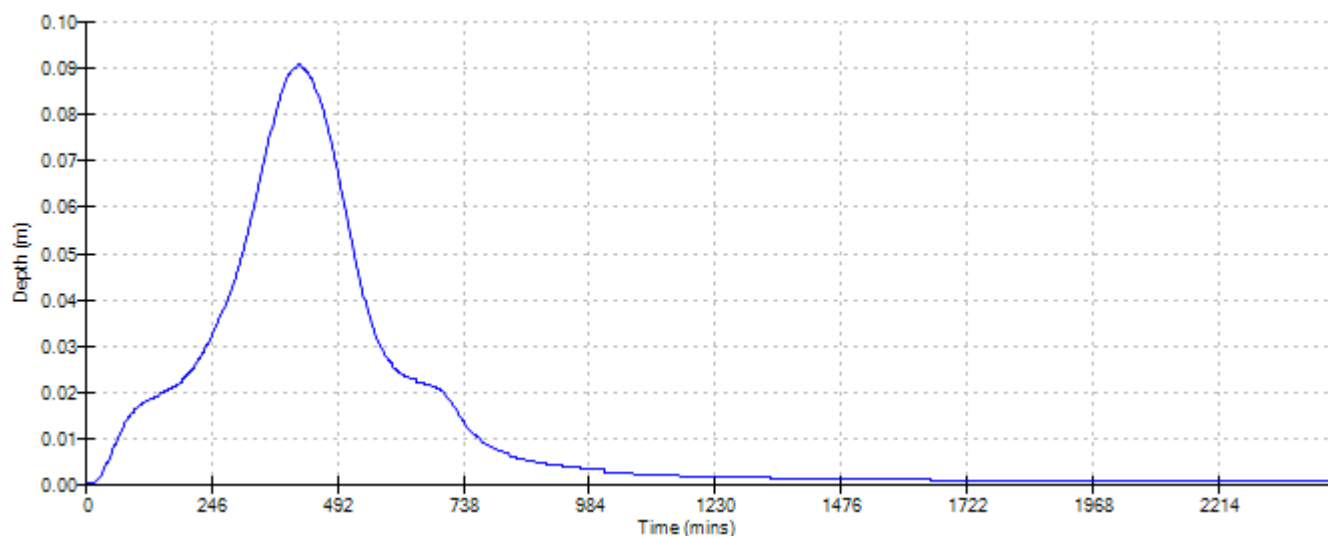
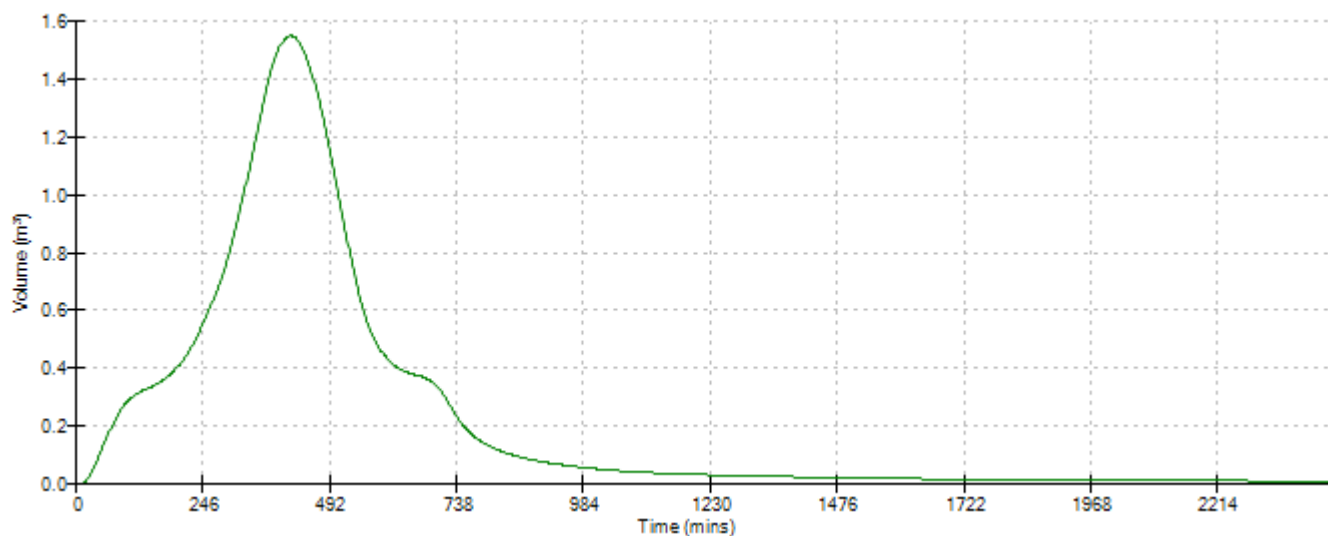
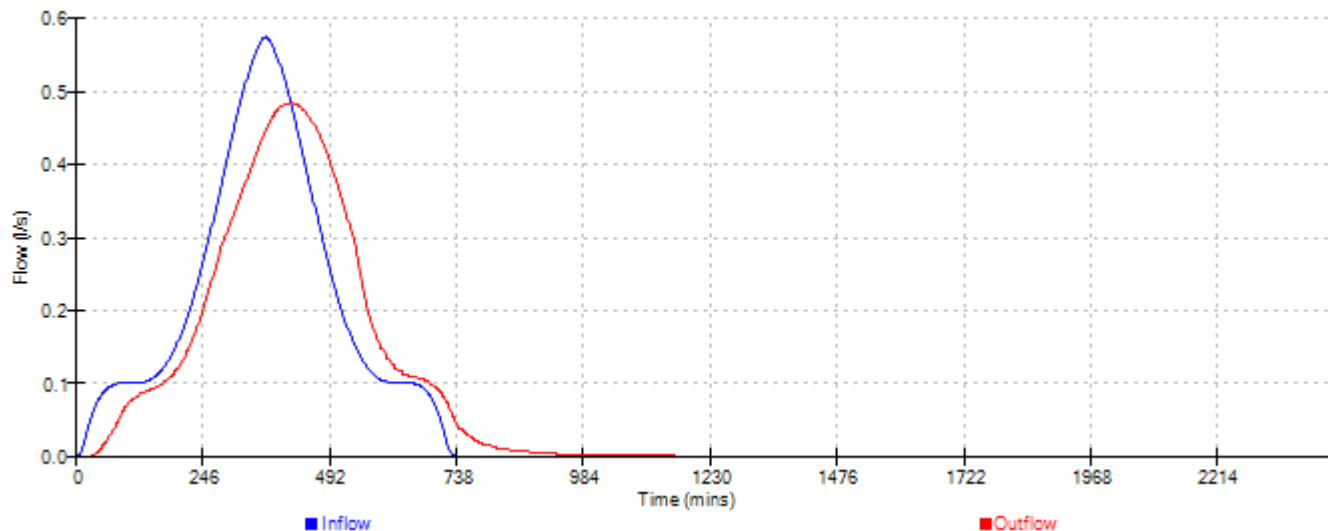
Event: 480 min Winter



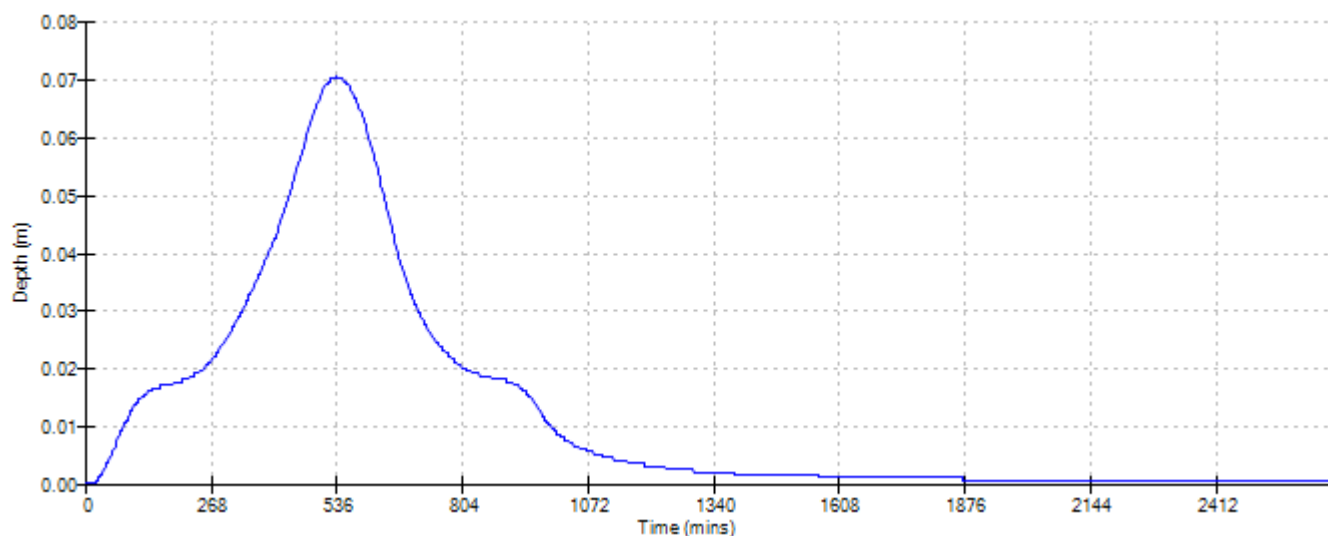
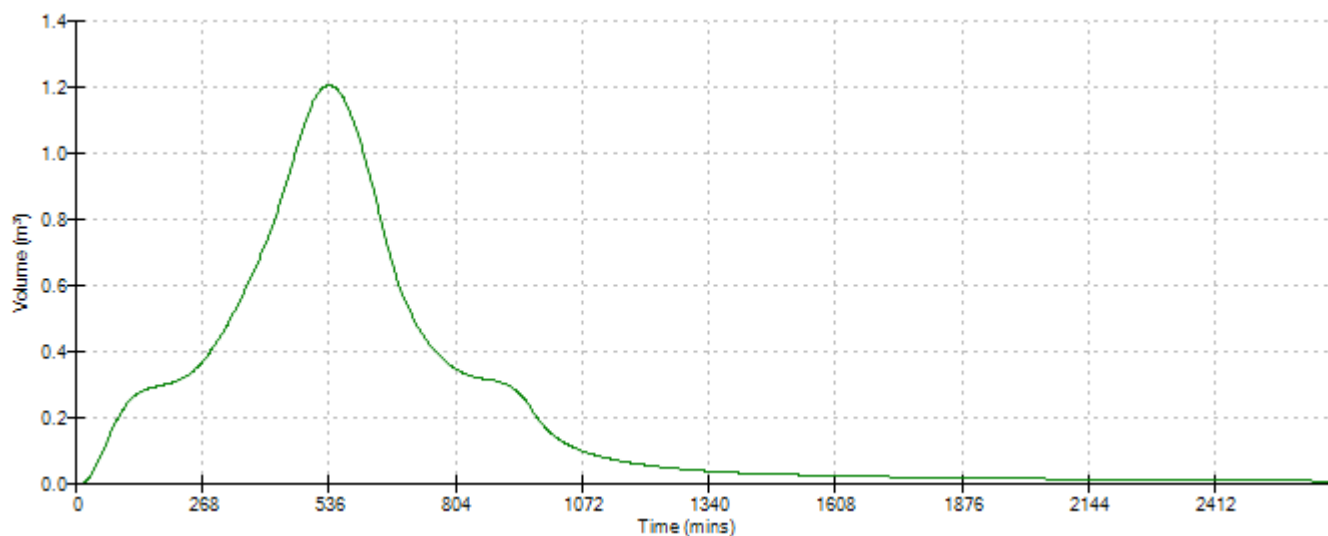
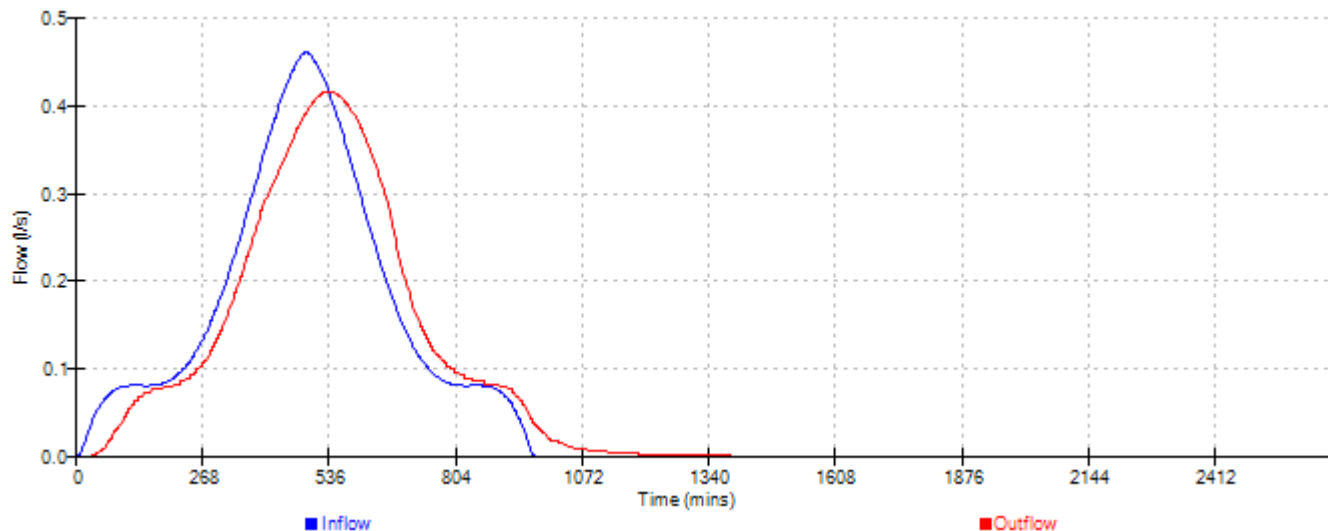
Event: 600 min Winter



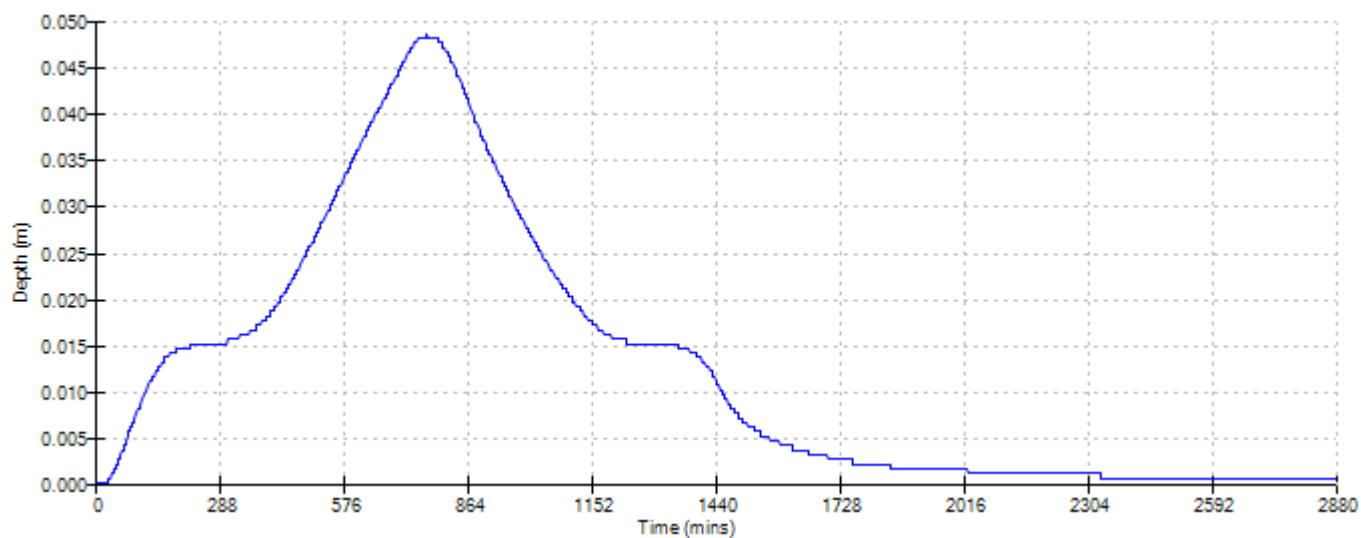
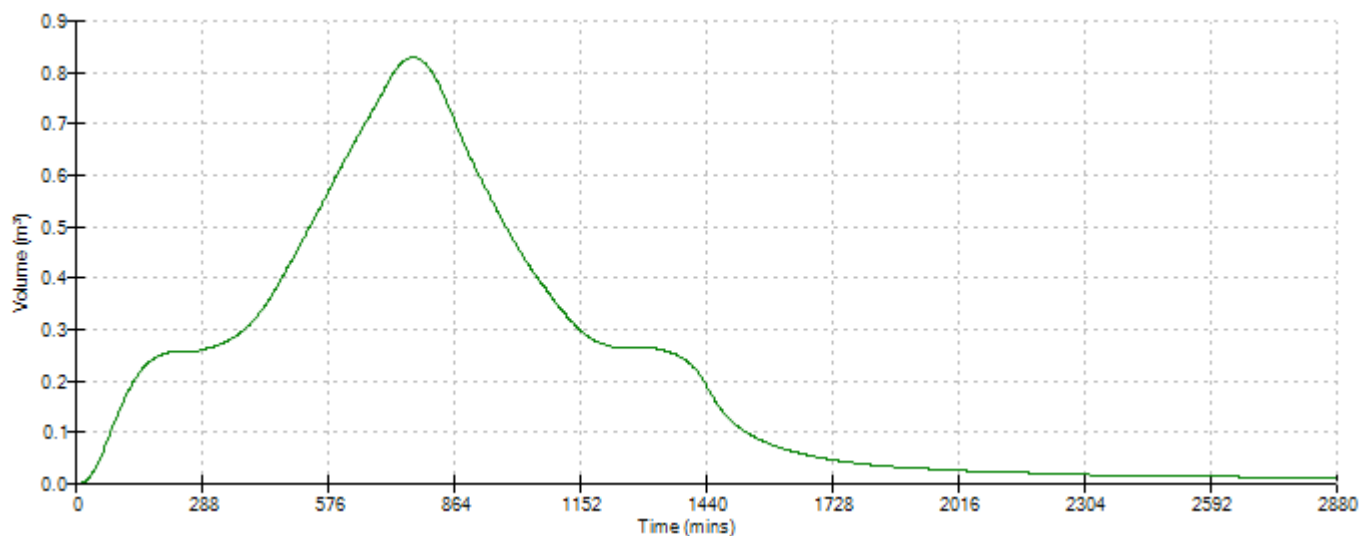
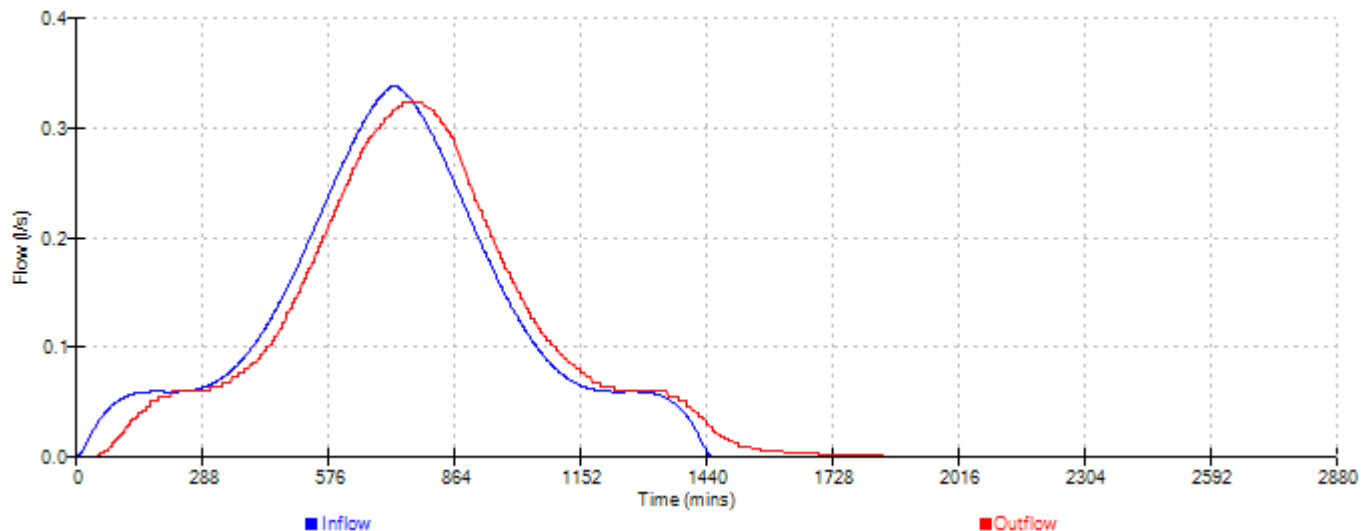
Event: 720 min Winter



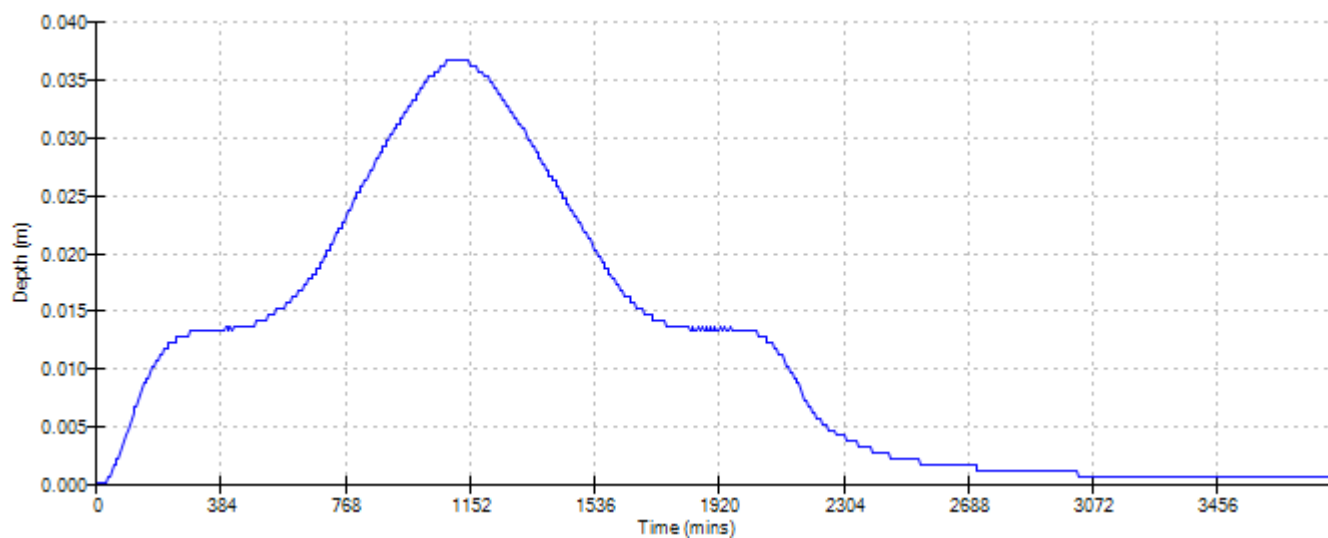
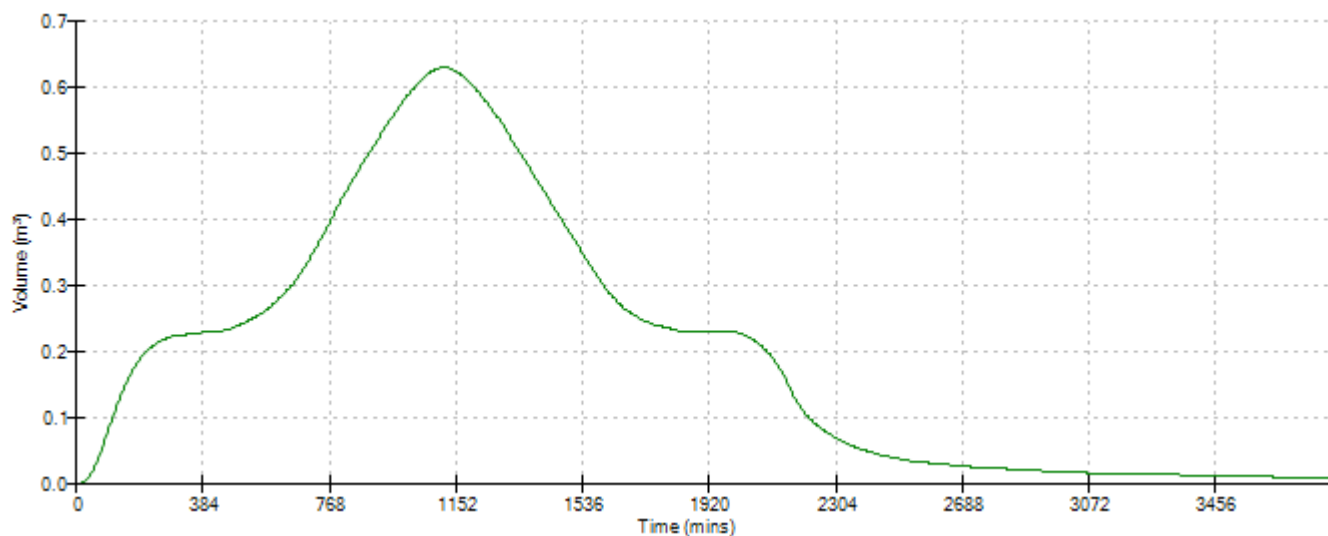
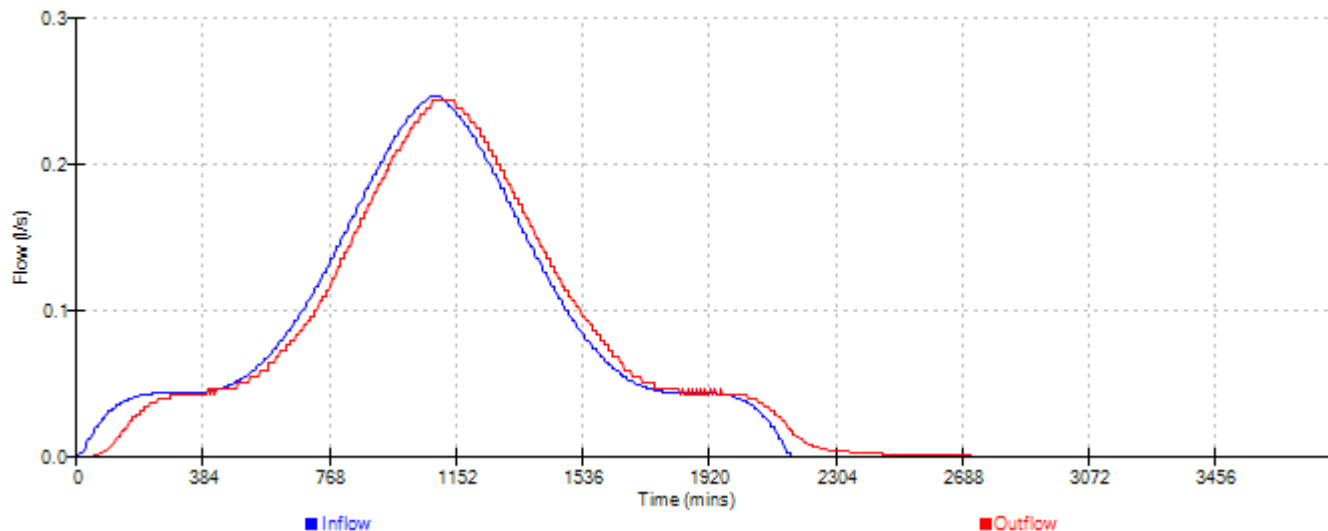
Event: 960 min Winter



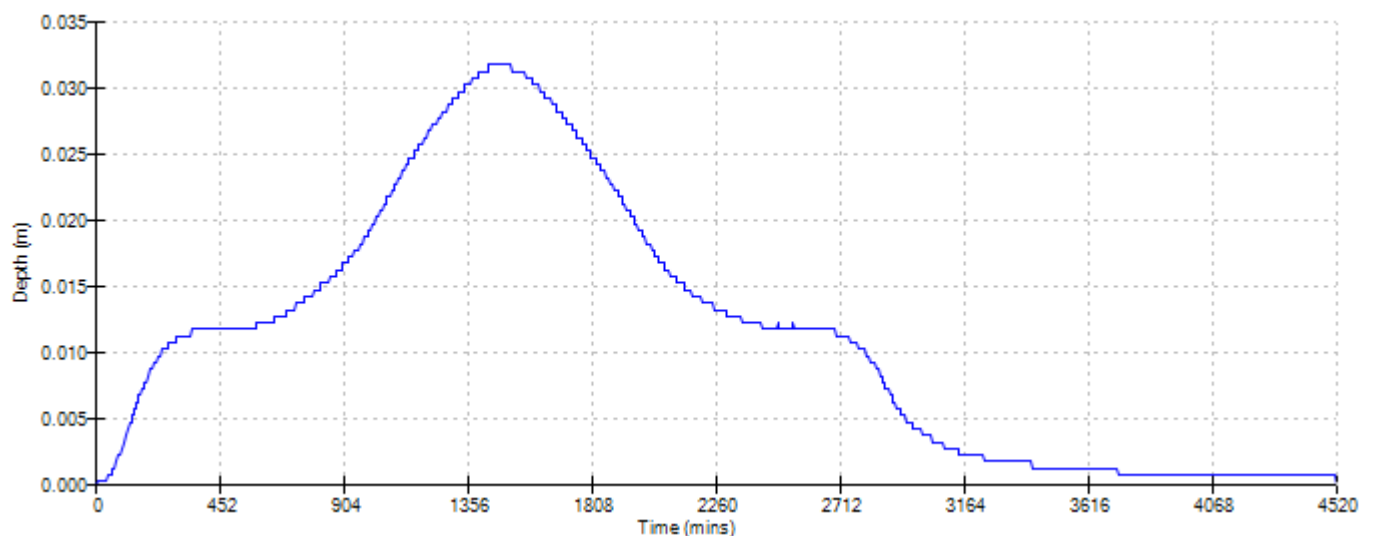
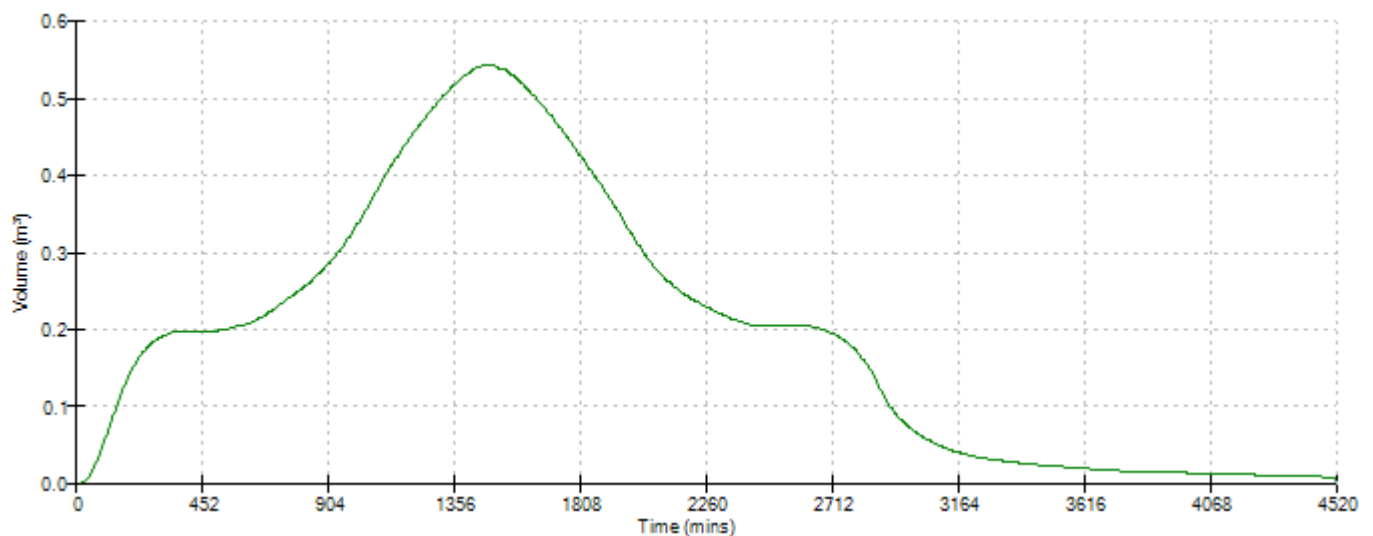
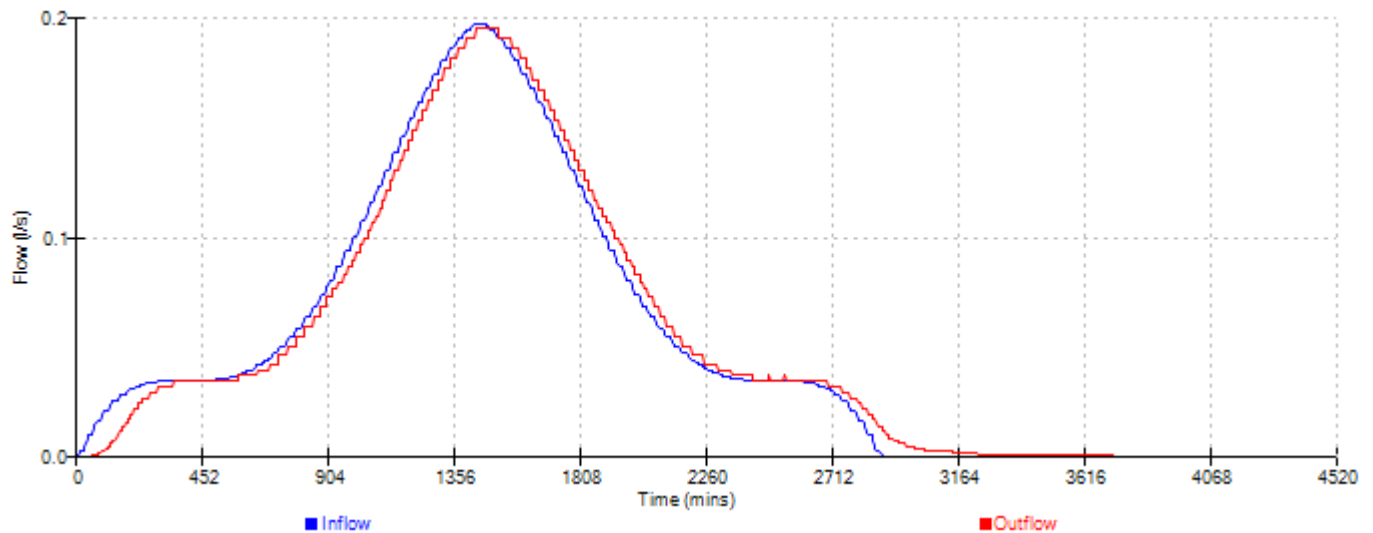
Event: 1440 min Winter



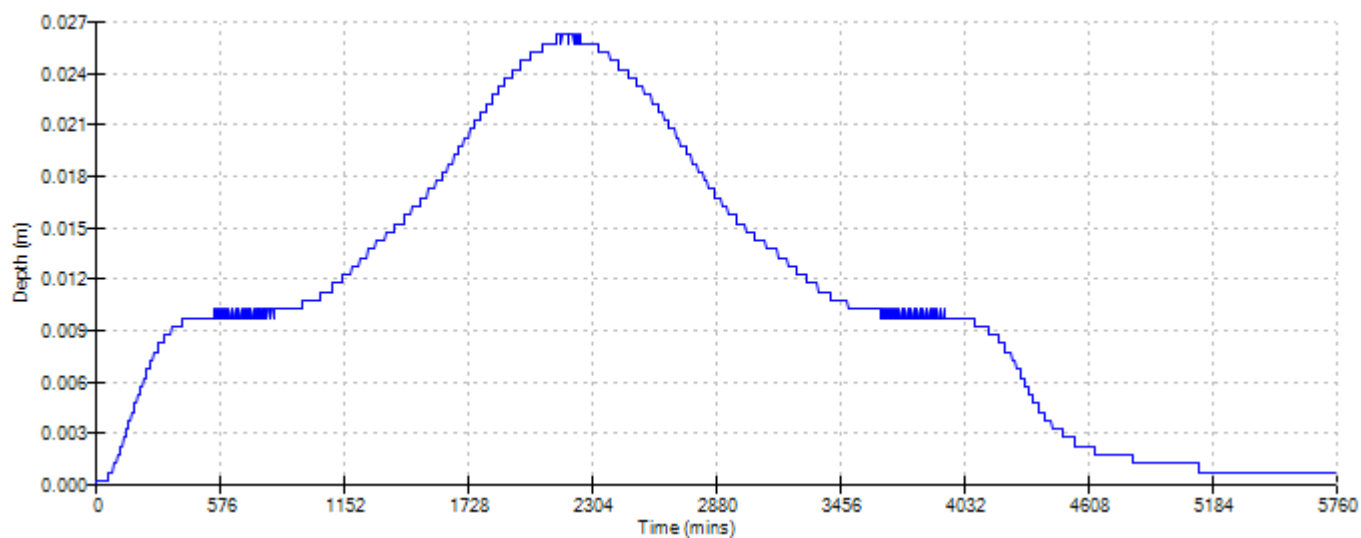
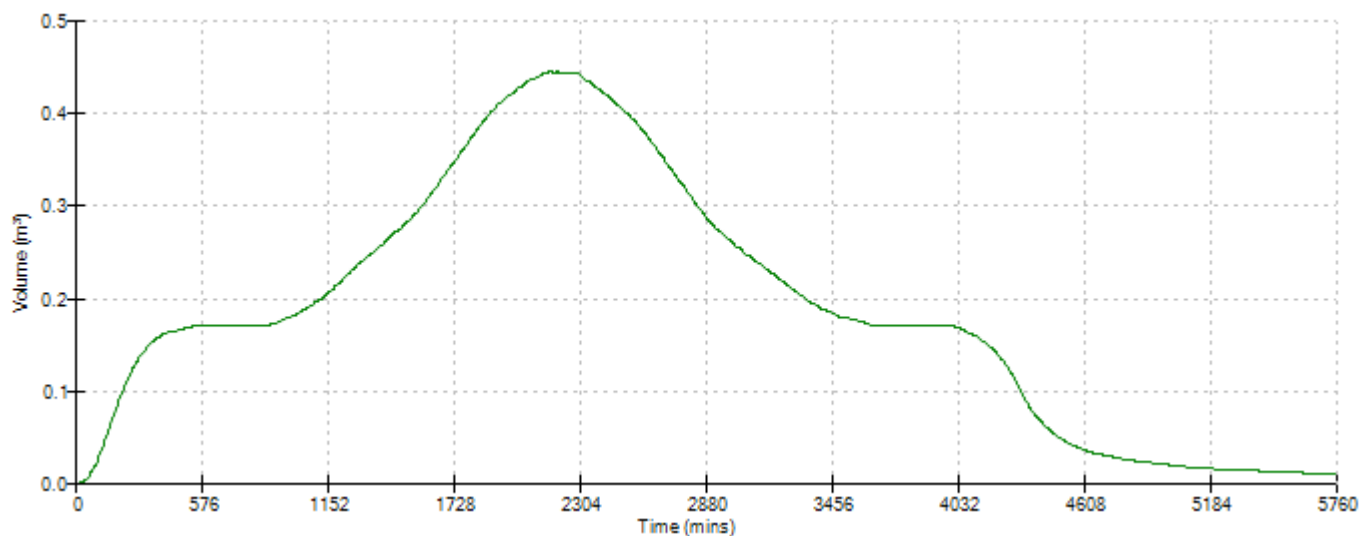
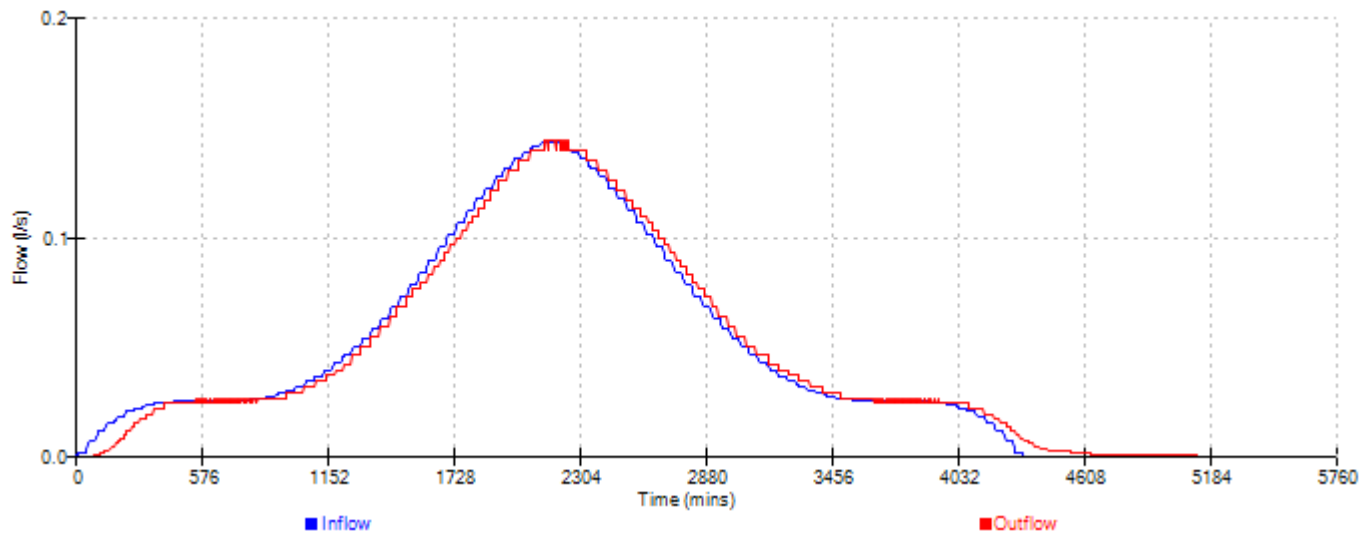
Event: 2160 min Winter



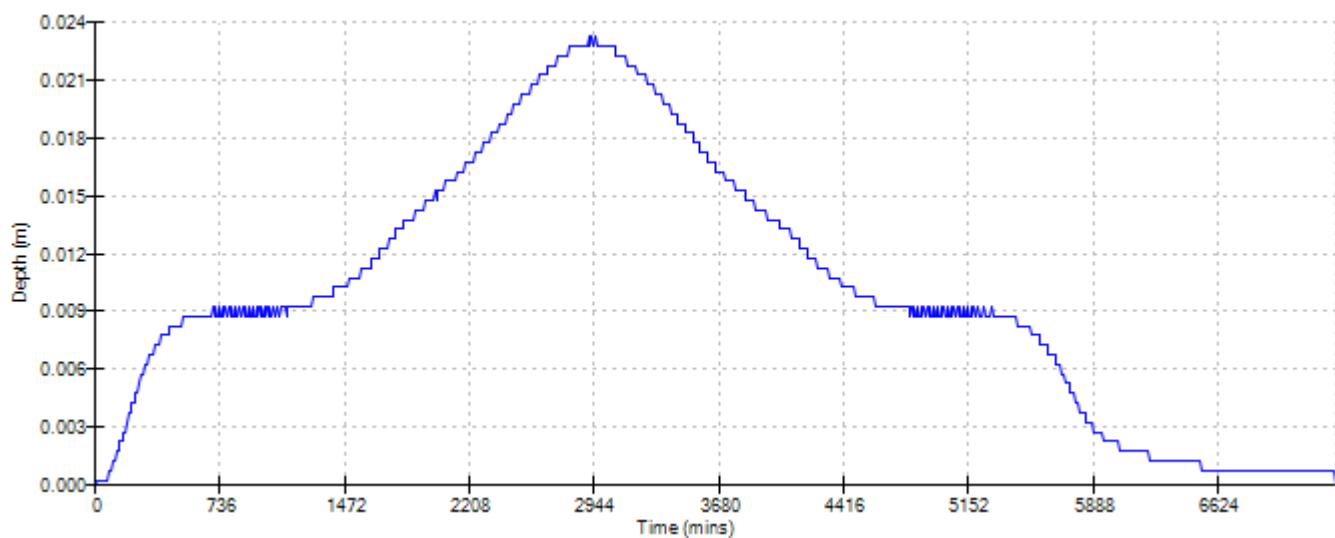
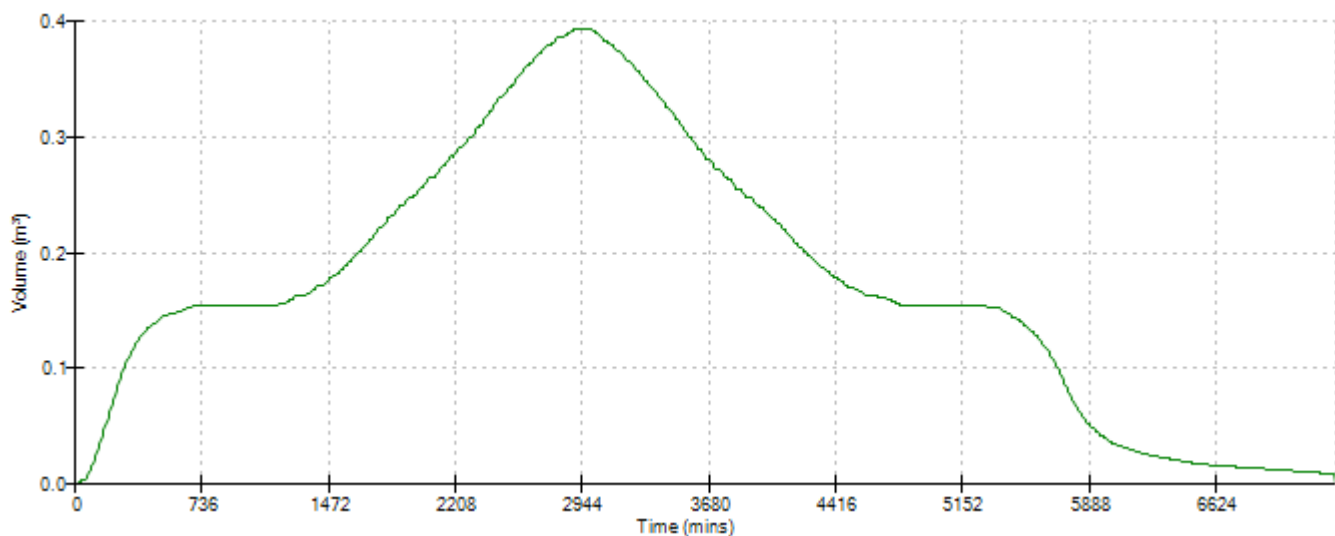
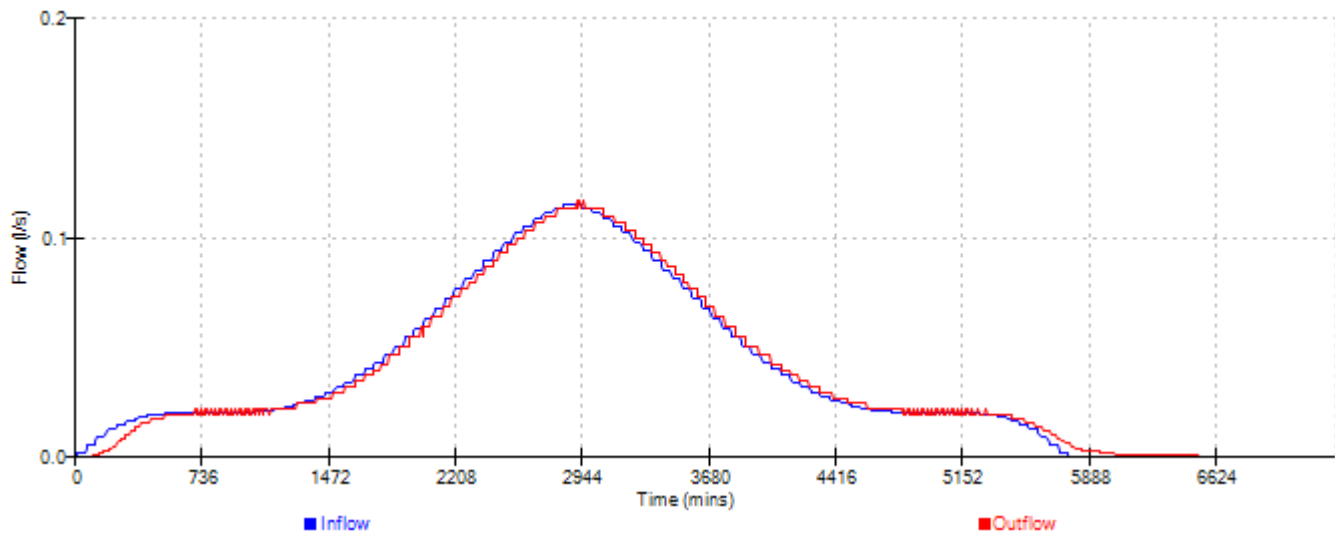
Event: 2880 min Winter



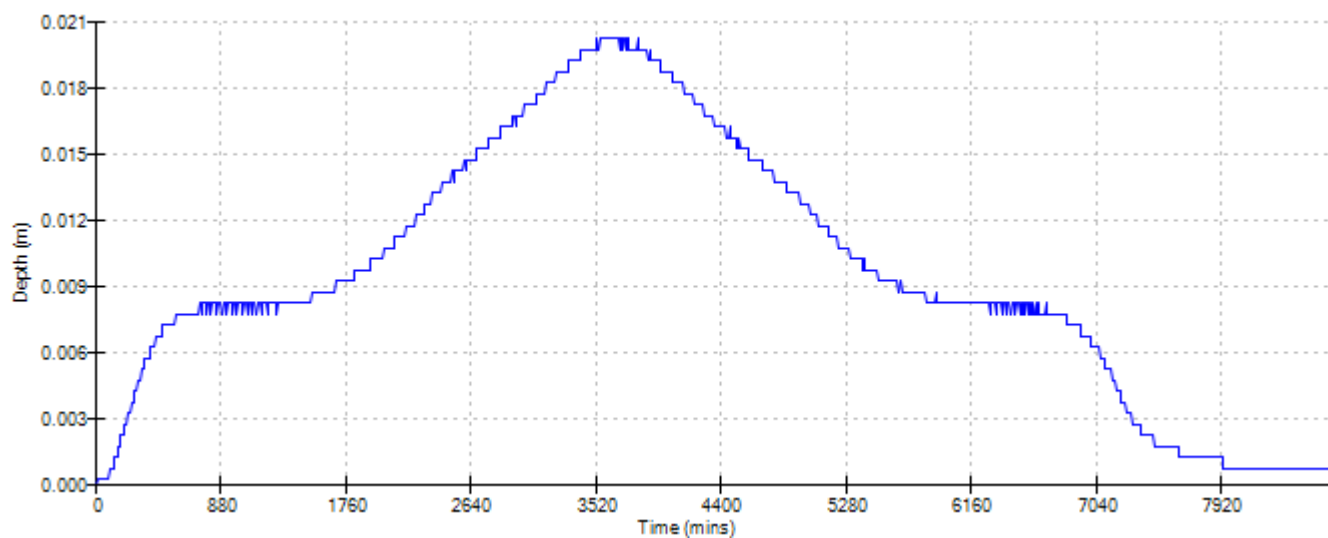
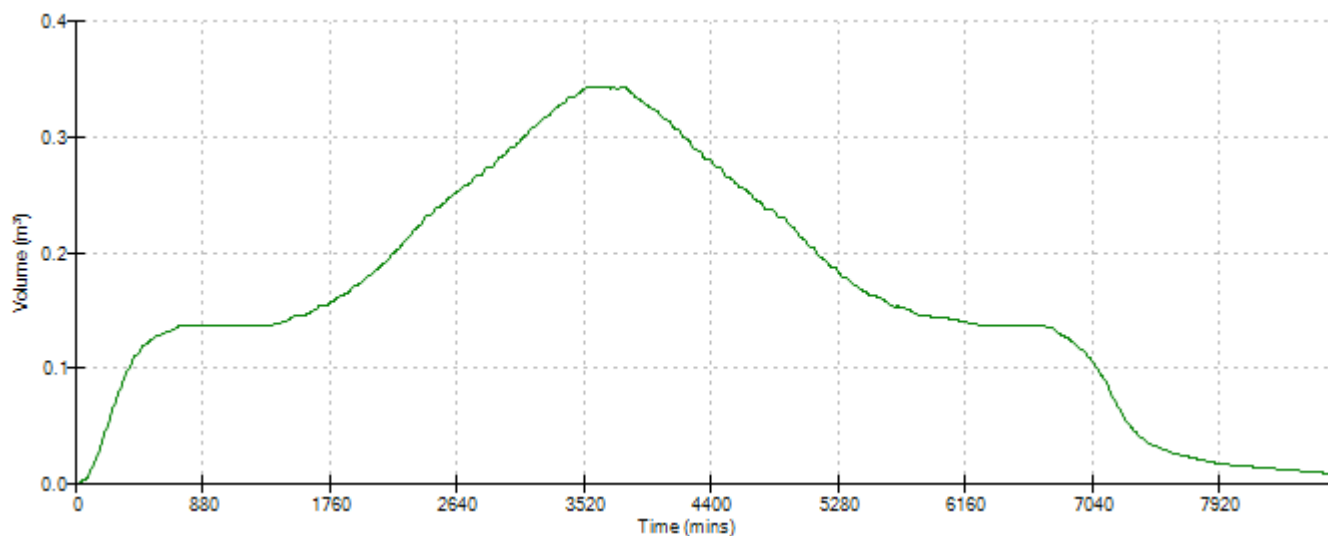
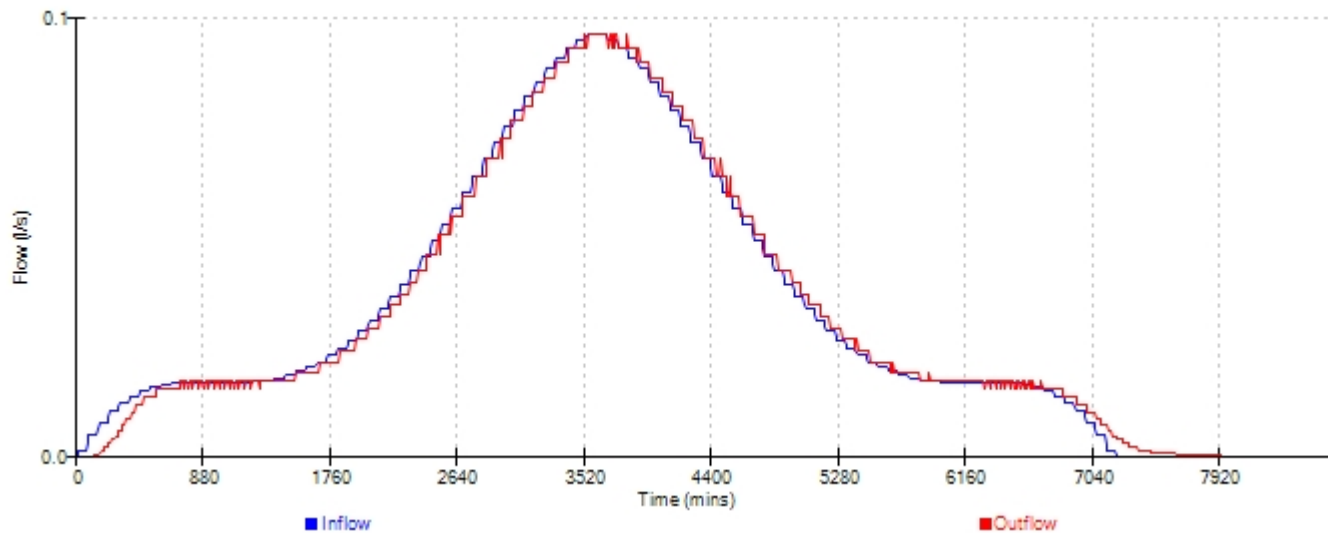
Event: 4320 min Winter



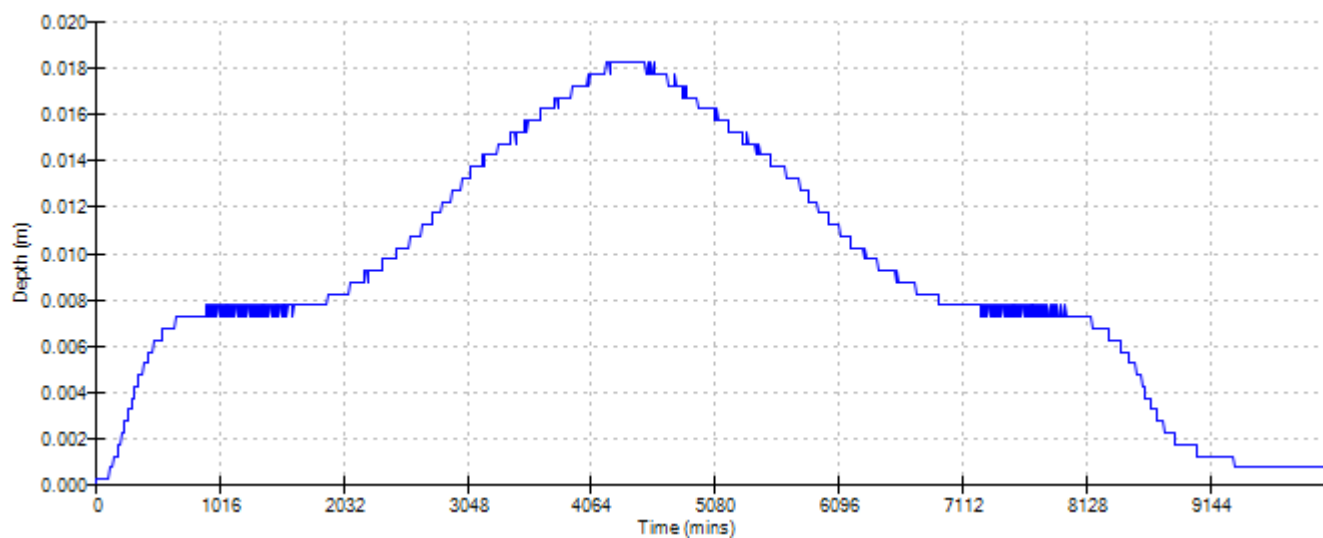
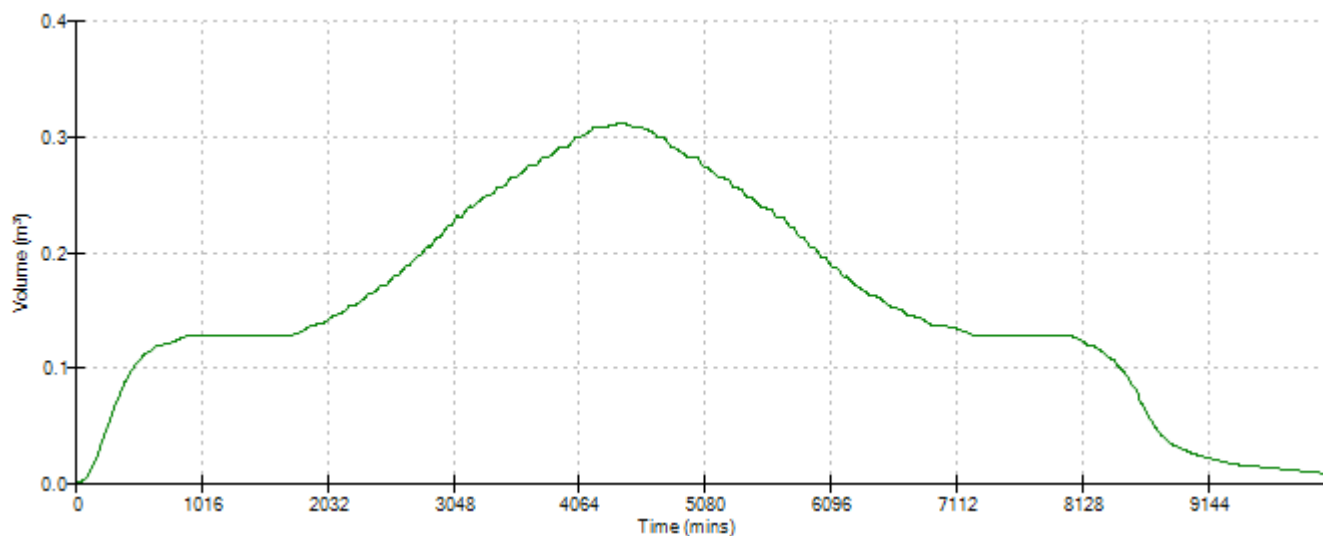
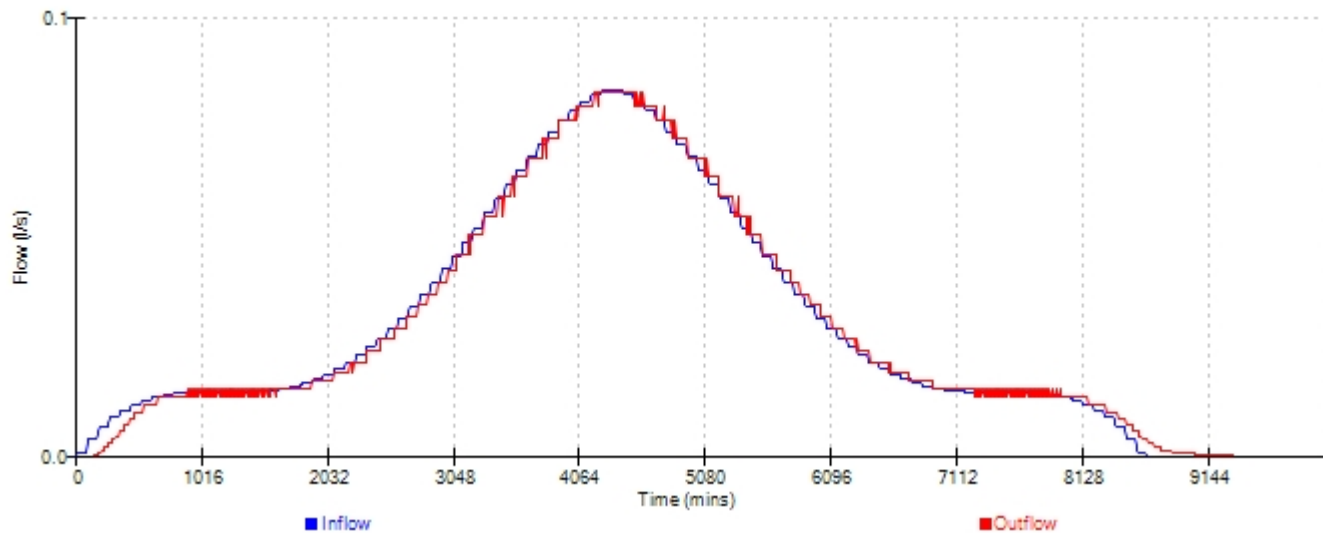
Event: 5760 min Winter



Event: 7200 min Winter



Event: 8640 min Winter



Event: 10080 min Winter

