

1 in 100 Year + 30% Climate Change Porous Car Park Attenuation Calculations

Banbury Close, Spalding

Seagate Homes

9th August 2018

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 455 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	3.086	0.116	0.0	1.1	1.1	34.8	O K
30 min Summer	3.126	0.156	0.0	1.4	1.4	46.7	O K
60 min Summer	3.165	0.195	0.0	1.5	1.5	58.5	O K
120 min Summer	3.200	0.230	0.0	1.7	1.7	69.0	O K
180 min Summer	3.215	0.245	0.0	1.7	1.7	73.6	O K
240 min Summer	3.222	0.252	0.0	1.8	1.8	75.7	O K
360 min Summer	3.225	0.255	0.0	1.8	1.8	76.6	O K
480 min Summer	3.227	0.257	0.0	1.8	1.8	77.0	O K
600 min Summer	3.227	0.257	0.0	1.8	1.8	77.0	O K
720 min Summer	3.226	0.256	0.0	1.8	1.8	76.7	O K
960 min Summer	3.222	0.252	0.0	1.8	1.8	75.5	O K
1440 min Summer	3.209	0.239	0.0	1.7	1.7	71.7	O K
2160 min Summer	3.188	0.218	0.0	1.6	1.6	65.3	O K
2880 min Summer	3.168	0.198	0.0	1.5	1.5	59.3	O K
4320 min Summer	3.134	0.164	0.0	1.4	1.4	49.2	O K
5760 min Summer	3.109	0.139	0.0	1.3	1.3	41.7	O K
7200 min Summer	3.090	0.120	0.0	1.2	1.2	35.9	O K
8640 min Summer	3.075	0.105	0.0	1.1	1.1	31.5	O K
10080 min Summer	3.063	0.093	0.0	1.0	1.0	28.0	O K
15 min Winter	3.102	0.132	0.0	1.2	1.2	39.6	O K
30 min Winter	3.147	0.177	0.0	1.5	1.5	53.0	O K
60 min Winter	3.191	0.221	0.0	1.6	1.6	66.2	O K
120 min Winter	3.231	0.261	0.0	1.8	1.8	78.2	O K
180 min Winter	3.249	0.279	0.0	1.9	1.9	83.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	121.269	0.0	31.7	20
30 min Summer	79.695	0.0	43.8	34
60 min Summer	49.937	0.0	59.5	64
120 min Summer	30.267	0.0	73.4	122
180 min Summer	22.297	0.0	81.6	182
240 min Summer	17.851	0.0	87.5	240
360 min Summer	12.957	0.0	95.5	322
480 min Summer	10.330	0.0	101.7	380
600 min Summer	8.659	0.0	106.5	442
720 min Summer	7.492	0.0	110.5	508
960 min Summer	5.959	0.0	117.0	646
1440 min Summer	4.309	0.0	125.9	920
2160 min Summer	3.110	0.0	138.7	1320
2880 min Summer	2.466	0.0	145.5	1704
4320 min Summer	1.775	0.0	154.2	2464
5760 min Summer	1.405	0.0	162.3	3224
7200 min Summer	1.171	0.0	166.7	3896
8640 min Summer	1.008	0.0	169.6	4664
10080 min Summer	0.889	0.0	171.3	5352
15 min Winter	121.269	0.0	36.4	19
30 min Winter	79.695	0.0	49.9	34
60 min Winter	49.937	0.0	67.5	62
120 min Winter	30.267	0.0	83.0	120
180 min Winter	22.297	0.0	92.3	178

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Summary of Results for 100 year Return Period (+30%)

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
240 min Winter	3.258	0.288	0.0	1.9	1.9	86.3	O K
360 min Winter	3.262	0.292	0.0	1.9	1.9	87.6	O K
480 min Winter	3.261	0.291	0.0	1.9	1.9	87.3	O K
600 min Winter	3.260	0.290	0.0	1.9	1.9	87.0	O K
720 min Winter	3.257	0.287	0.0	1.9	1.9	86.2	O K
960 min Winter	3.249	0.279	0.0	1.9	1.9	83.8	O K
1440 min Winter	3.228	0.258	0.0	1.8	1.8	77.5	O K
2160 min Winter	3.196	0.226	0.0	1.7	1.7	67.8	O K
2880 min Winter	3.167	0.197	0.0	1.5	1.5	59.2	O K
4320 min Winter	3.123	0.153	0.0	1.3	1.3	45.9	O K
5760 min Winter	3.092	0.122	0.0	1.2	1.2	36.6	O K
7200 min Winter	3.070	0.100	0.0	1.0	1.0	30.0	O K
8640 min Winter	3.054	0.084	0.0	0.9	0.9	25.3	O K
10080 min Winter	3.043	0.073	0.0	0.8	0.8	21.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
240 min Winter	17.851	0.0	98.8	234
360 min Winter	12.957	0.0	107.8	342
480 min Winter	10.330	0.0	114.7	398
600 min Winter	8.659	0.0	120.2	466
720 min Winter	7.492	0.0	124.8	544
960 min Winter	5.959	0.0	132.0	696
1440 min Winter	4.309	0.0	142.0	994
2160 min Winter	3.110	0.0	156.6	1408
2880 min Winter	2.466	0.0	164.4	1816
4320 min Winter	1.775	0.0	174.7	2592
5760 min Winter	1.405	0.0	184.0	3336
7200 min Winter	1.171	0.0	189.4	4032
8640 min Winter	1.008	0.0	193.2	4752
10080 min Winter	0.889	0.0	195.6	5448

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.178

Time (mins) From:	To:	Area (ha)
0	5	0.178

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Model Details

Storage is Online Cover Level (m) 3.640

Porous Car Park Structure

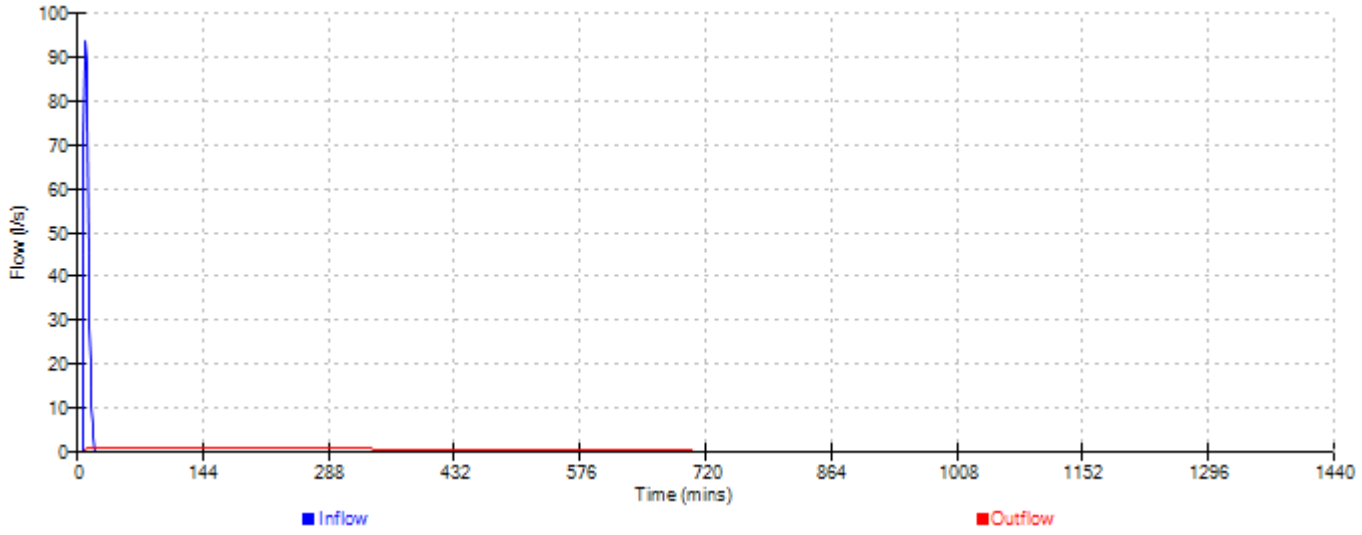
Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	200.0
Max Percolation (l/s)	277.8	Slope (1:X)	0.0
Safety Factor	1.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	2.970	Cap Volume Depth (m)	9.500

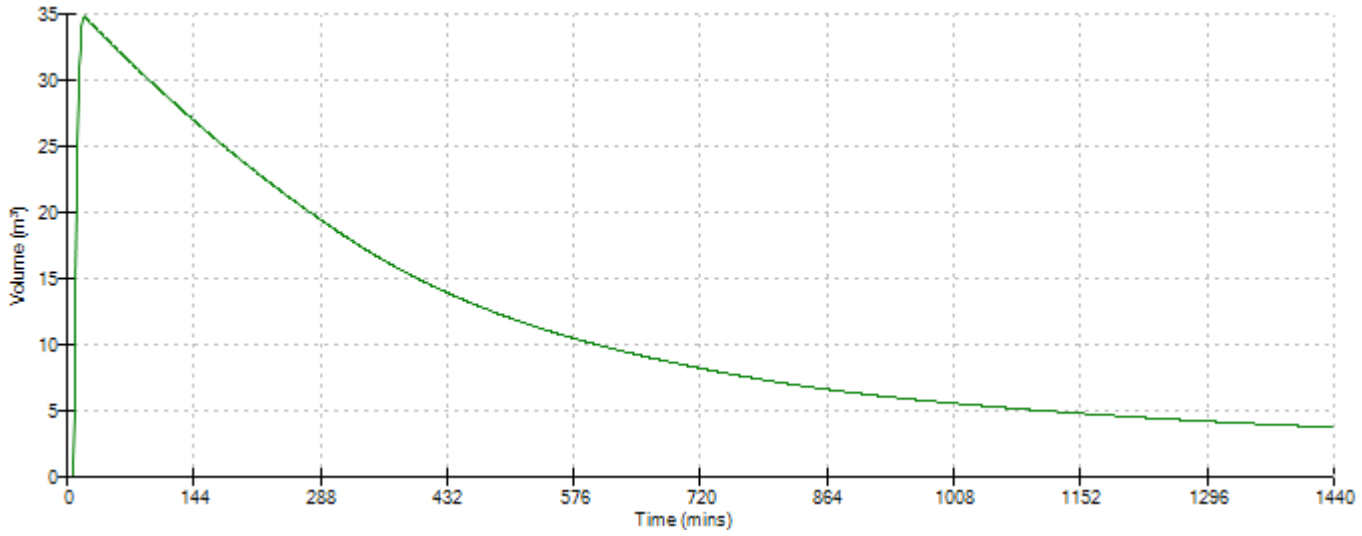
Orifice Outflow Control

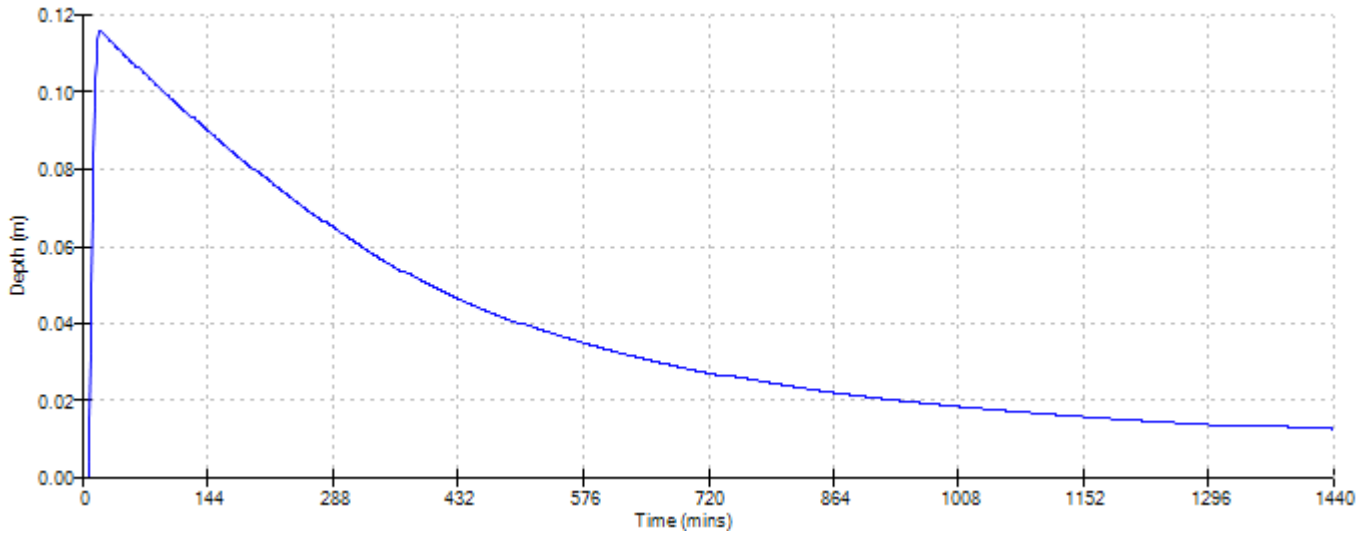
Diameter (m) 0.042 Discharge Coefficient 0.600 Invert Level (m) 2.970

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Event: 15 min Summer

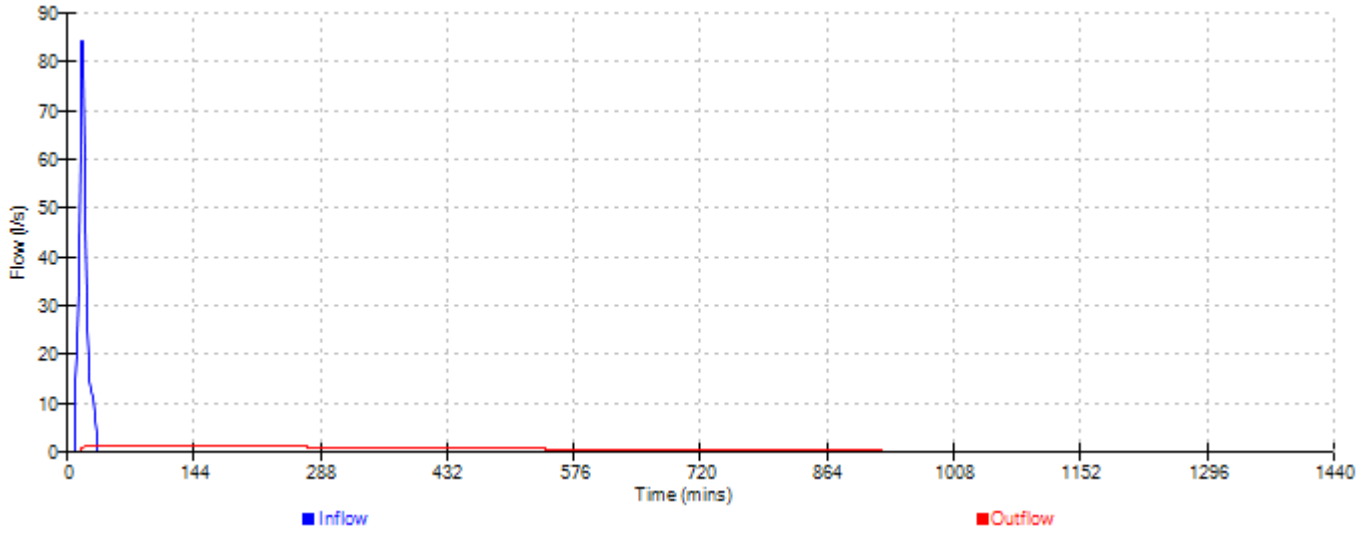


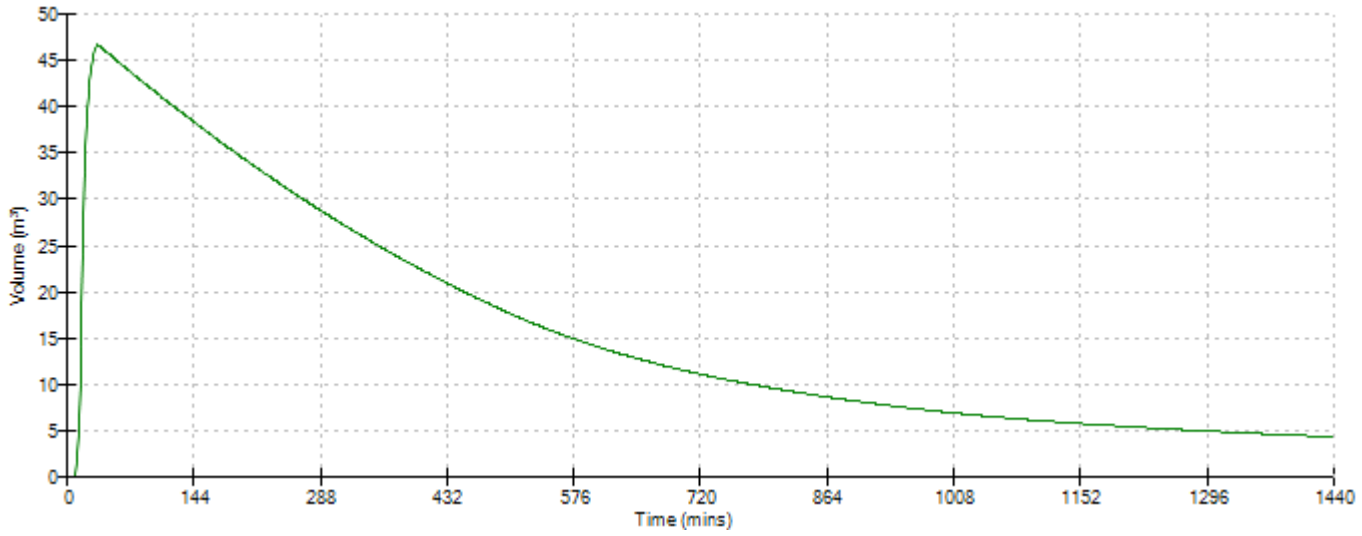


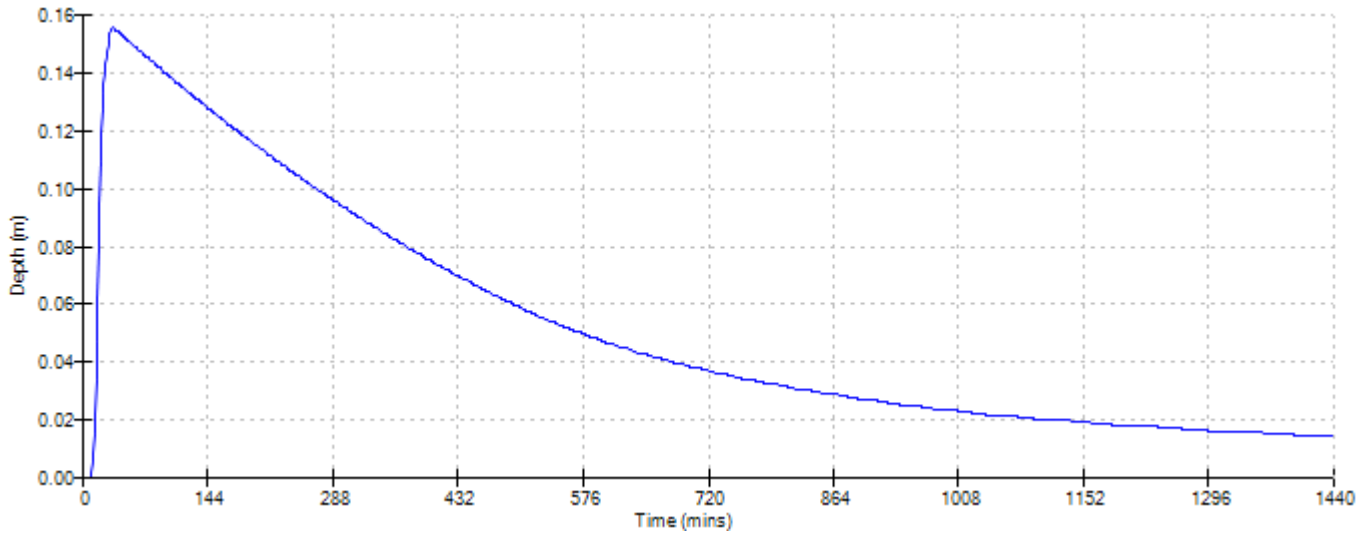


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Event: 30 min Summer

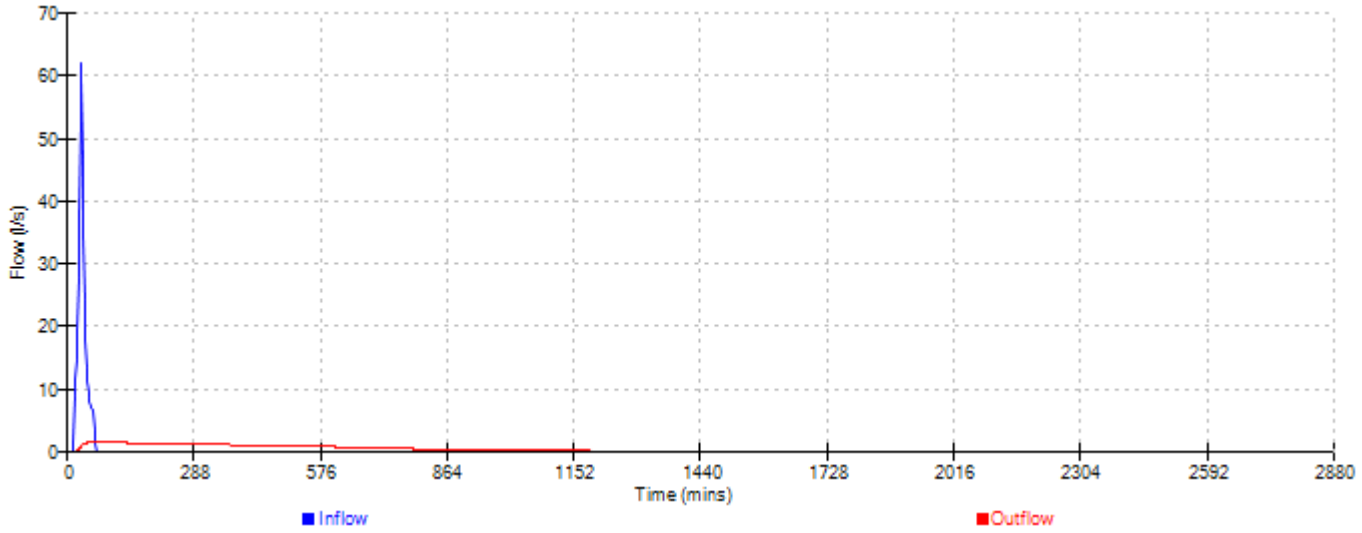


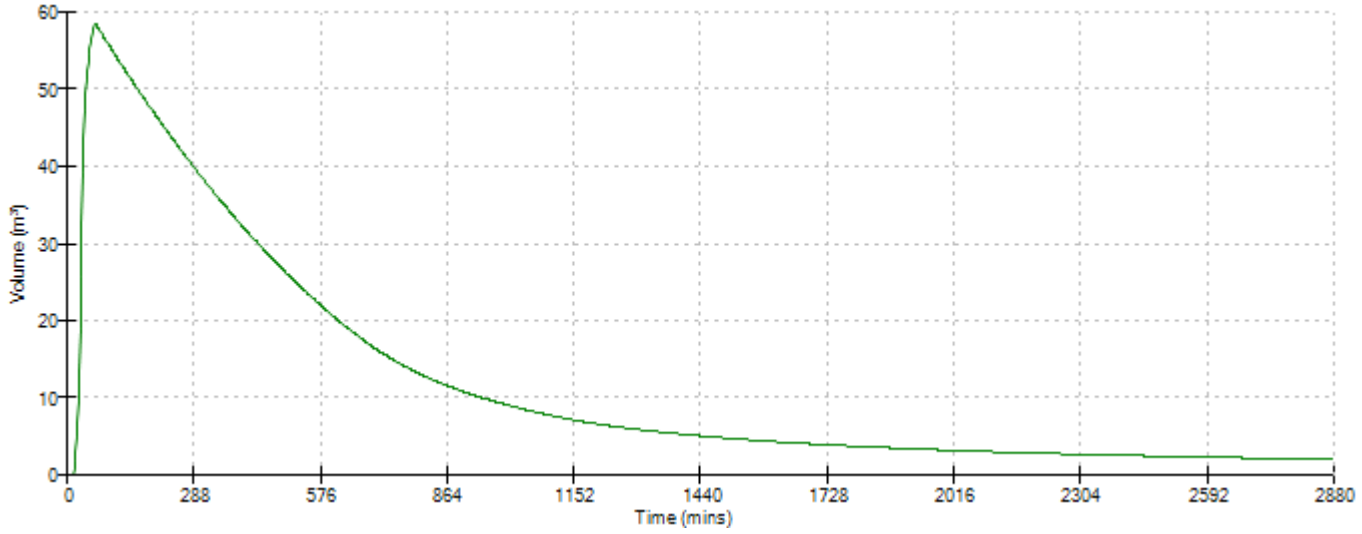


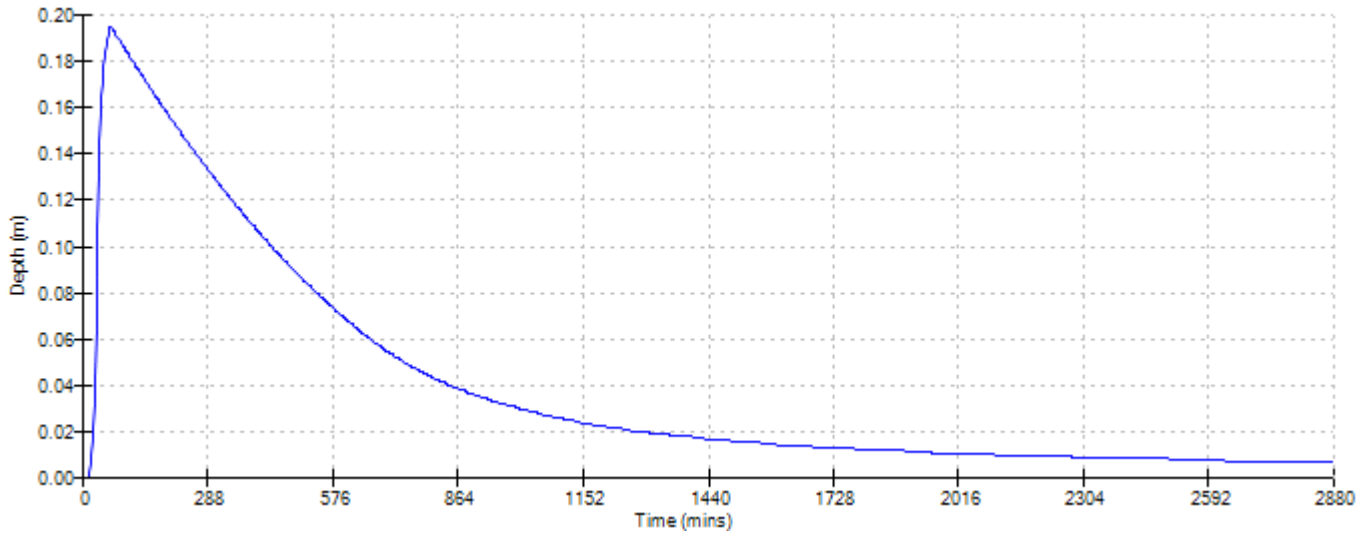


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Event: 60 min Summer

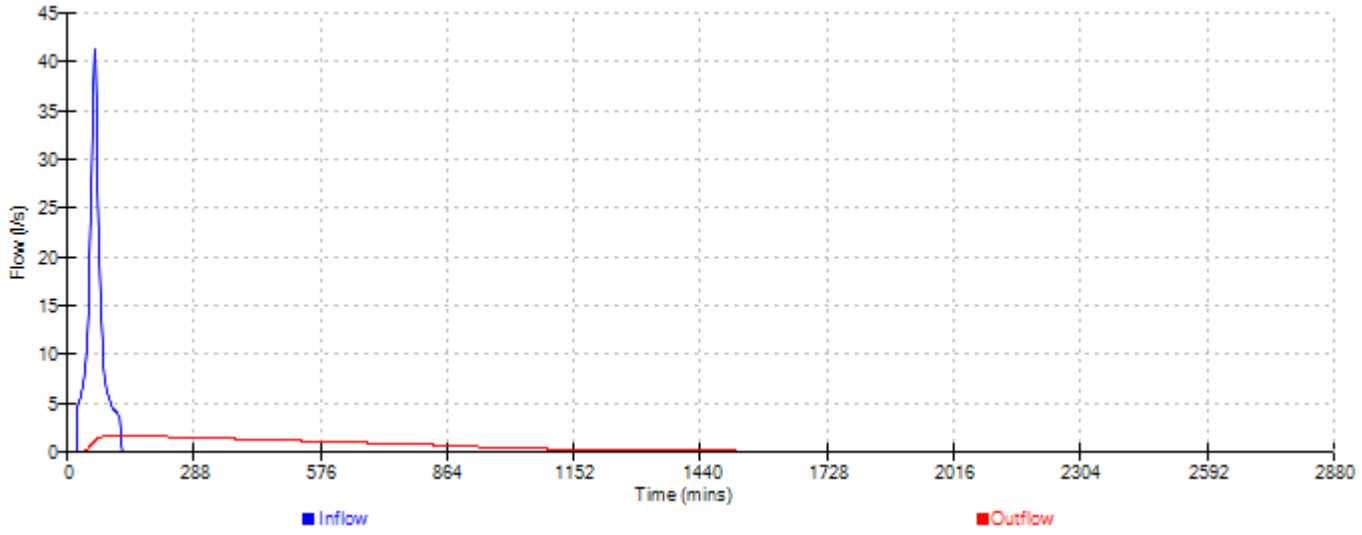


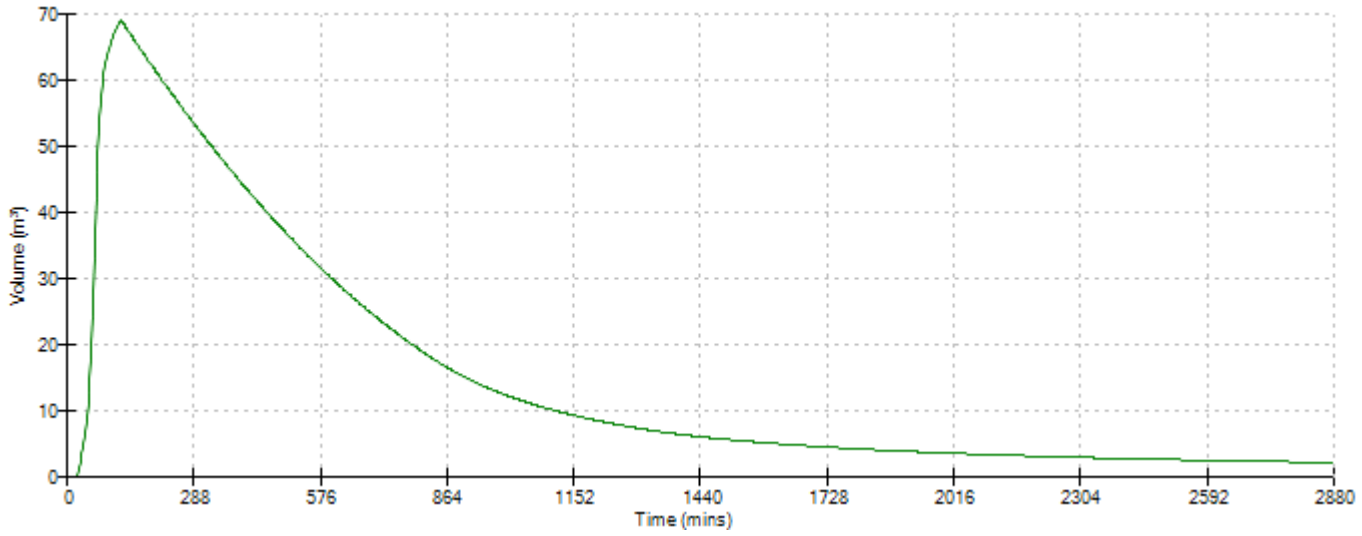


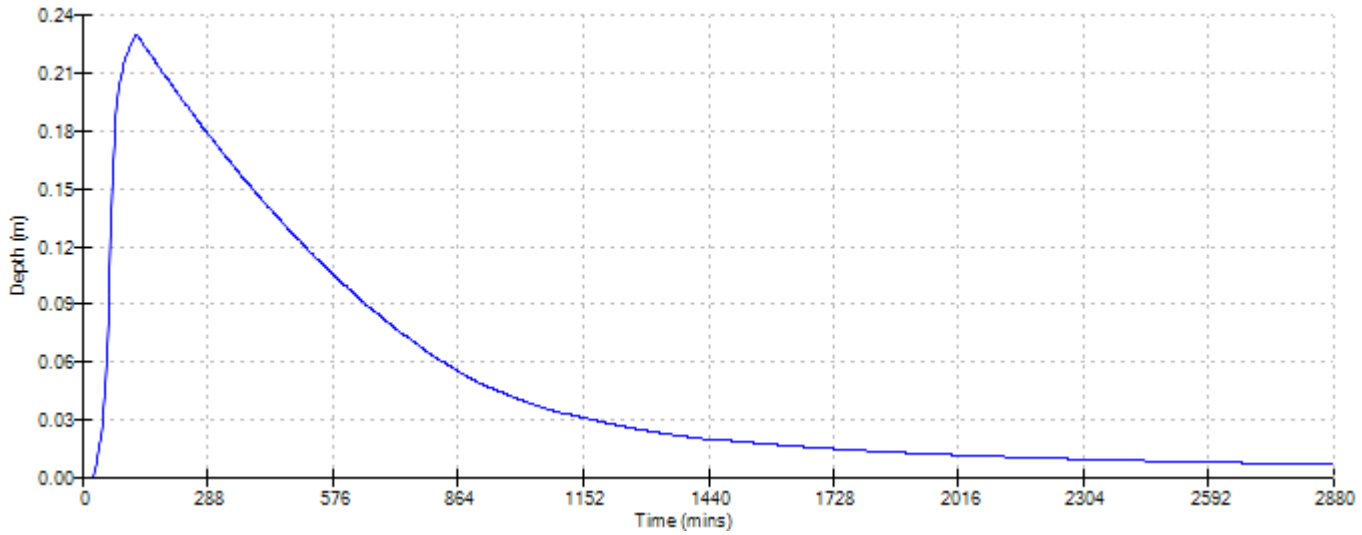


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Event: 120 min Summer

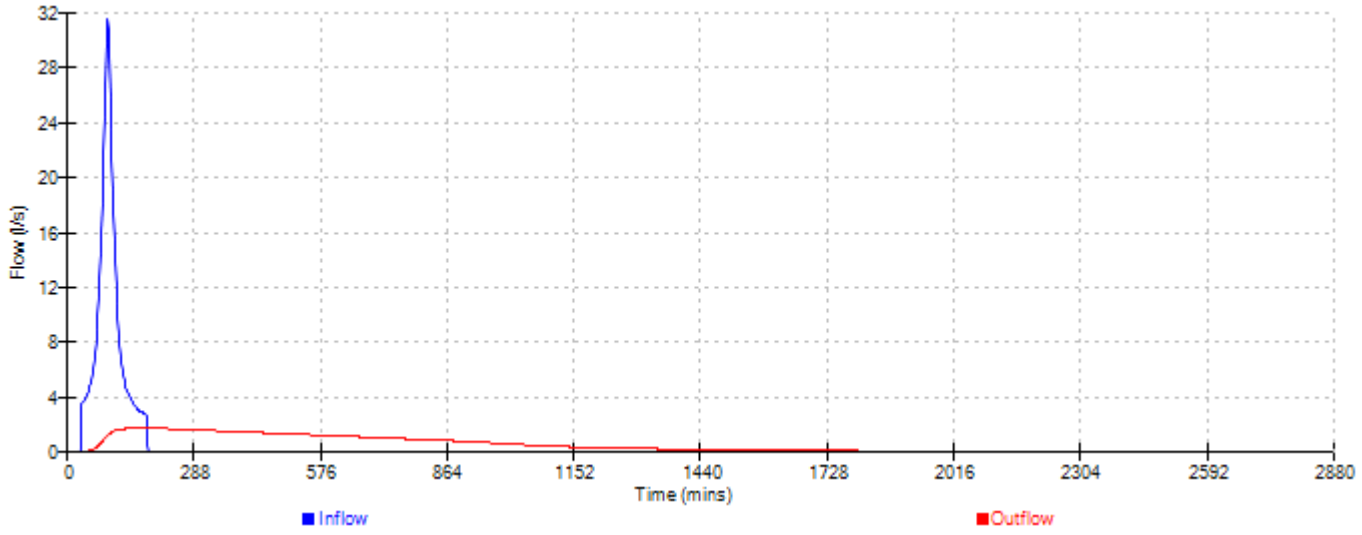


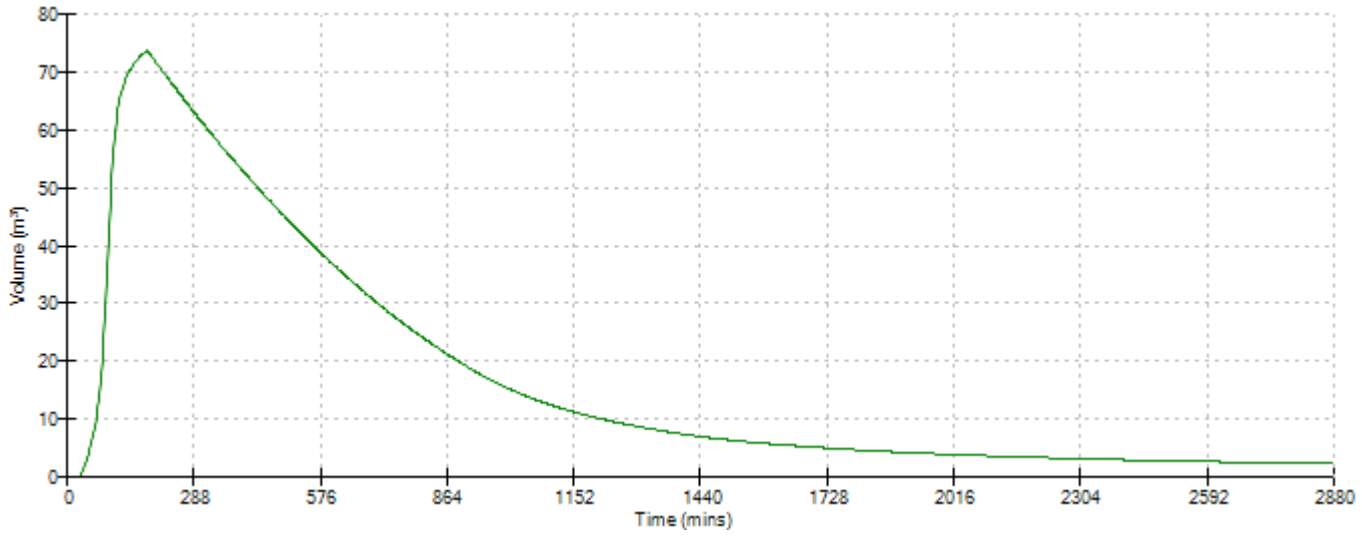


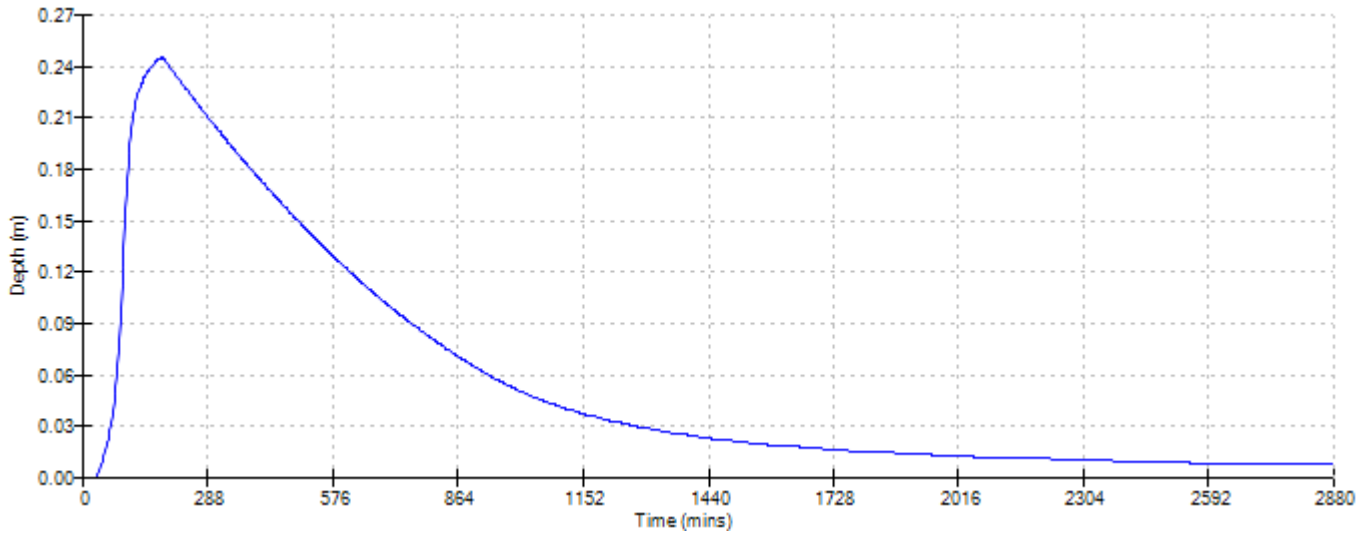


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Event: 180 min Summer

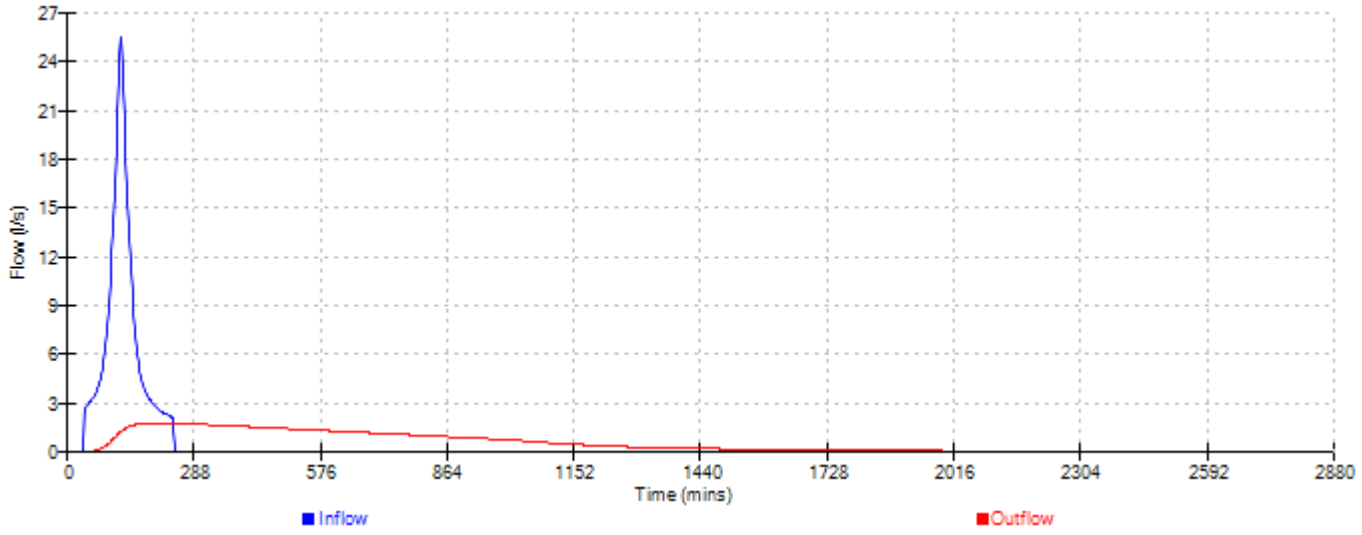


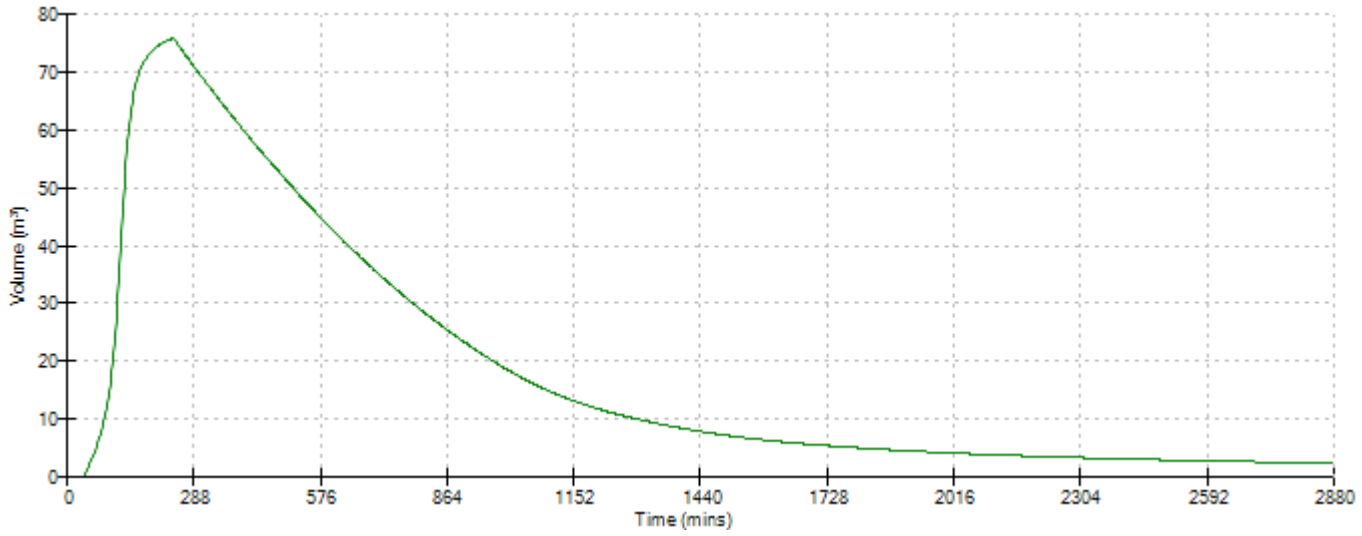


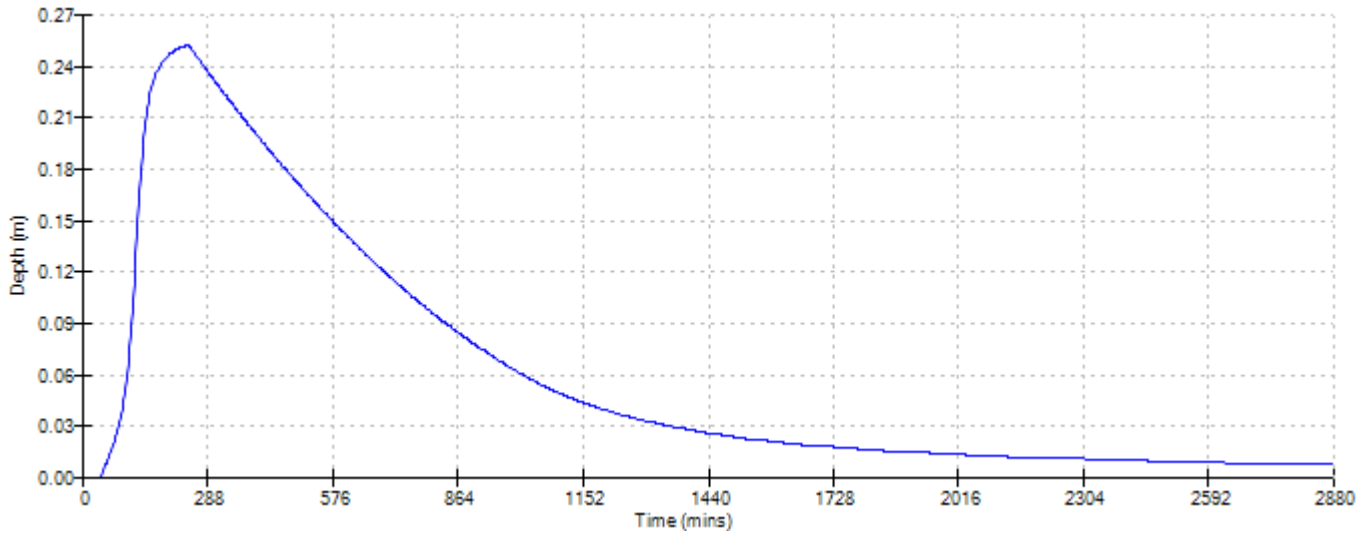


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Event: 240 min Summer

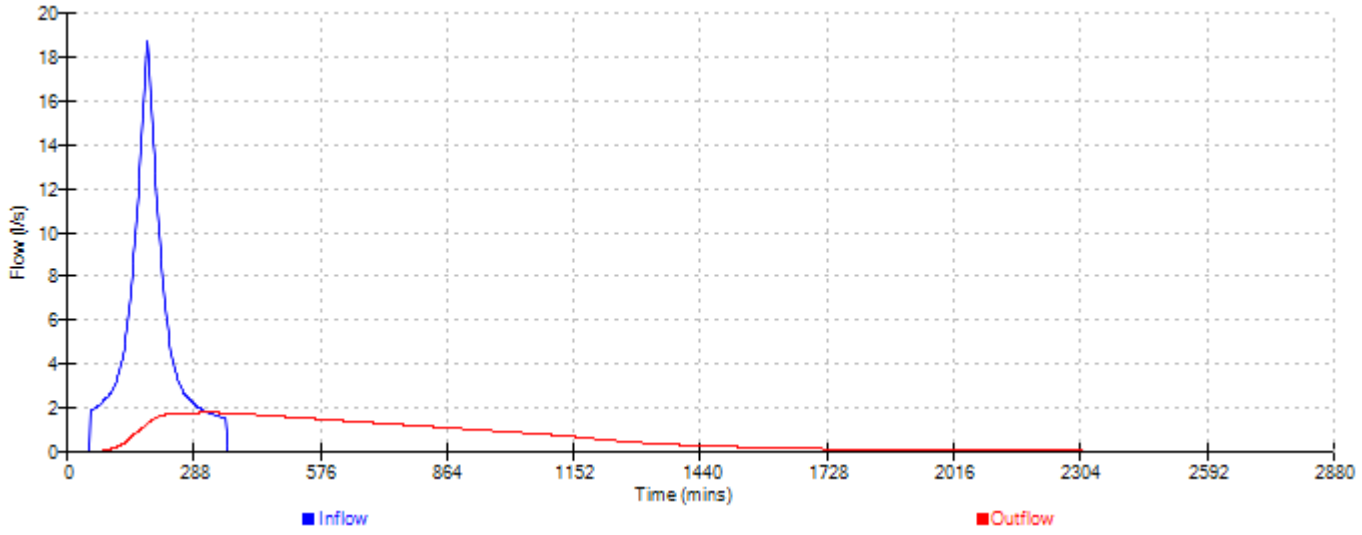


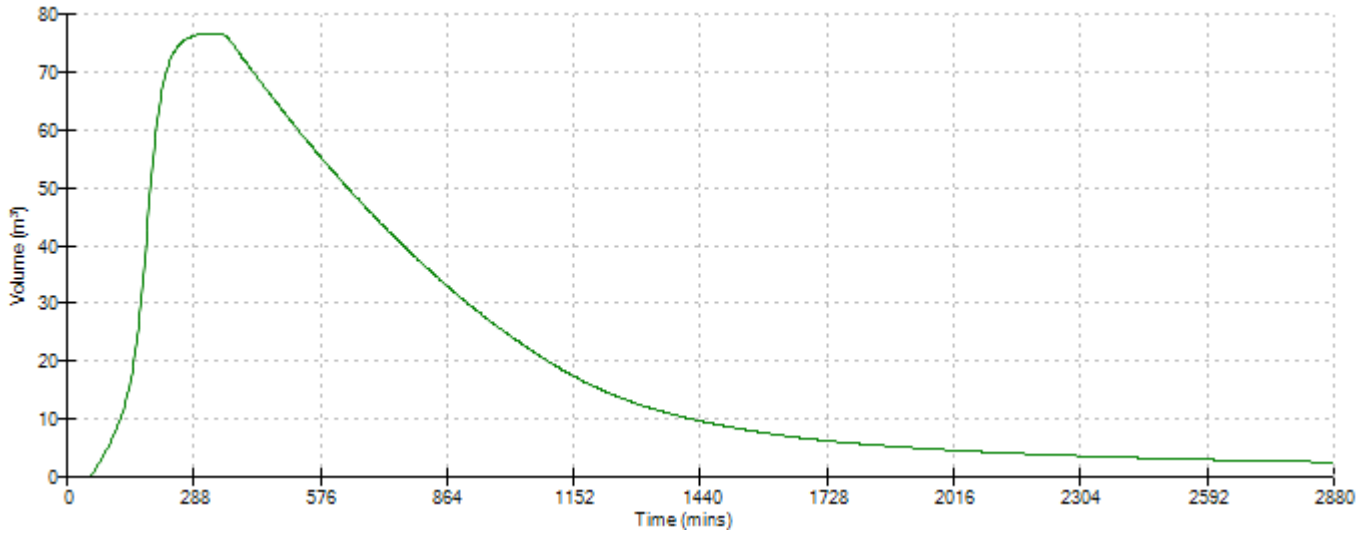


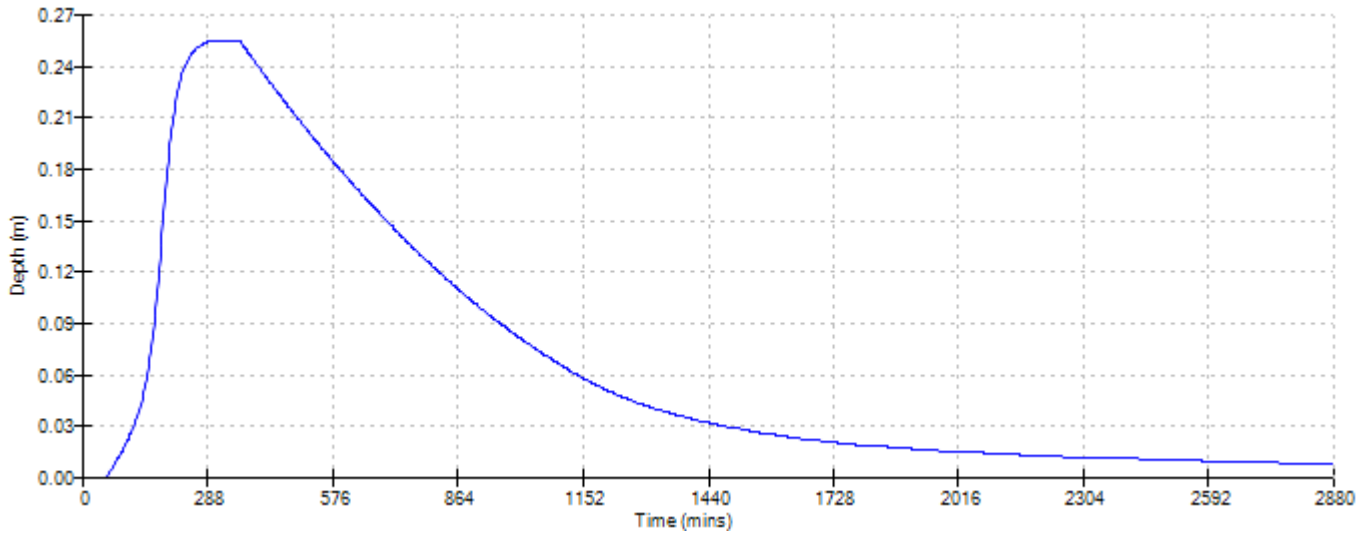


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Event: 360 min Summer

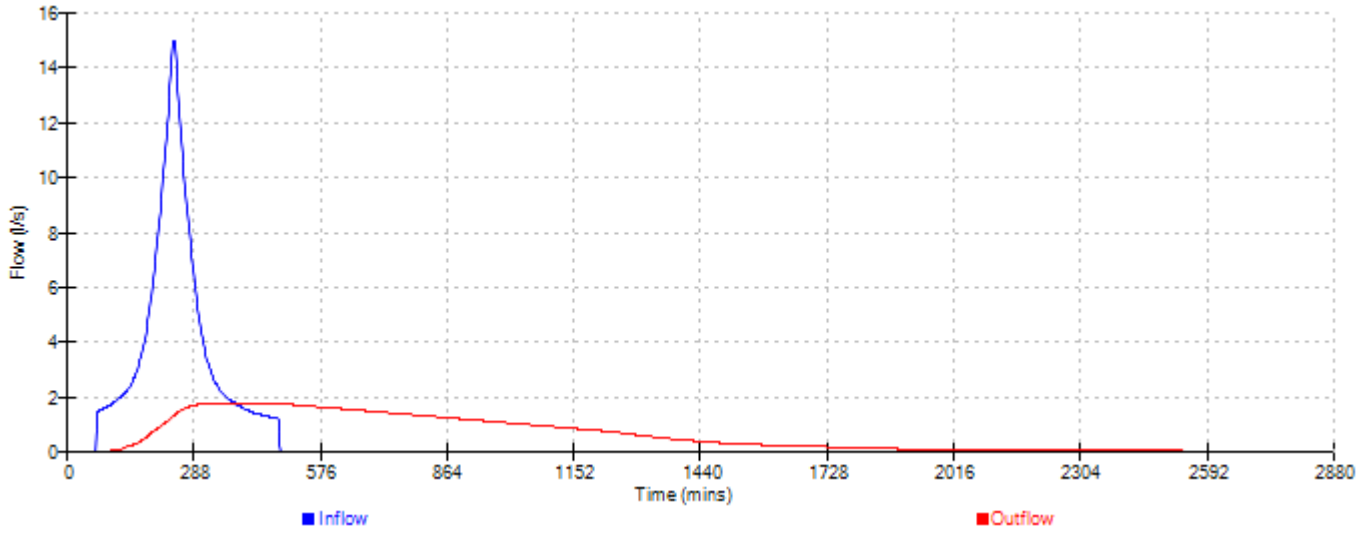


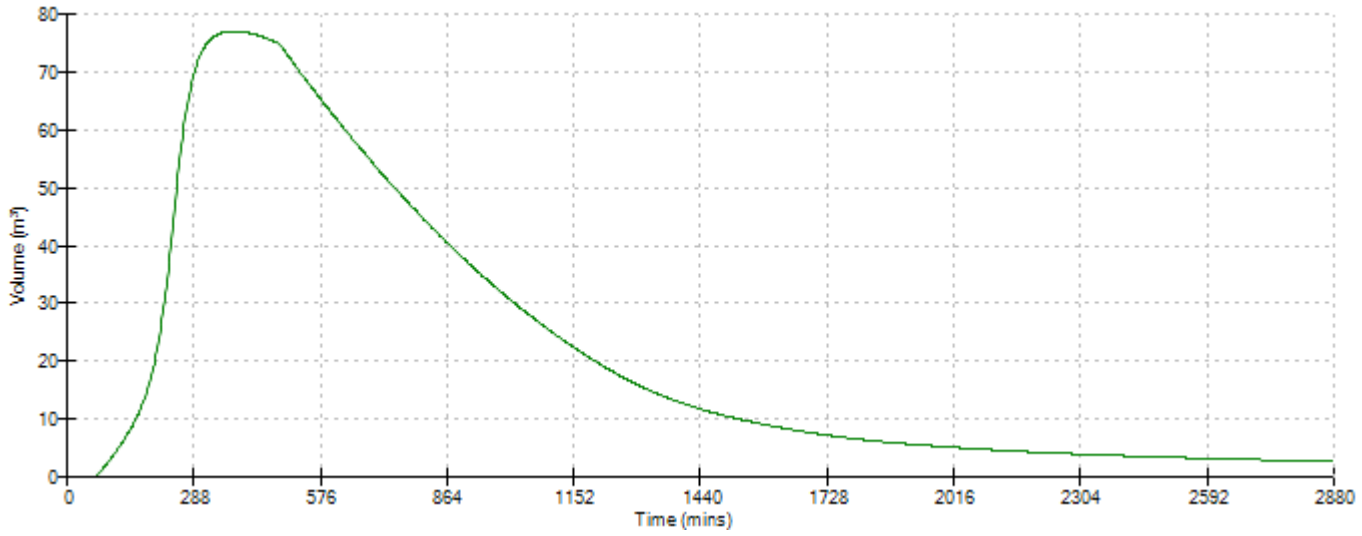


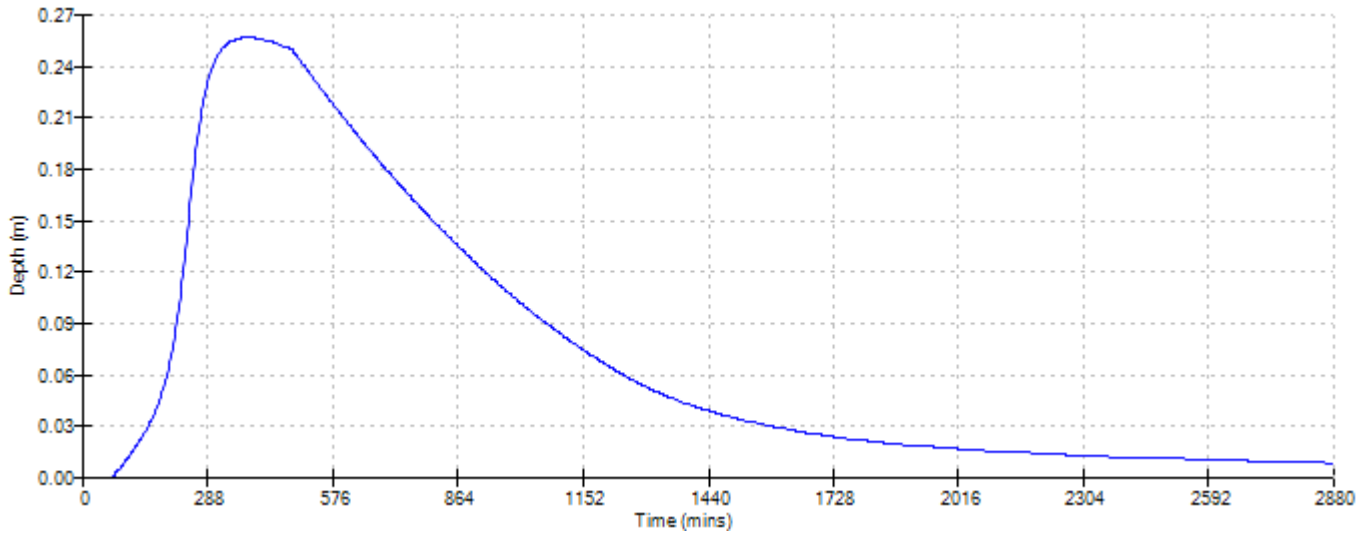


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Event: 480 min Summer

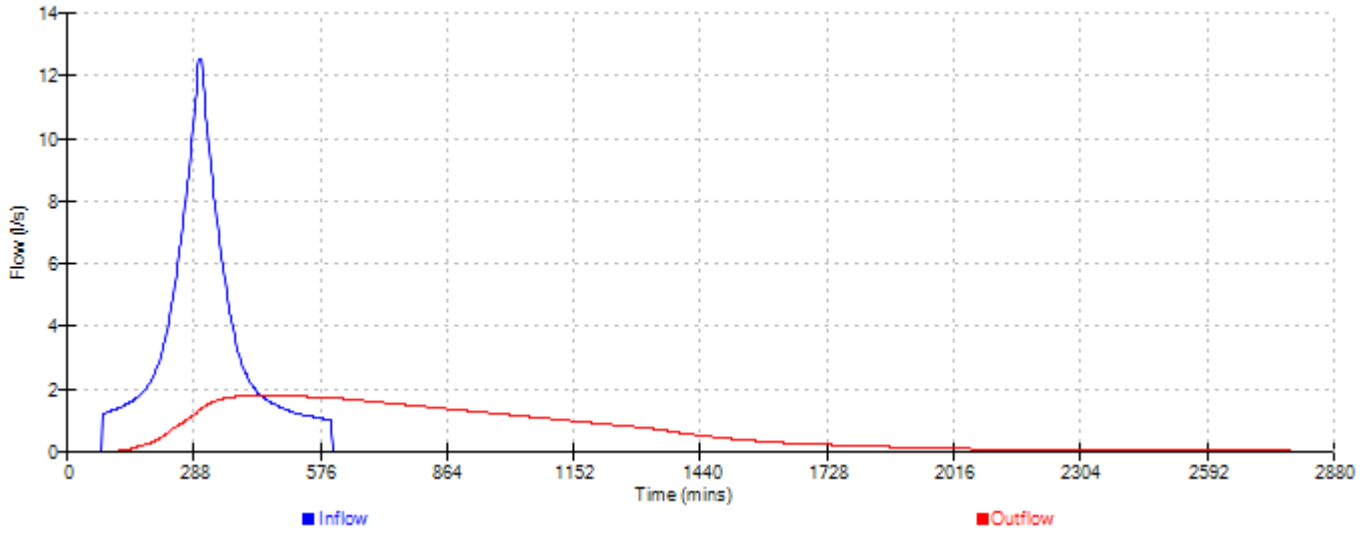


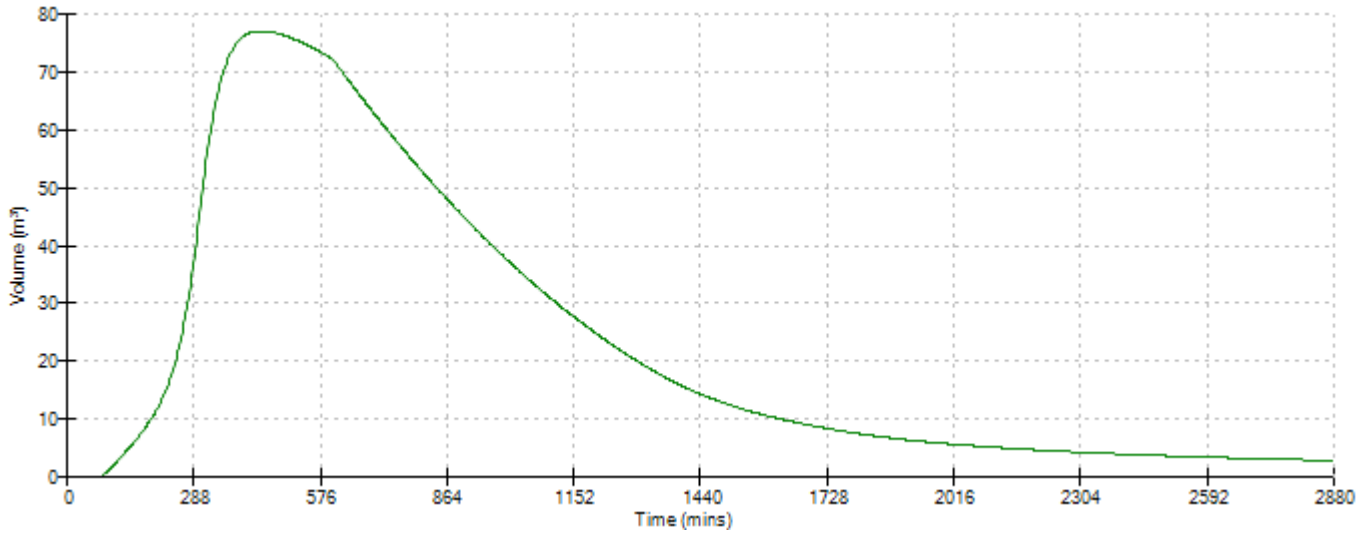


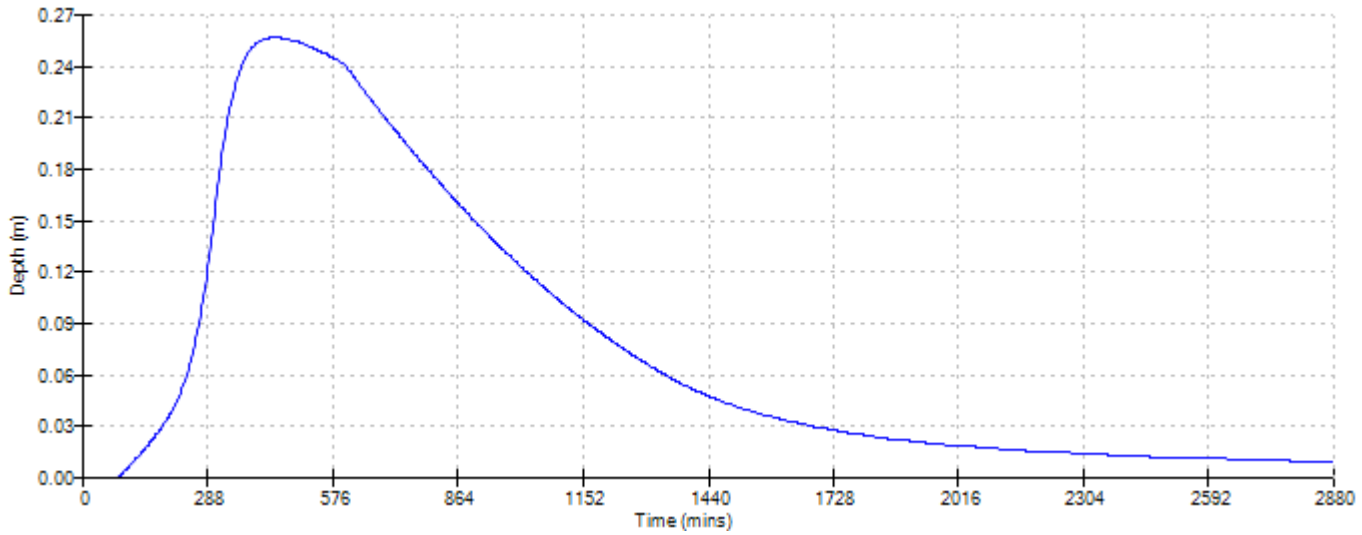


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Event: 600 min Summer

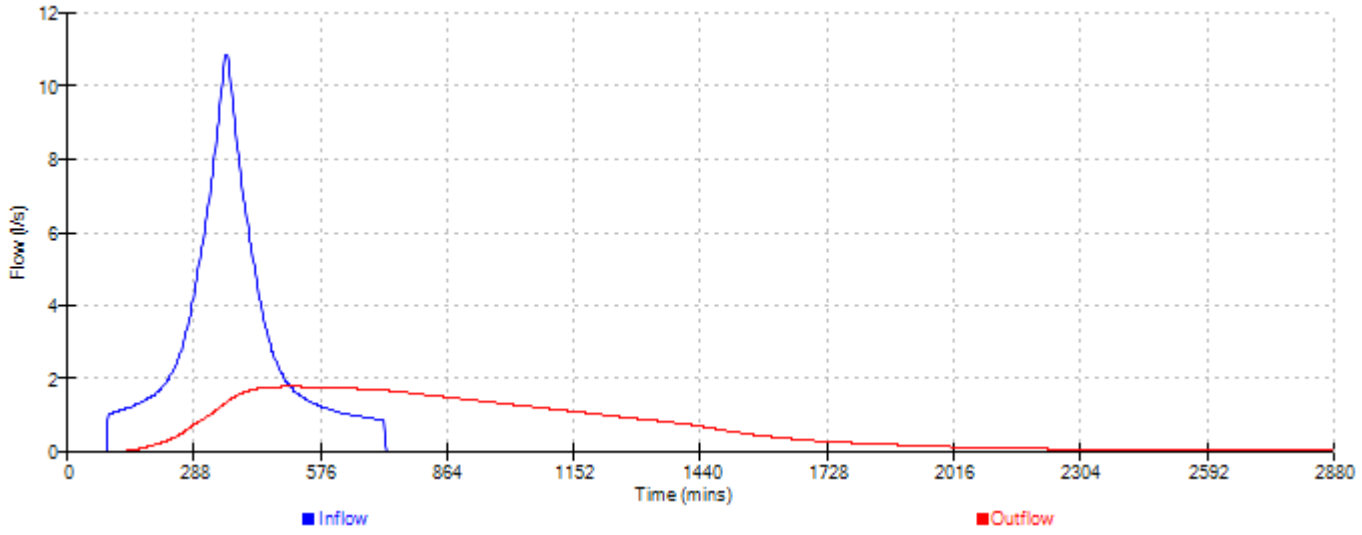


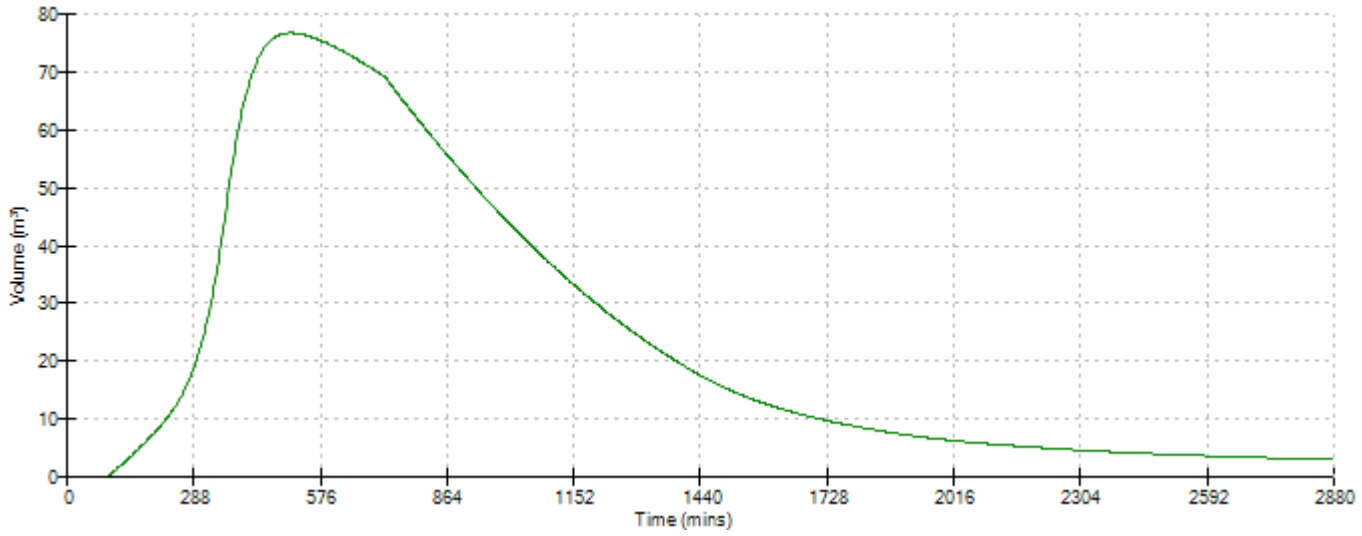


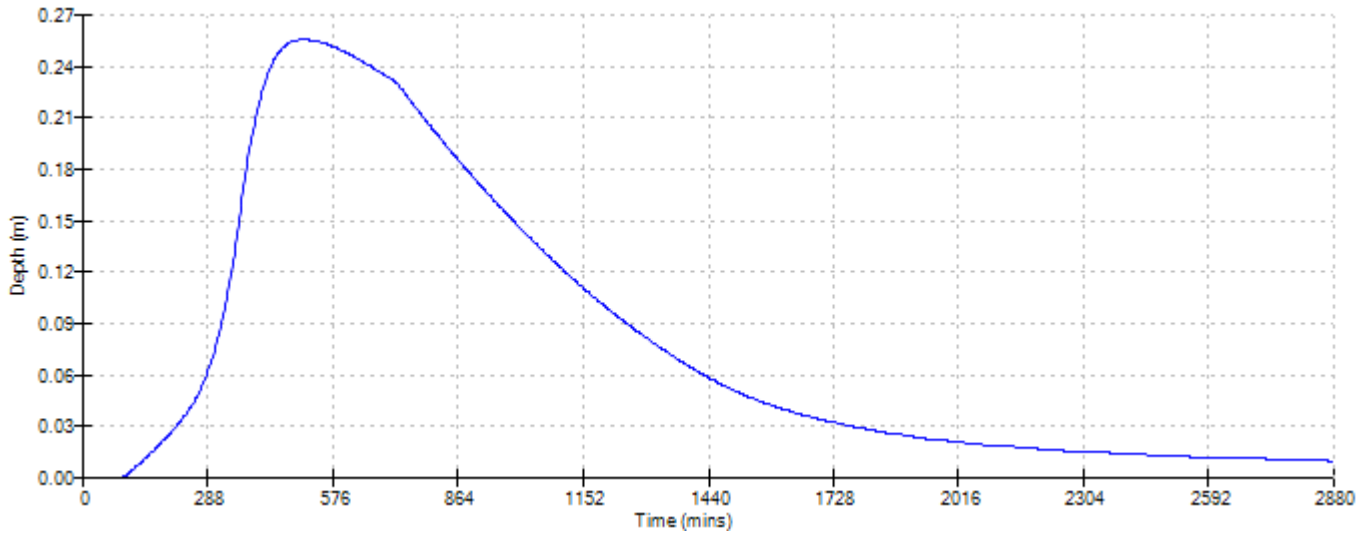


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Event: 720 min Summer

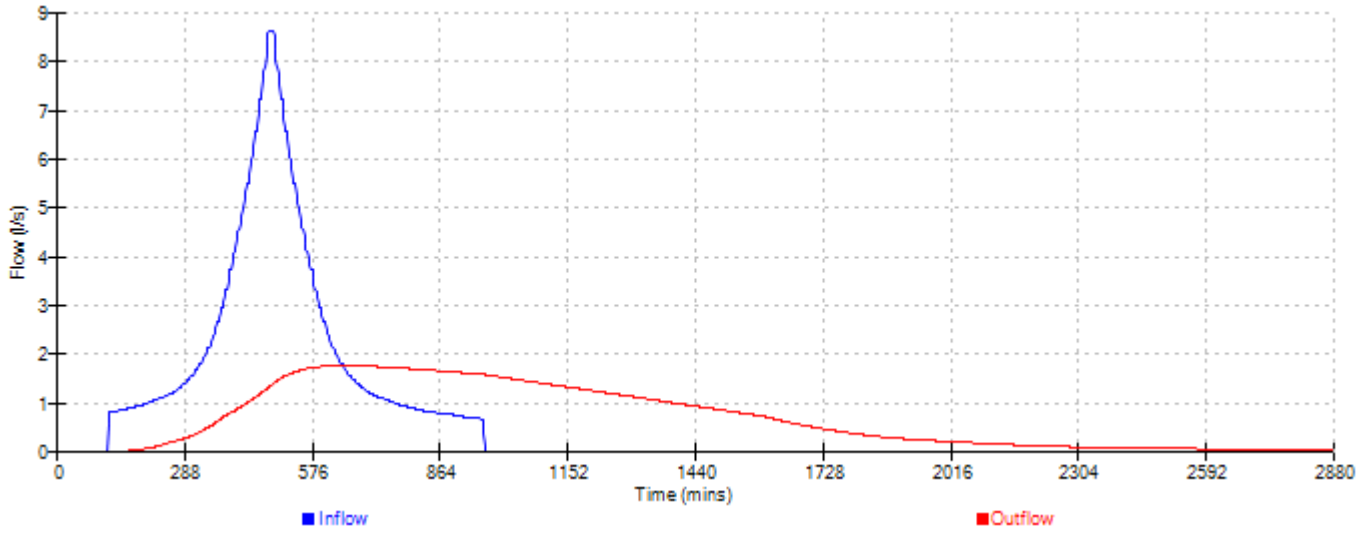


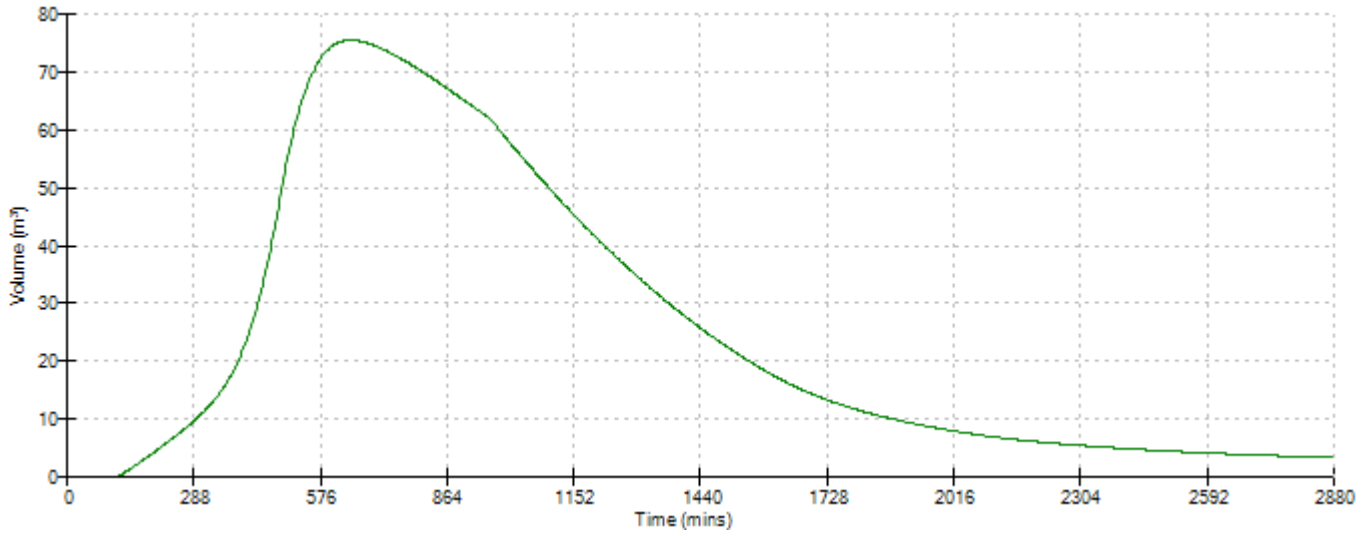


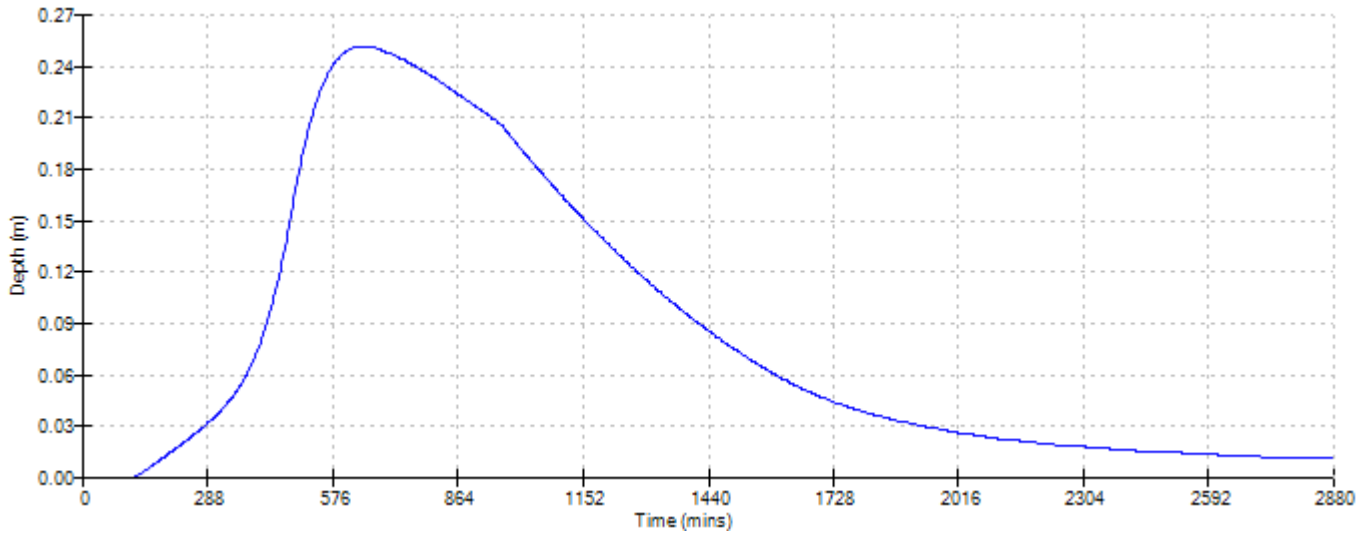


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Event: 960 min Summer

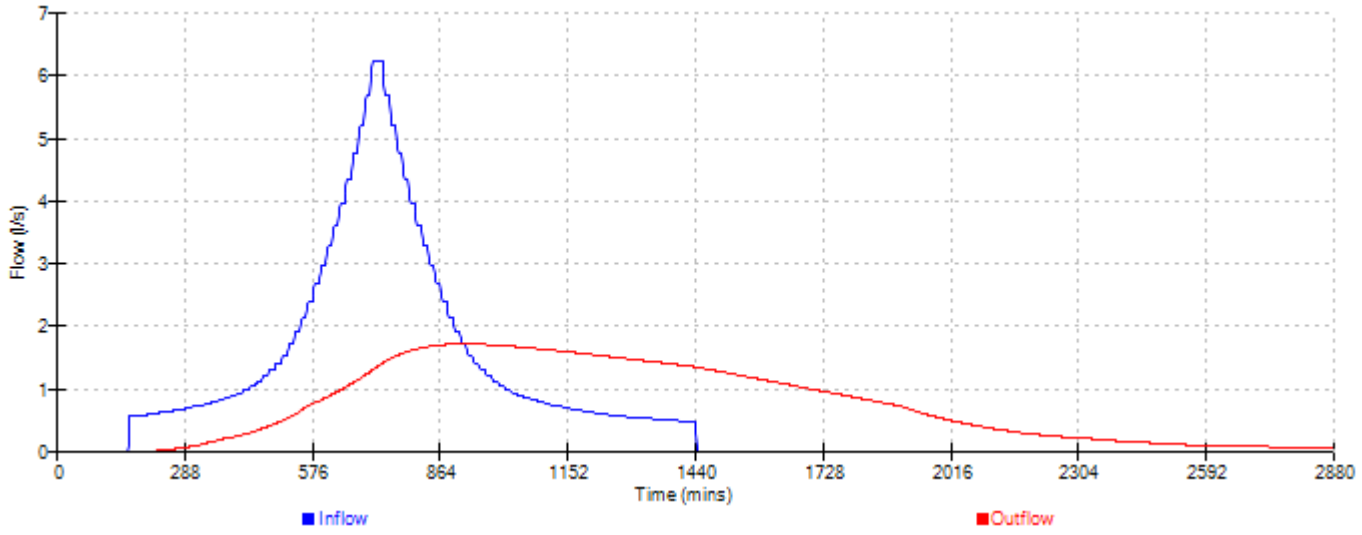


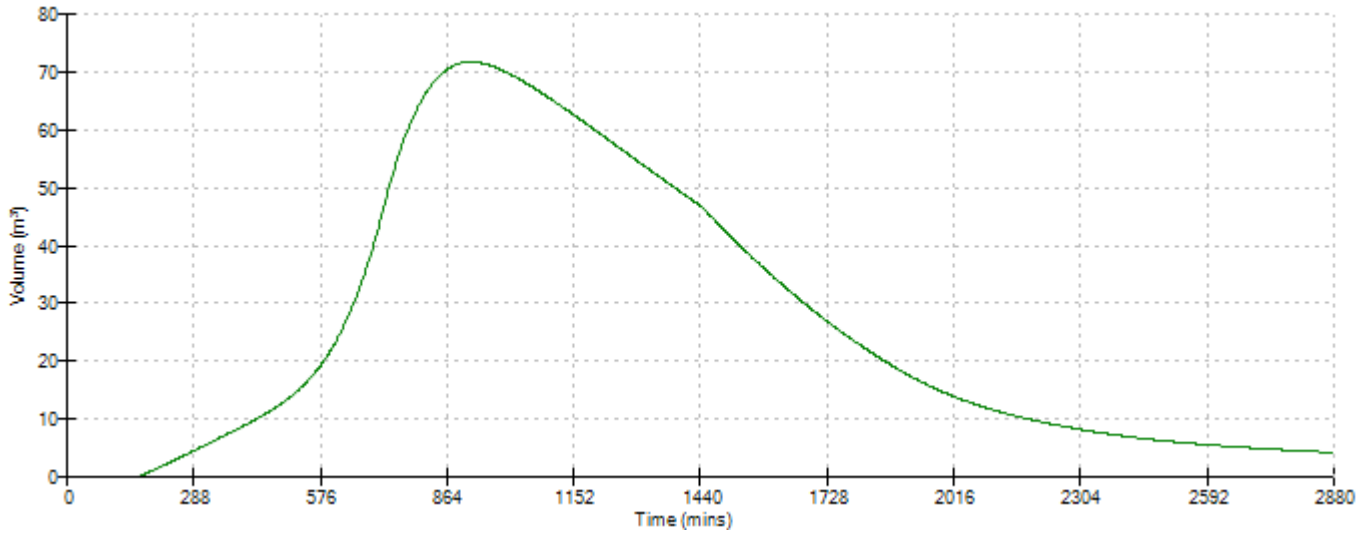


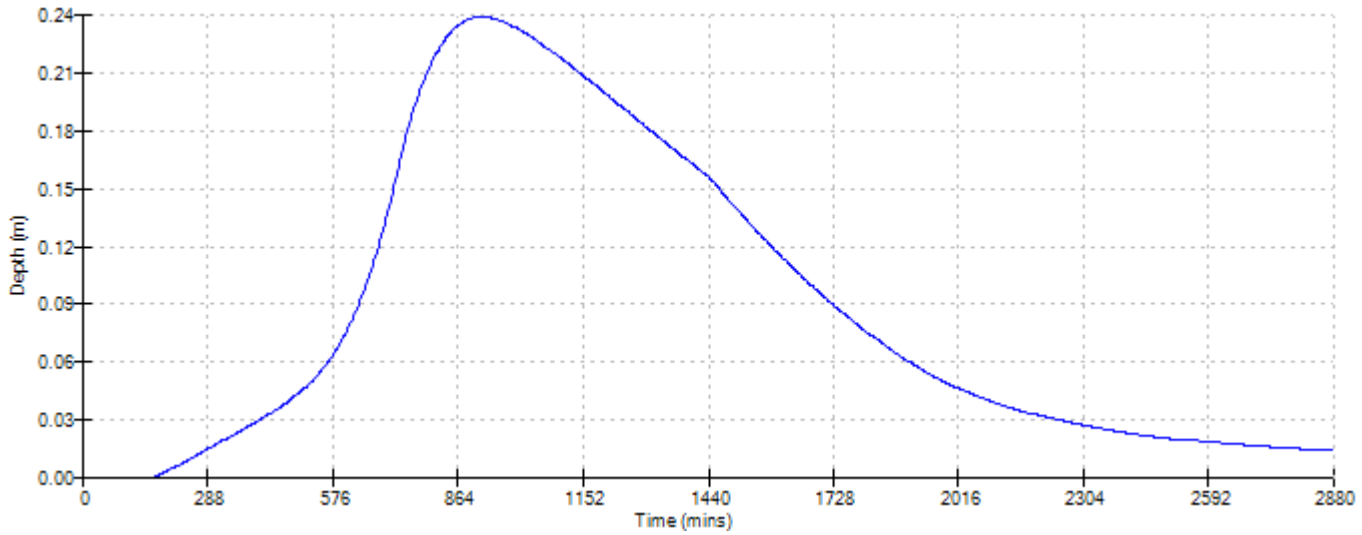


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Event: 1440 min Summer

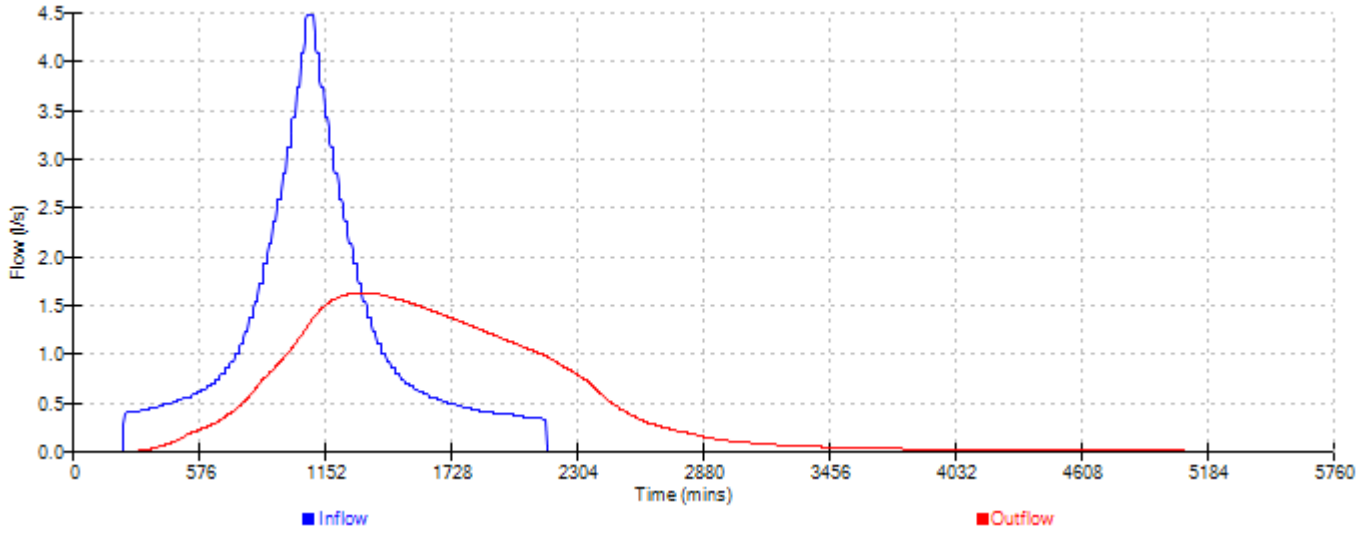


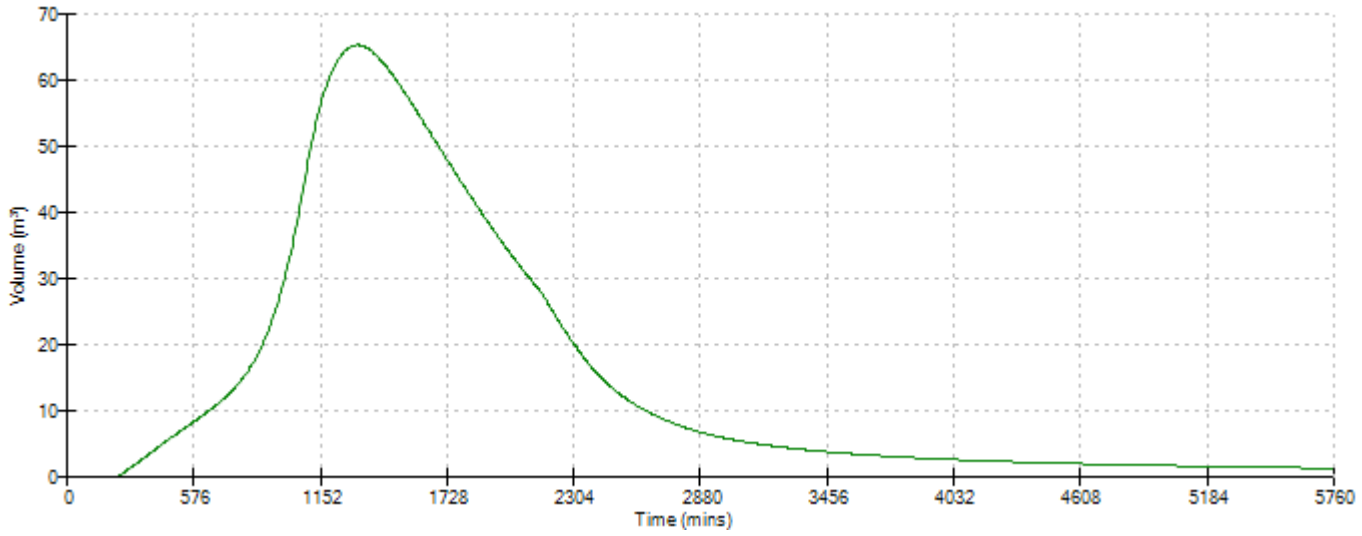


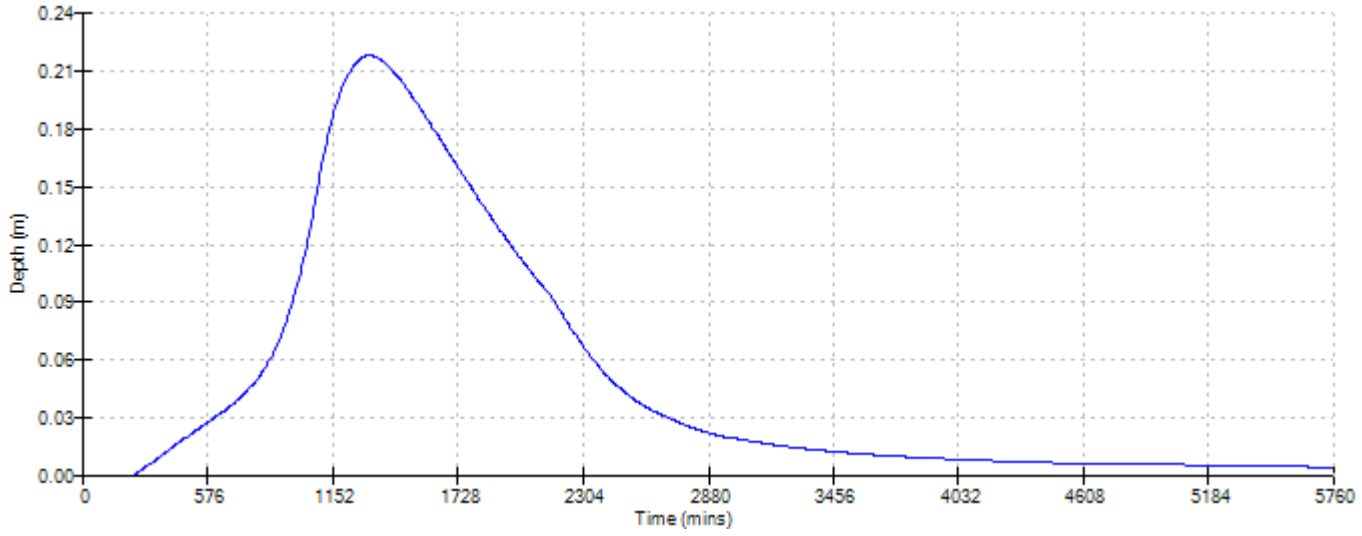


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Event: 2160 min Summer

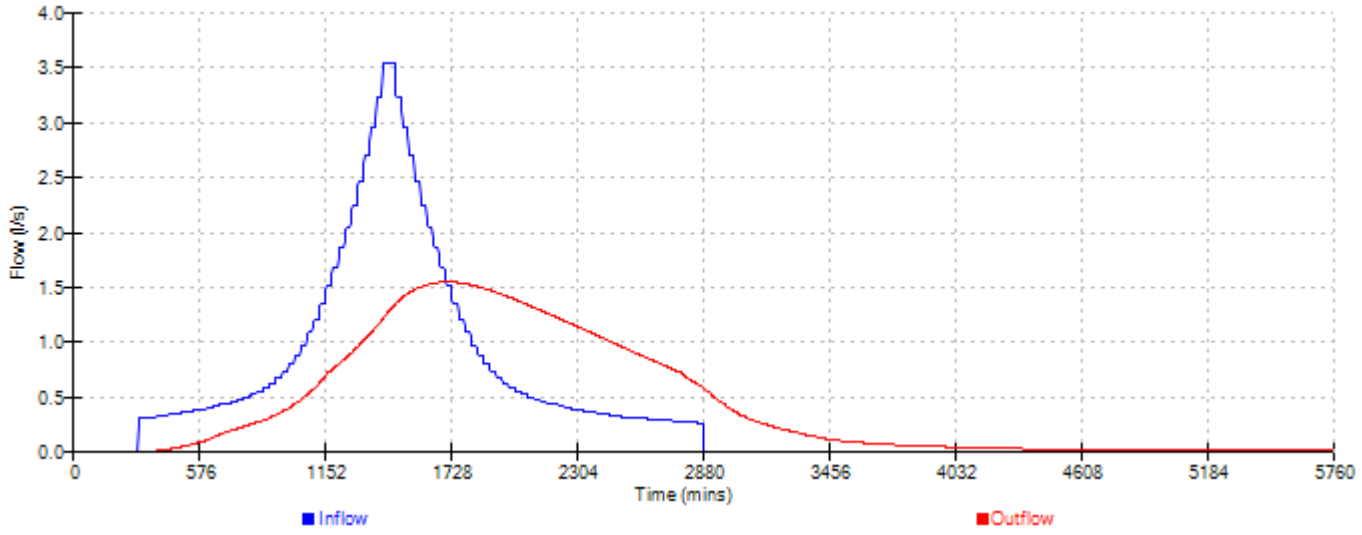


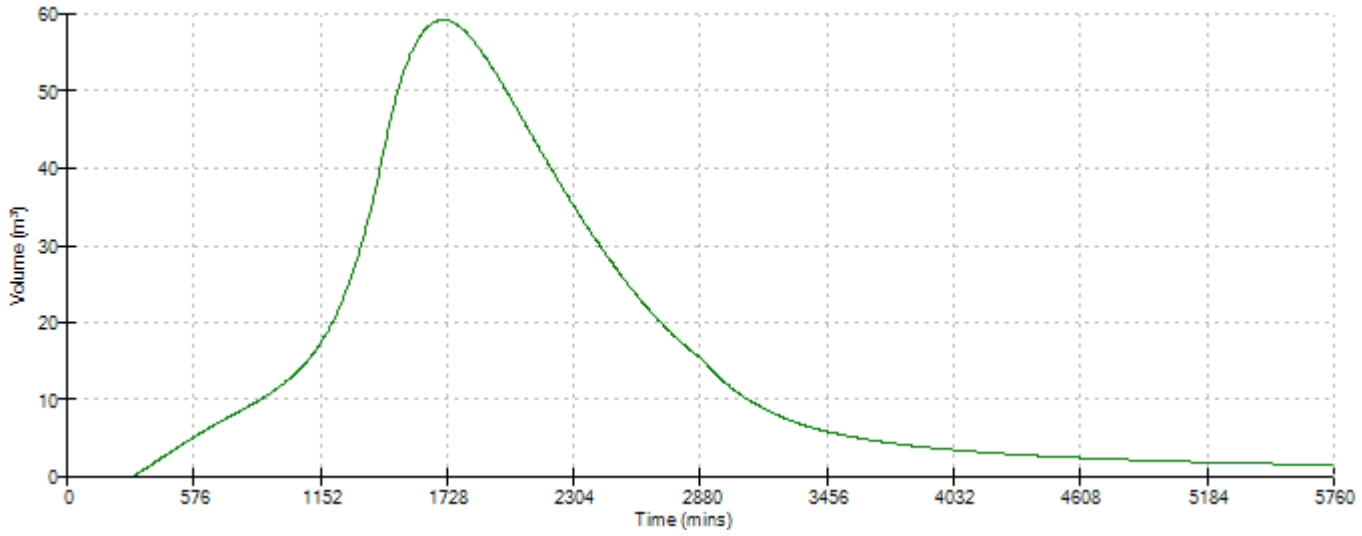


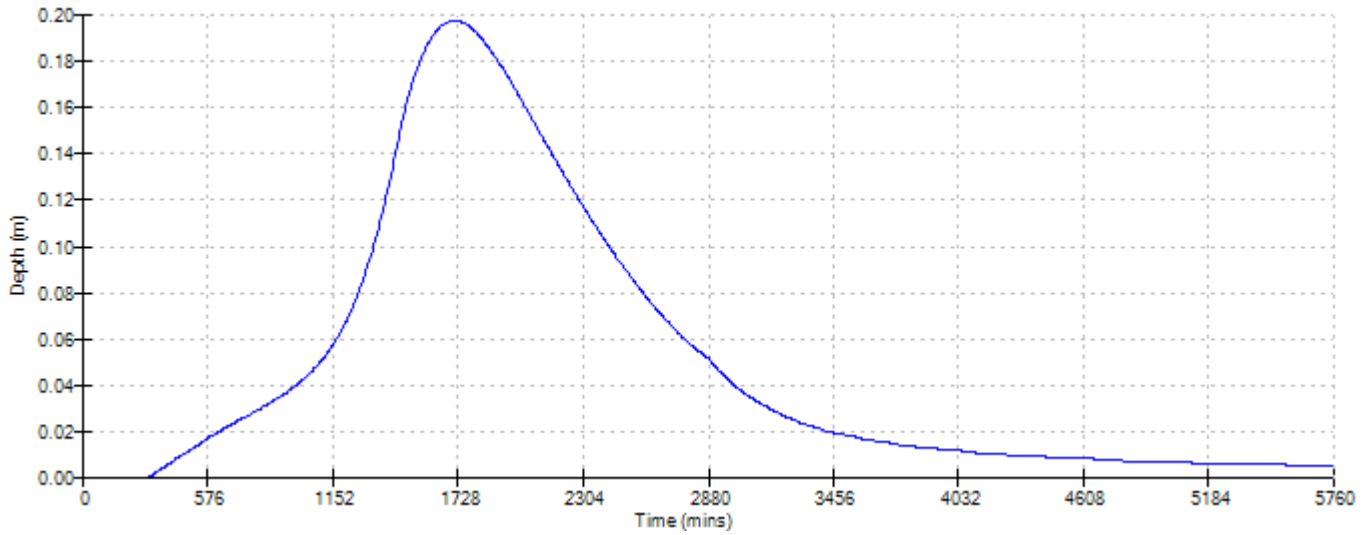


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Event: 2880 min Summer

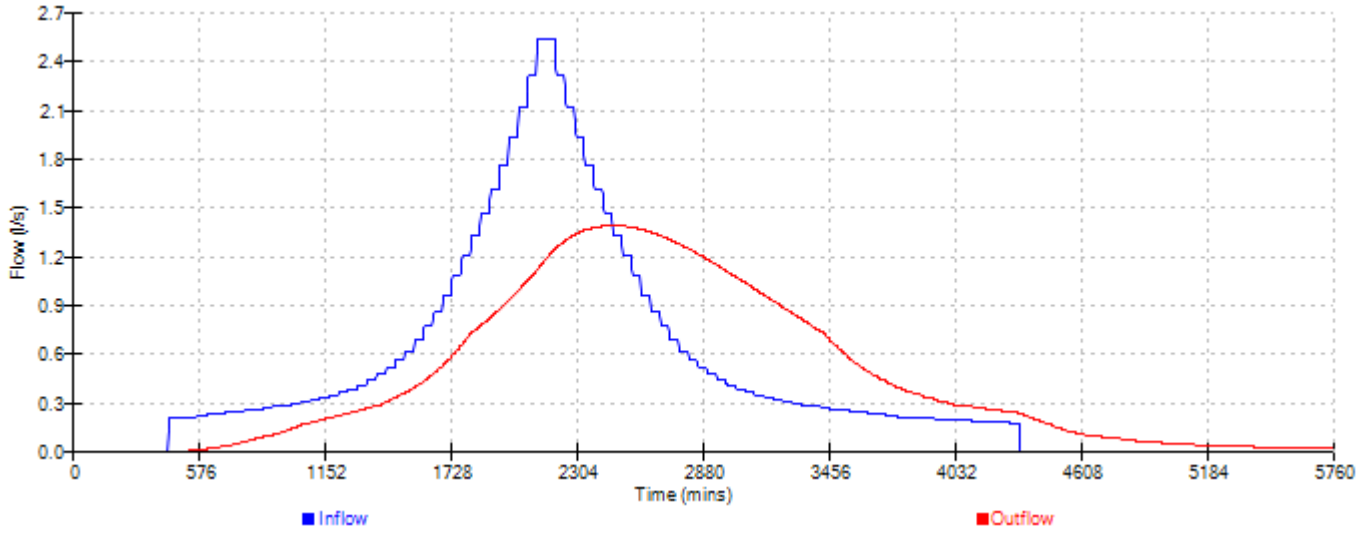


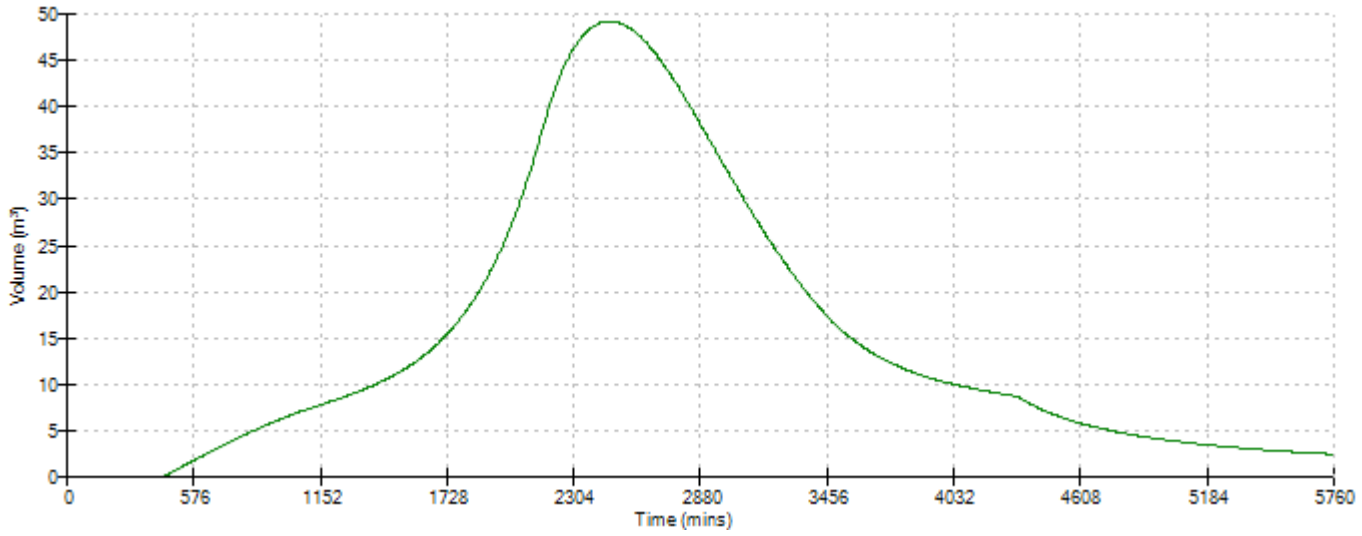


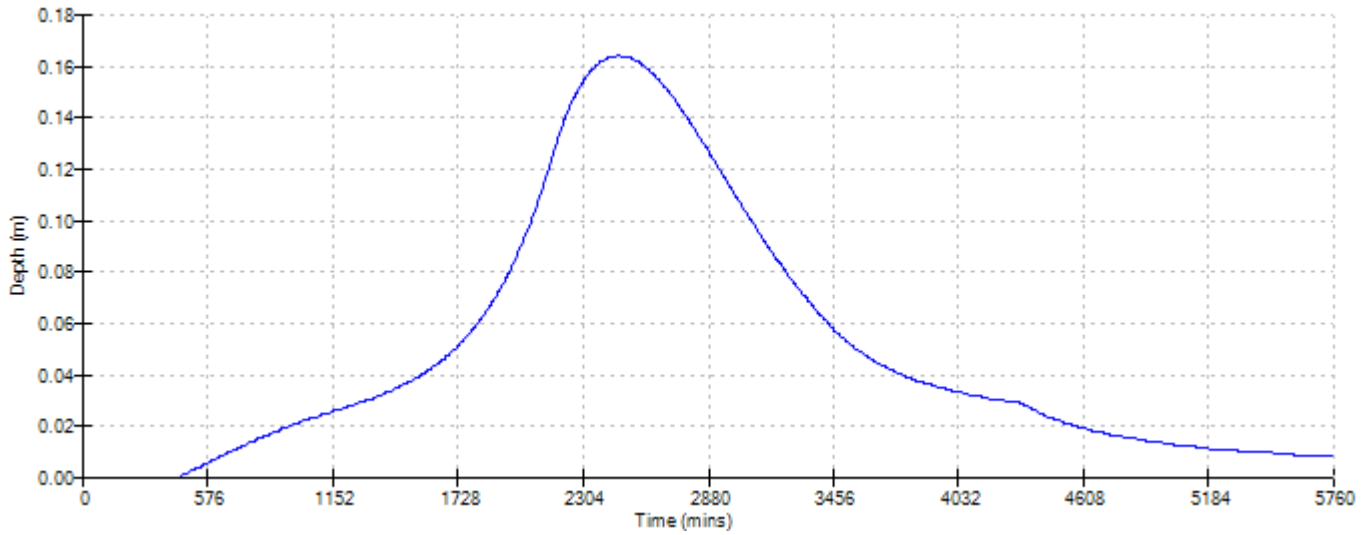


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Event: 4320 min Summer

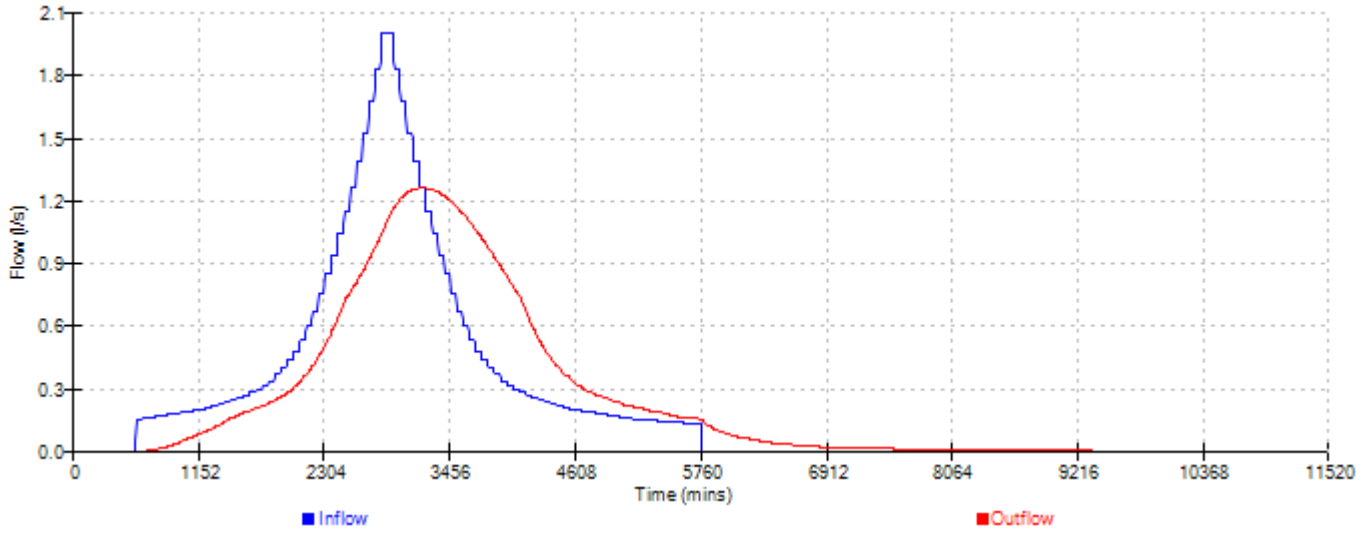


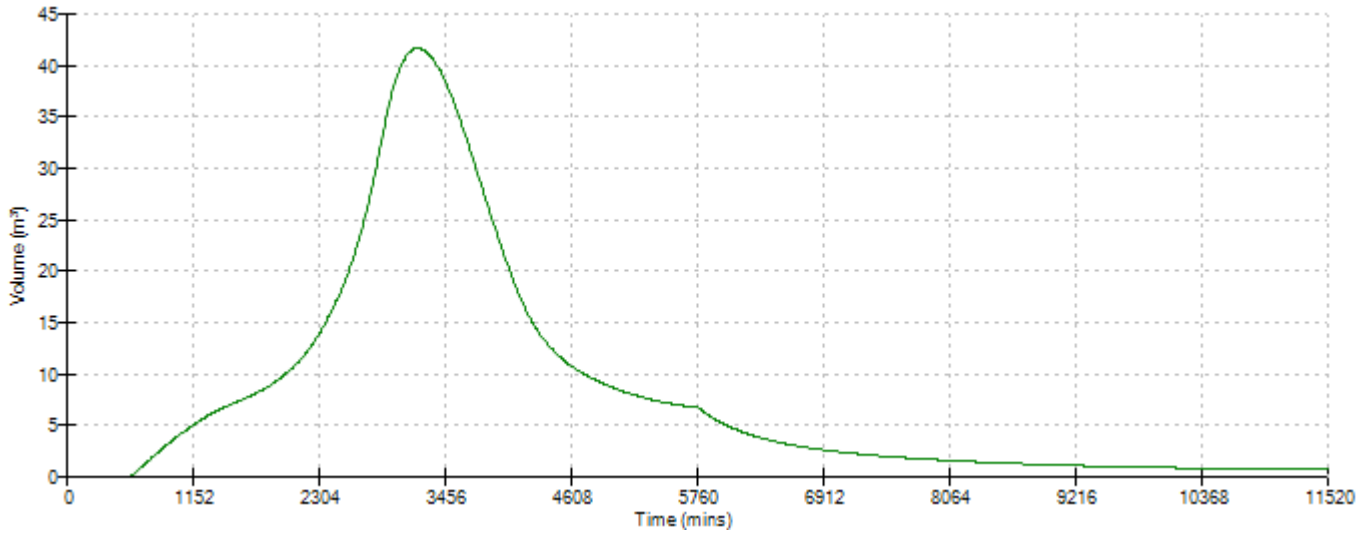


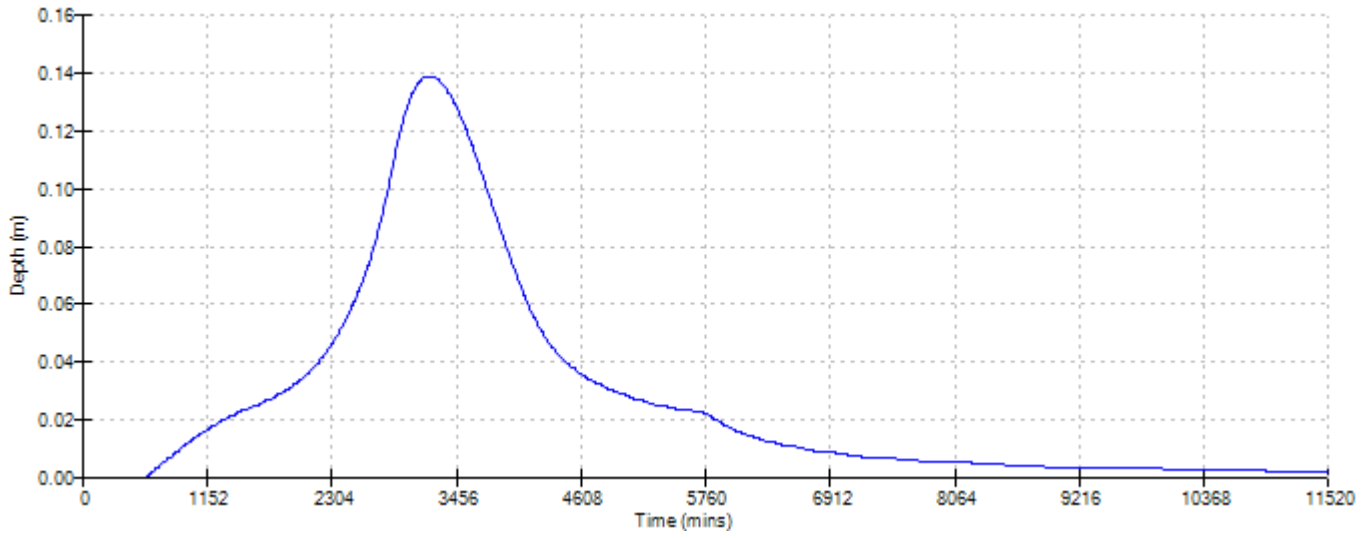


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Event: 5760 min Summer

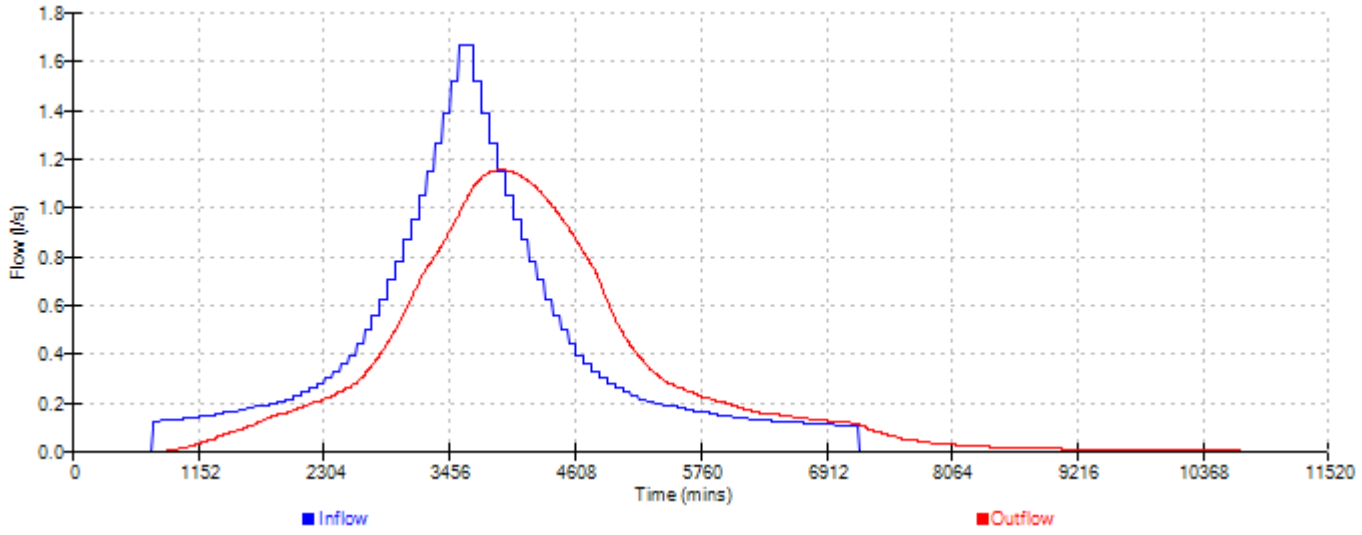


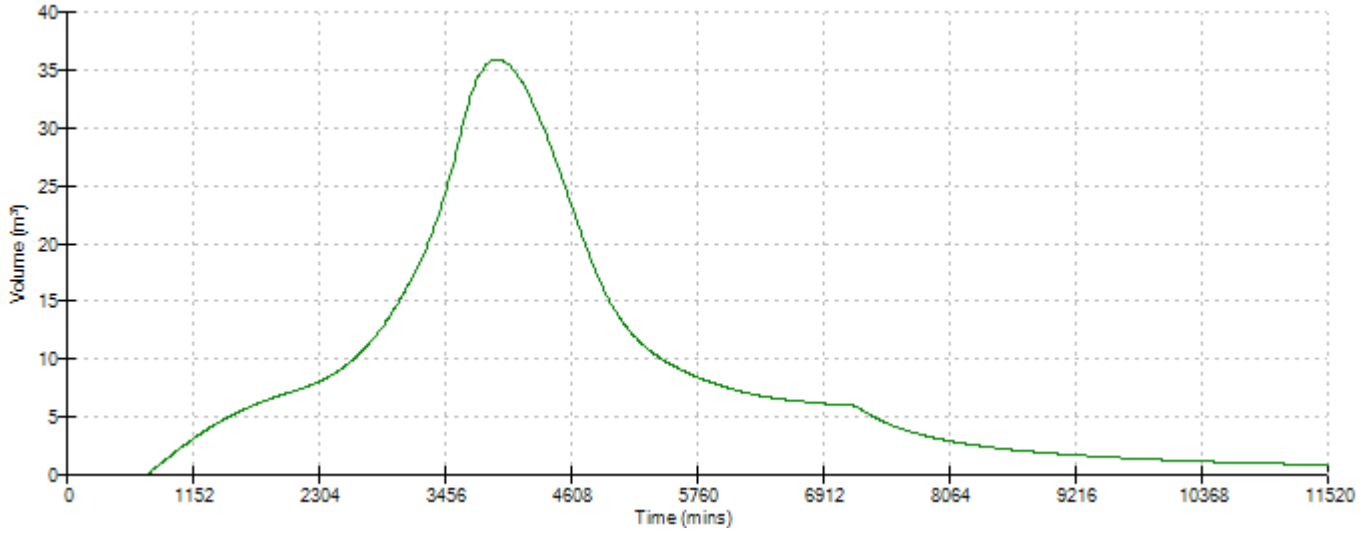


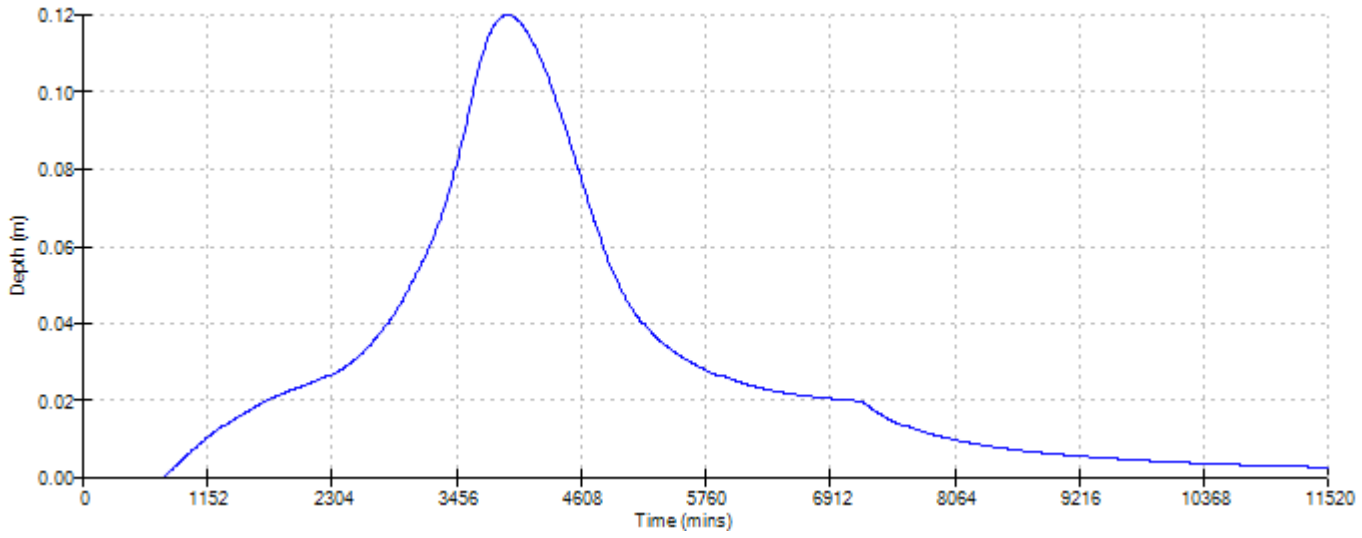


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Event: 7200 min Summer

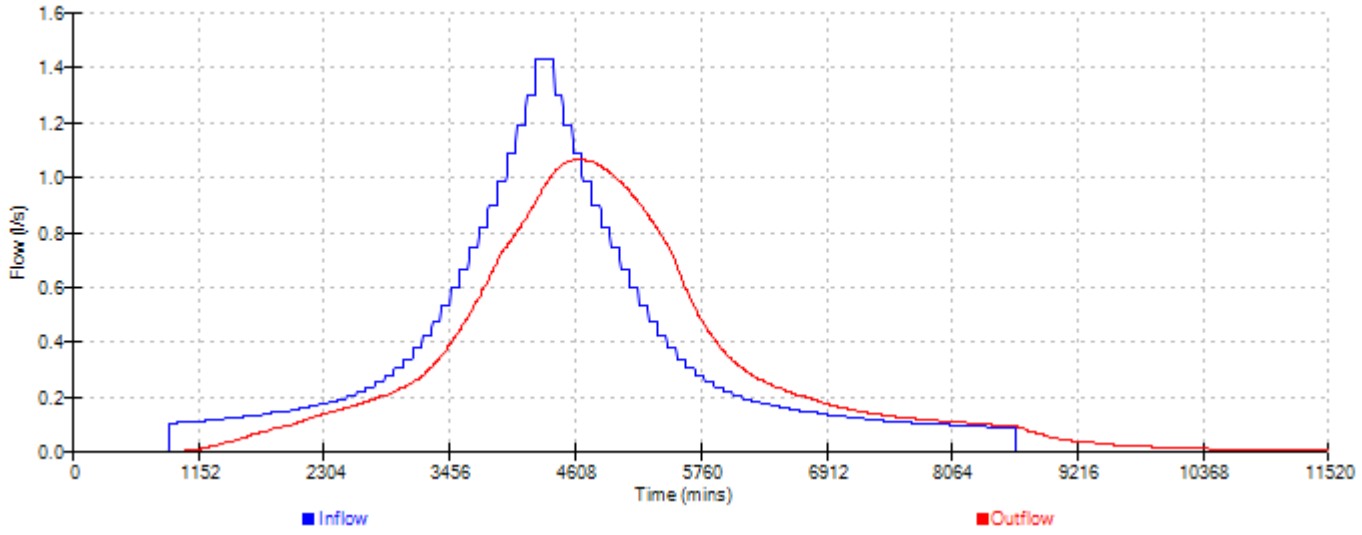


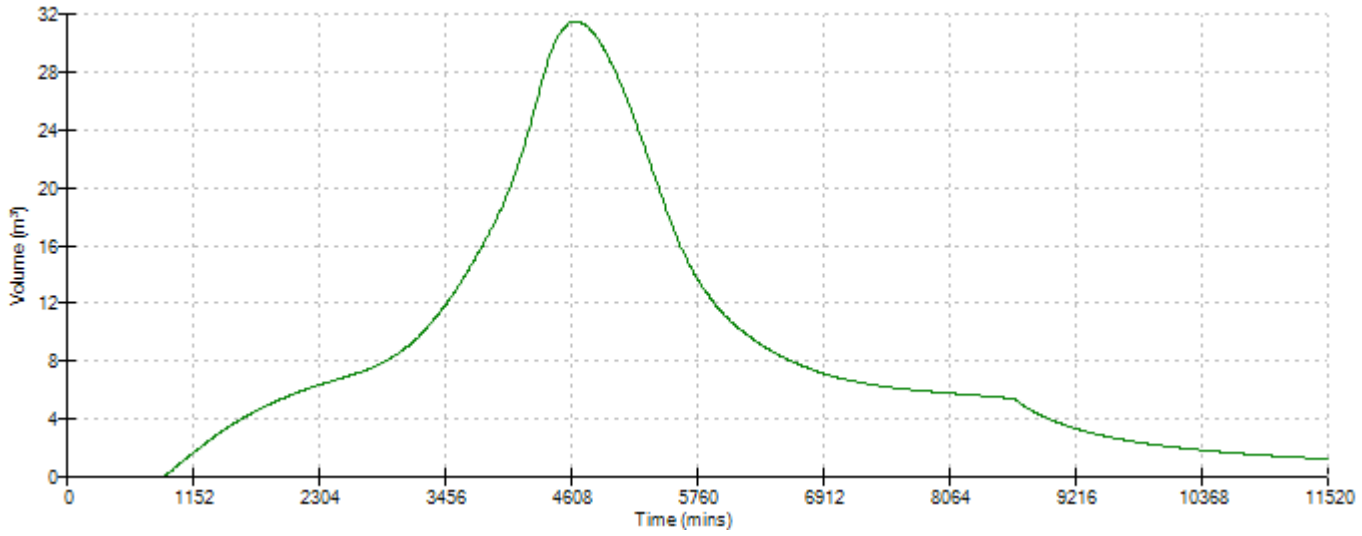


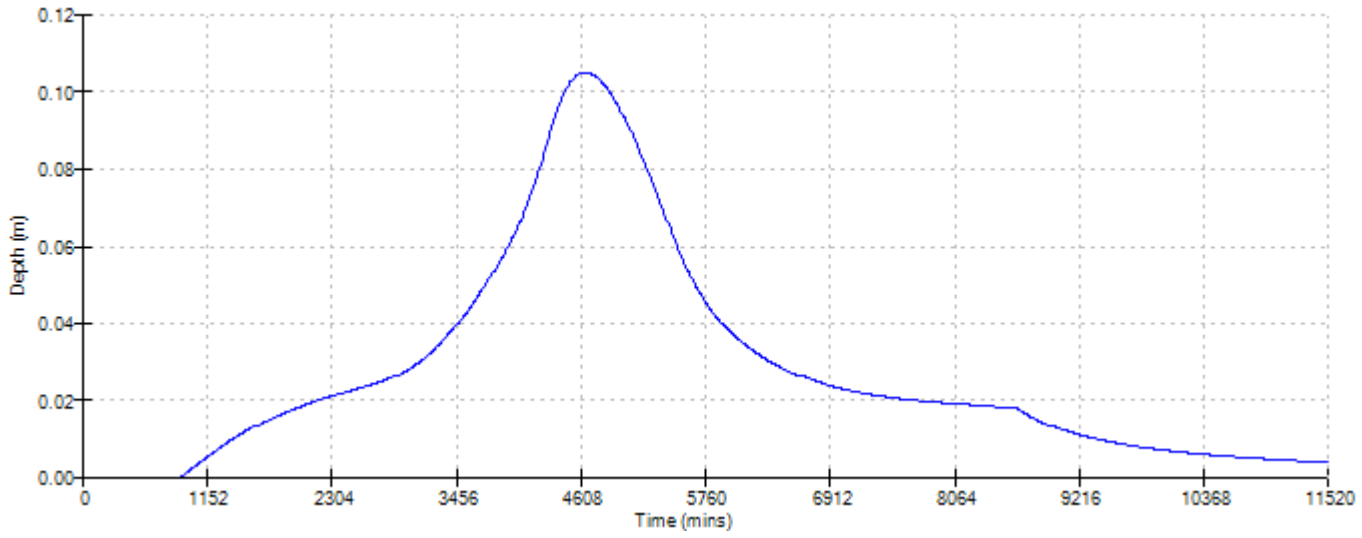


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Event: 8640 min Summer

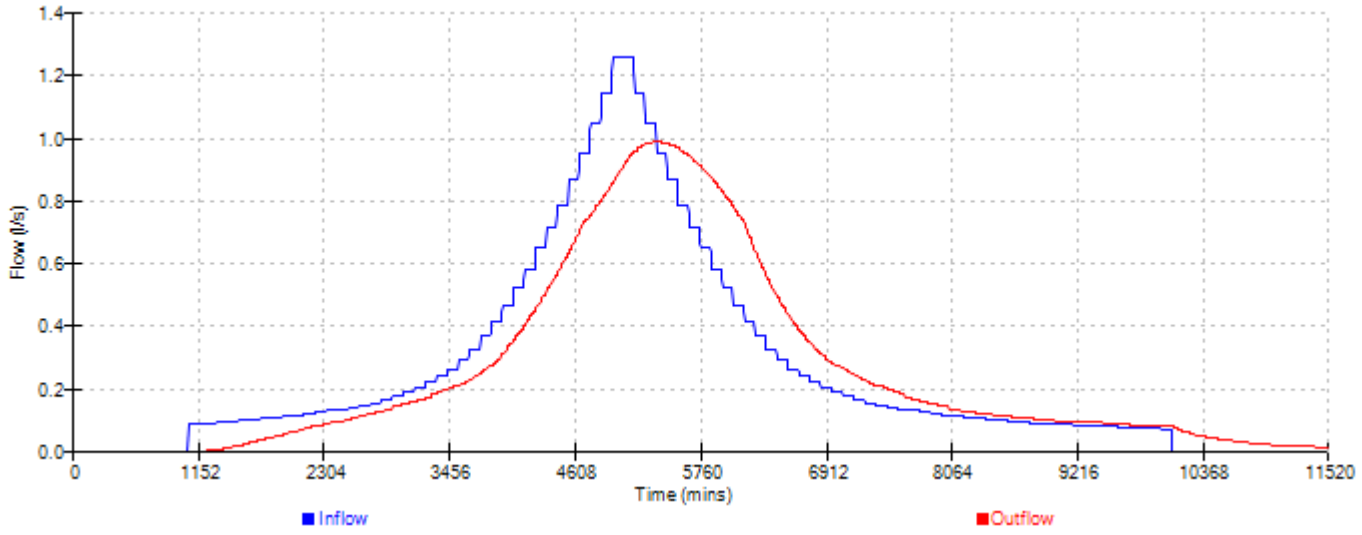


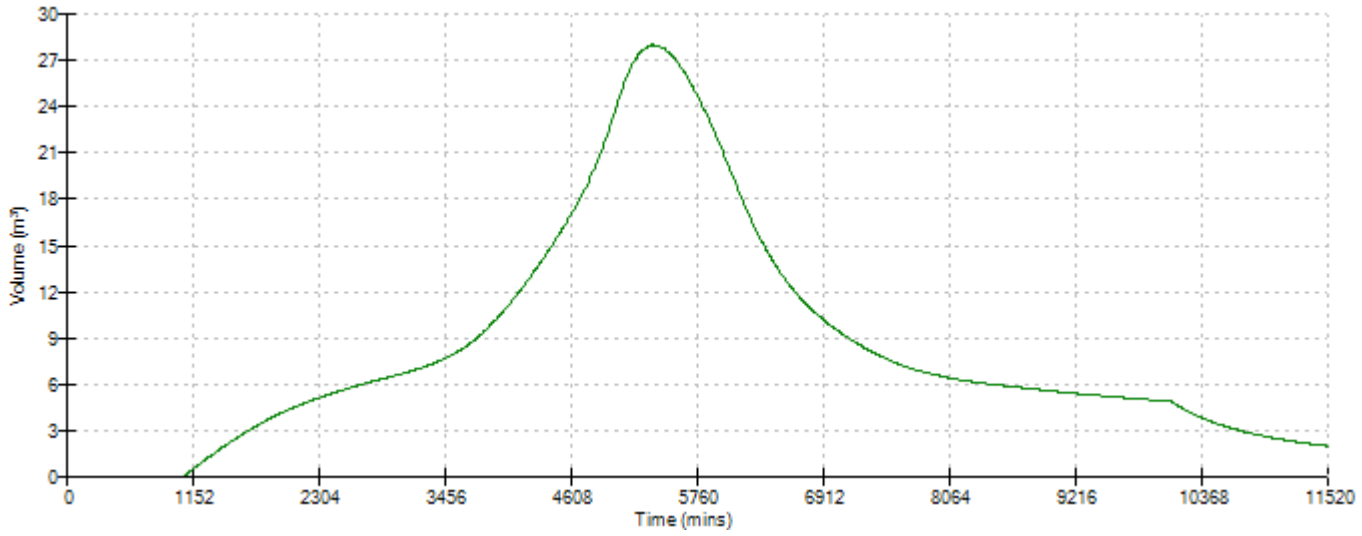


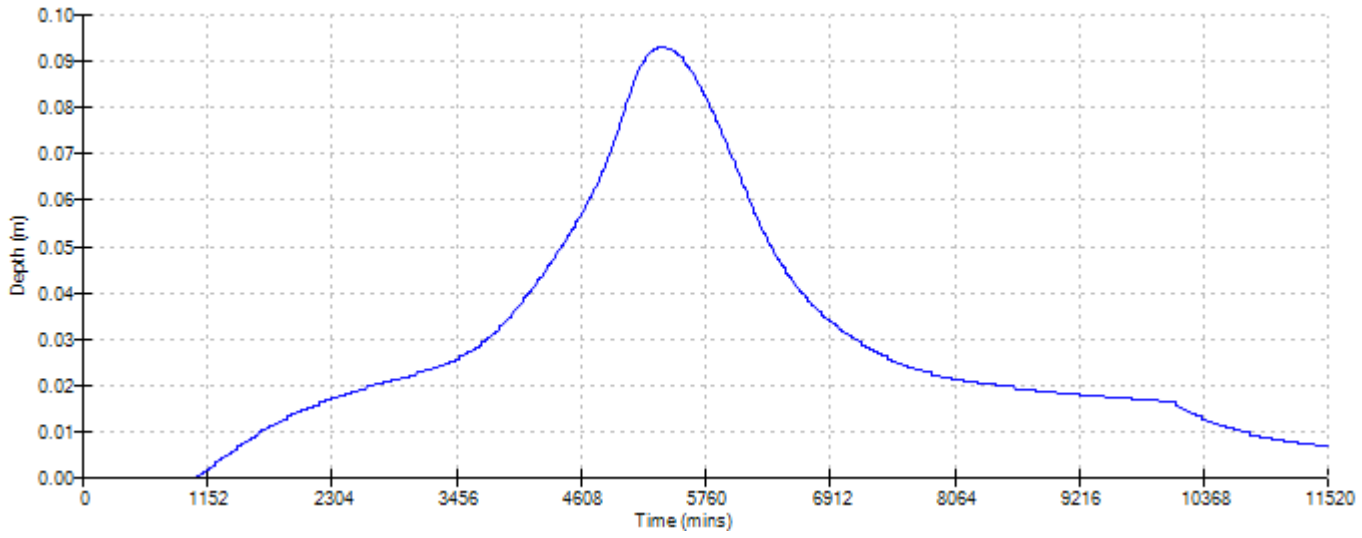


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Event: 10080 min Summer

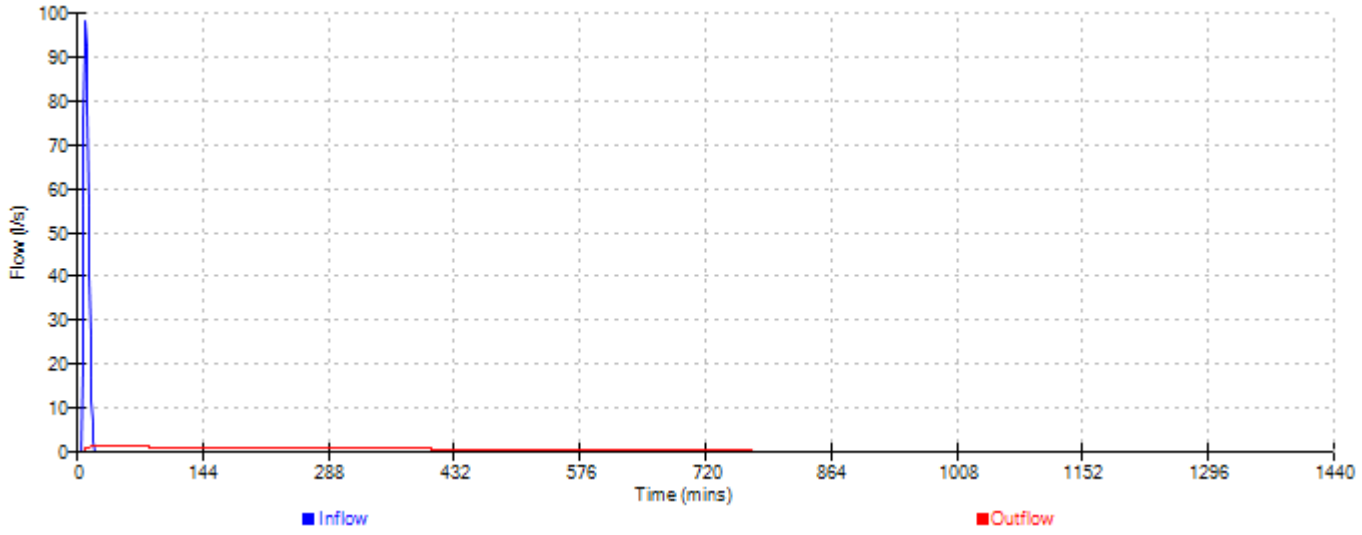


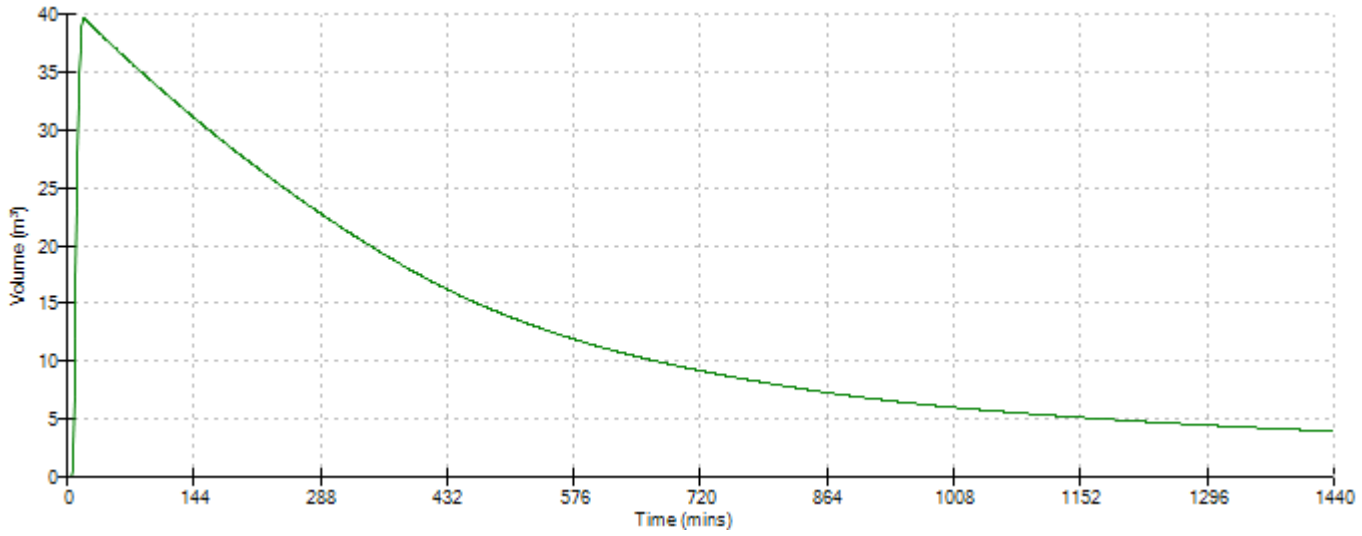


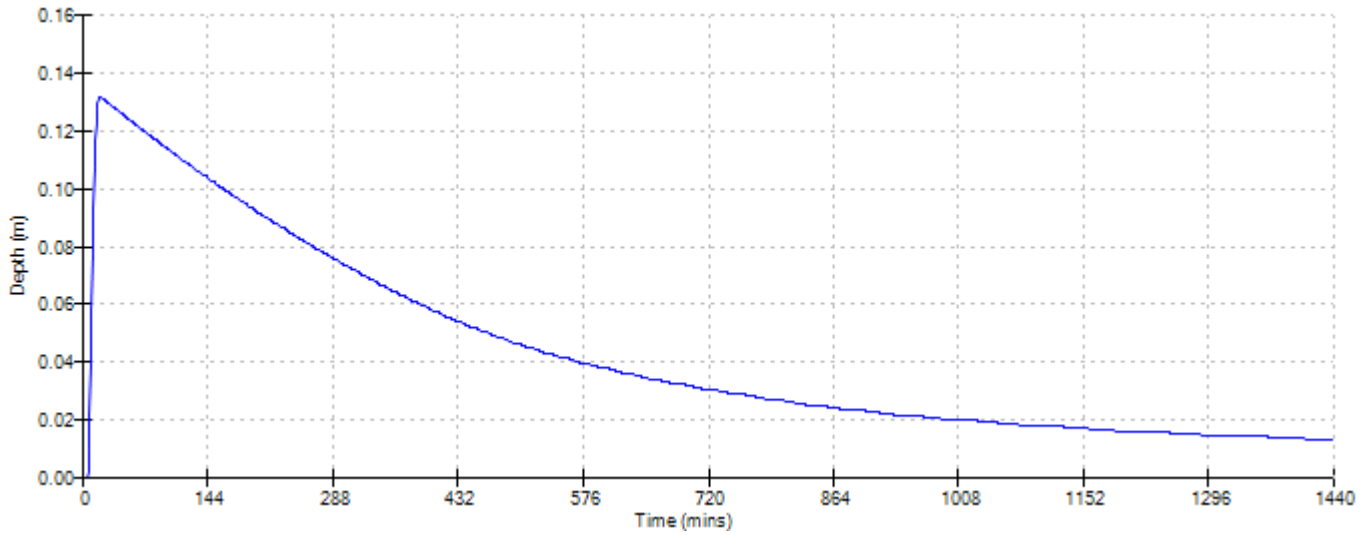


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Event: 15 min Winter

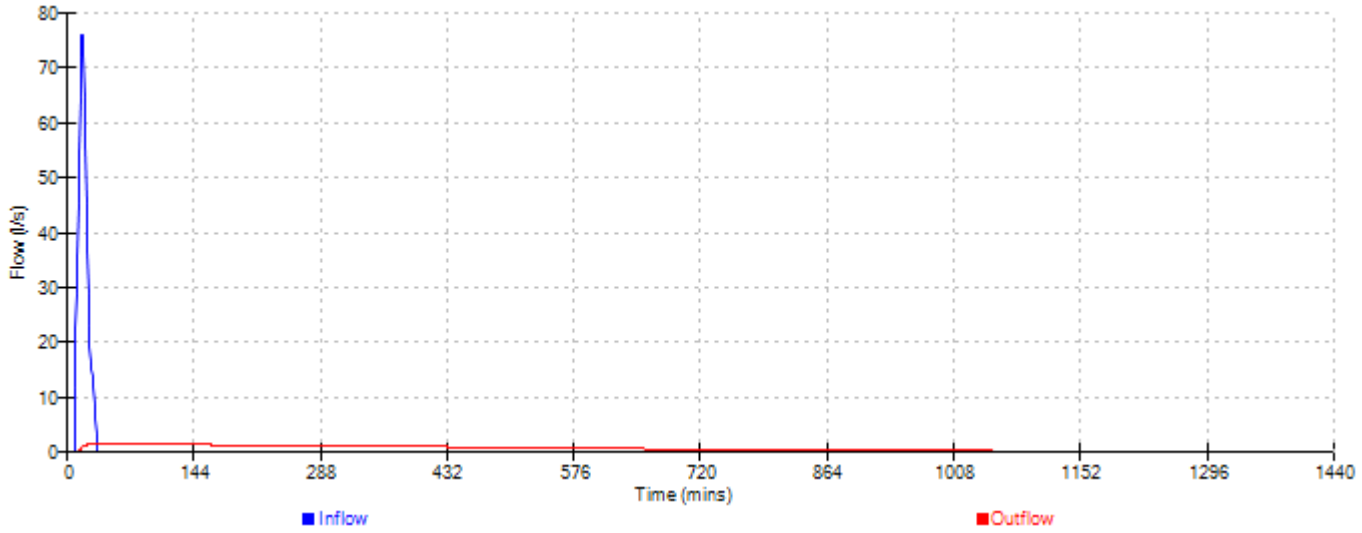


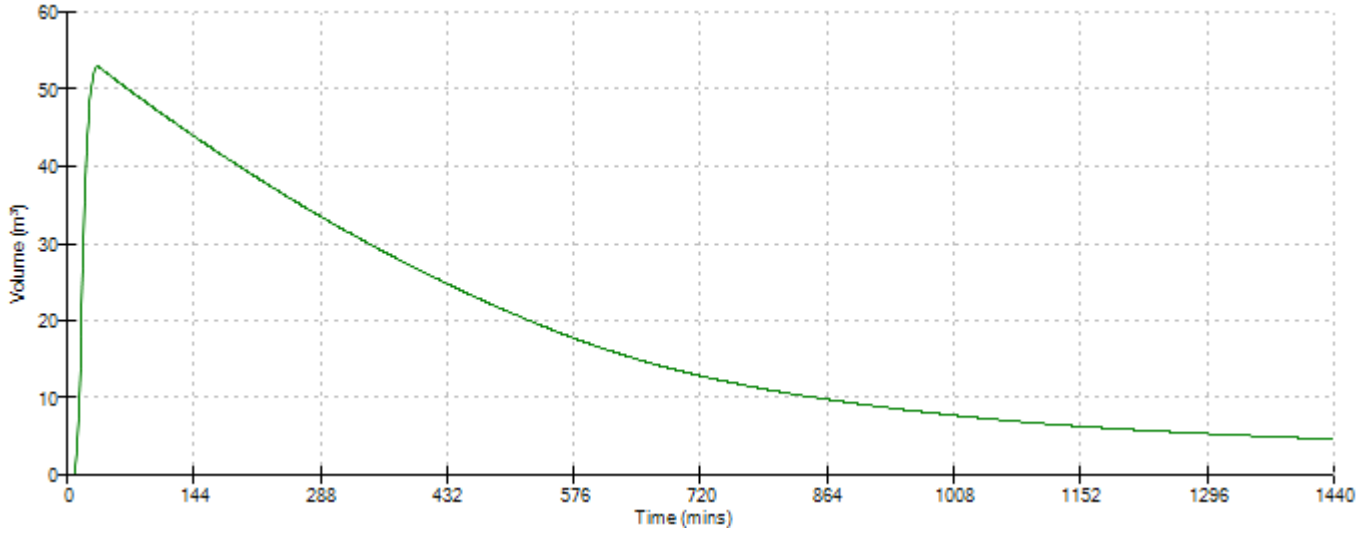


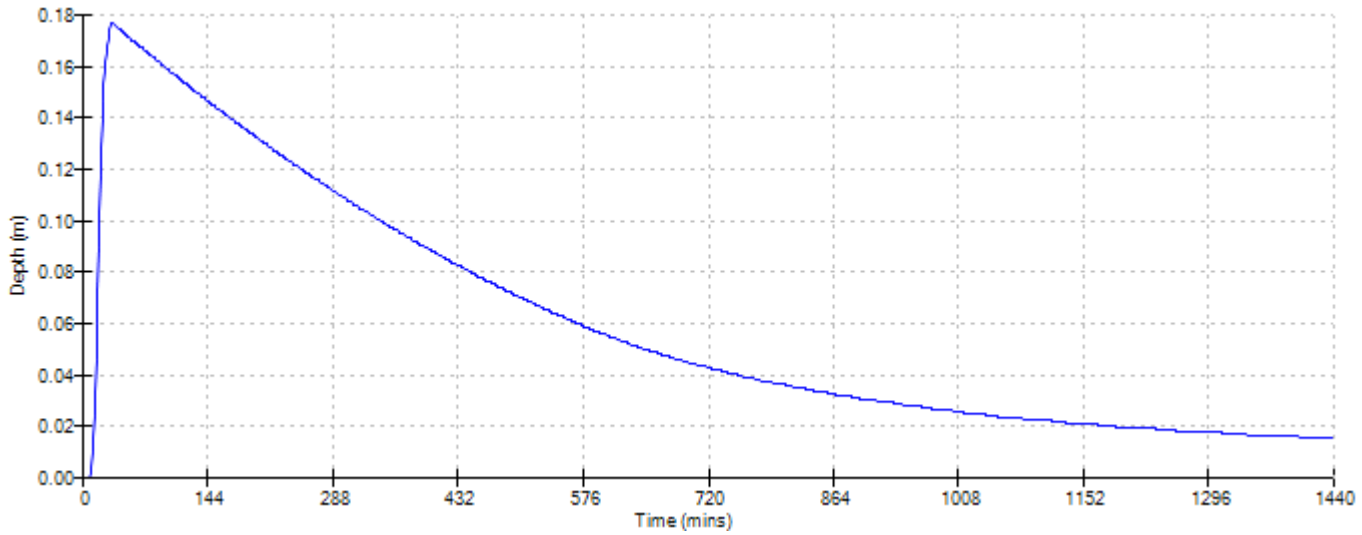


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Event: 30 min Winter

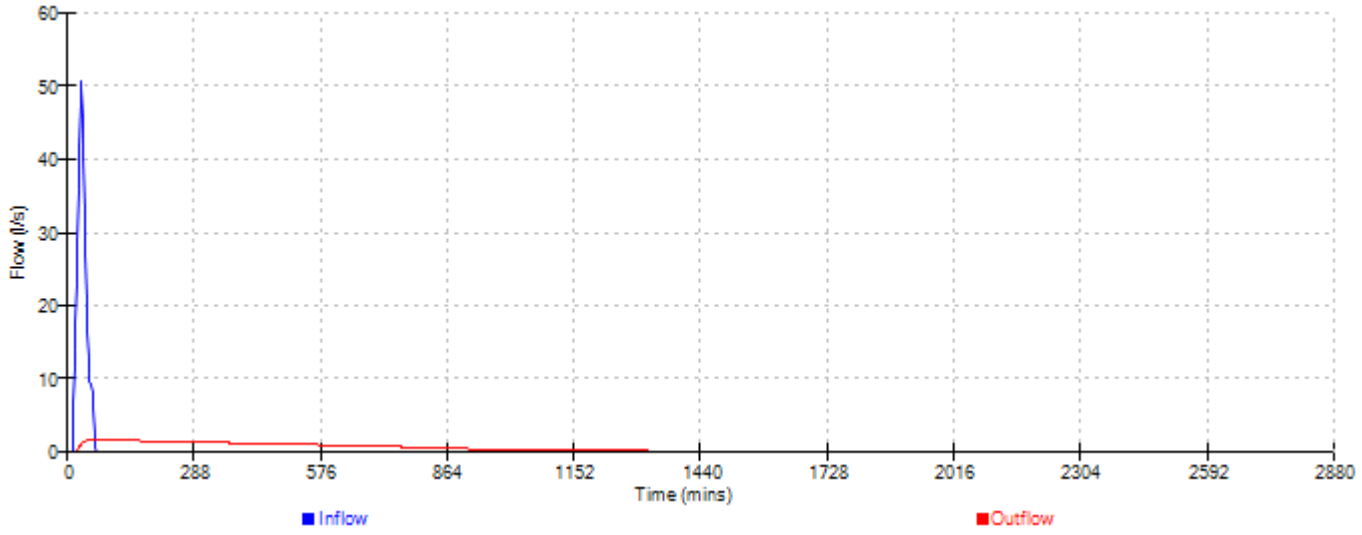


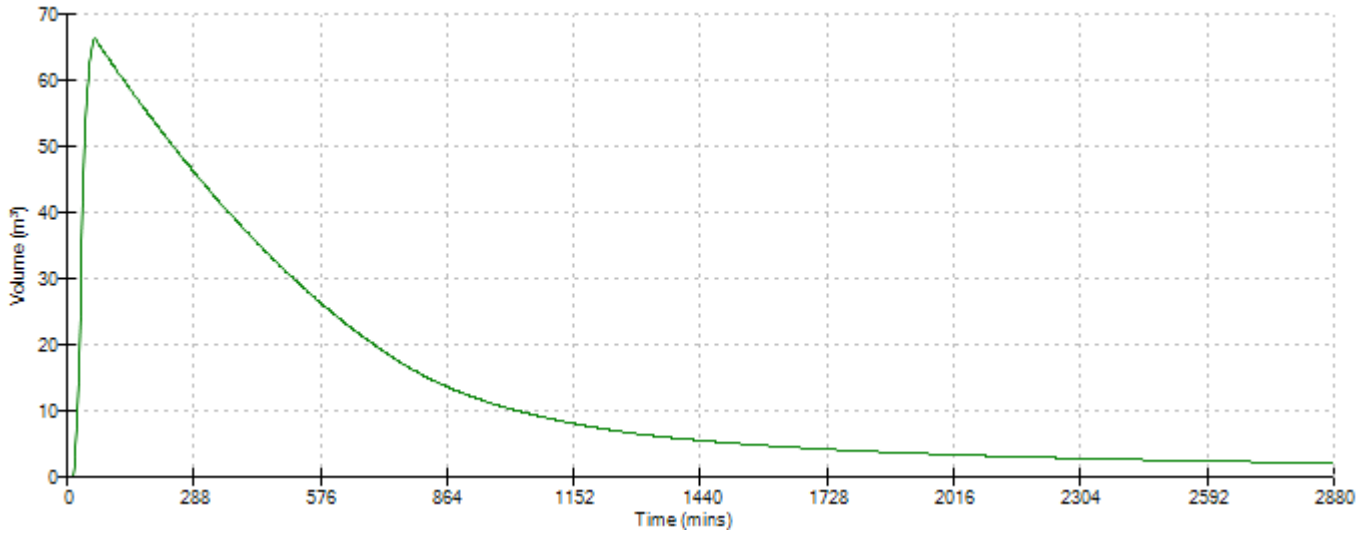


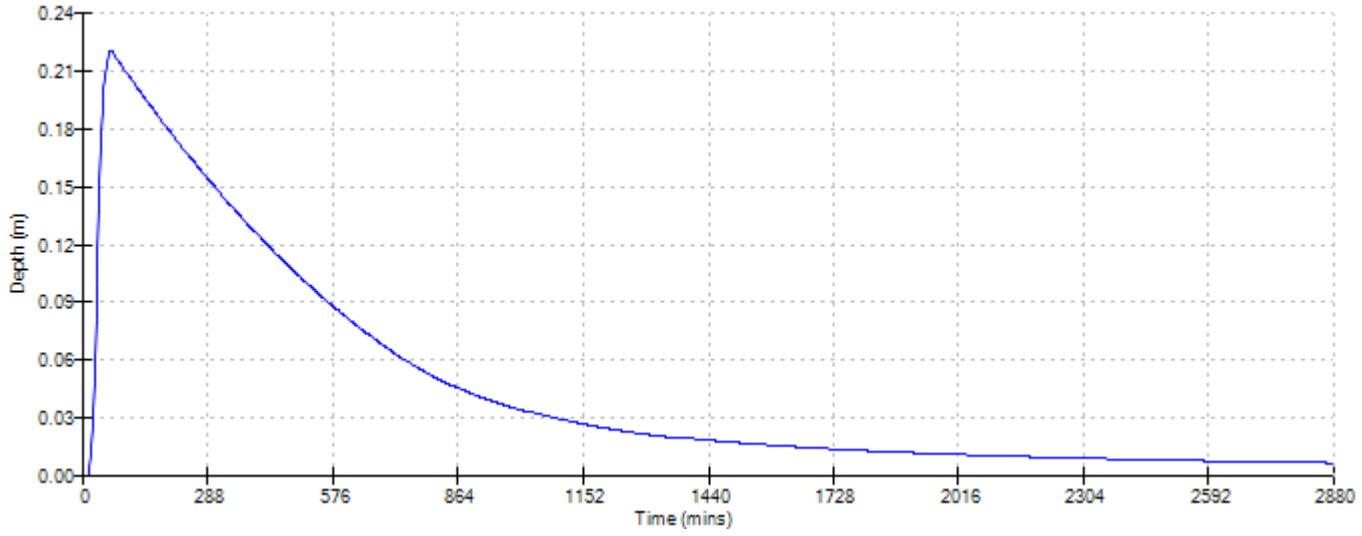


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Event: 60 min Winter

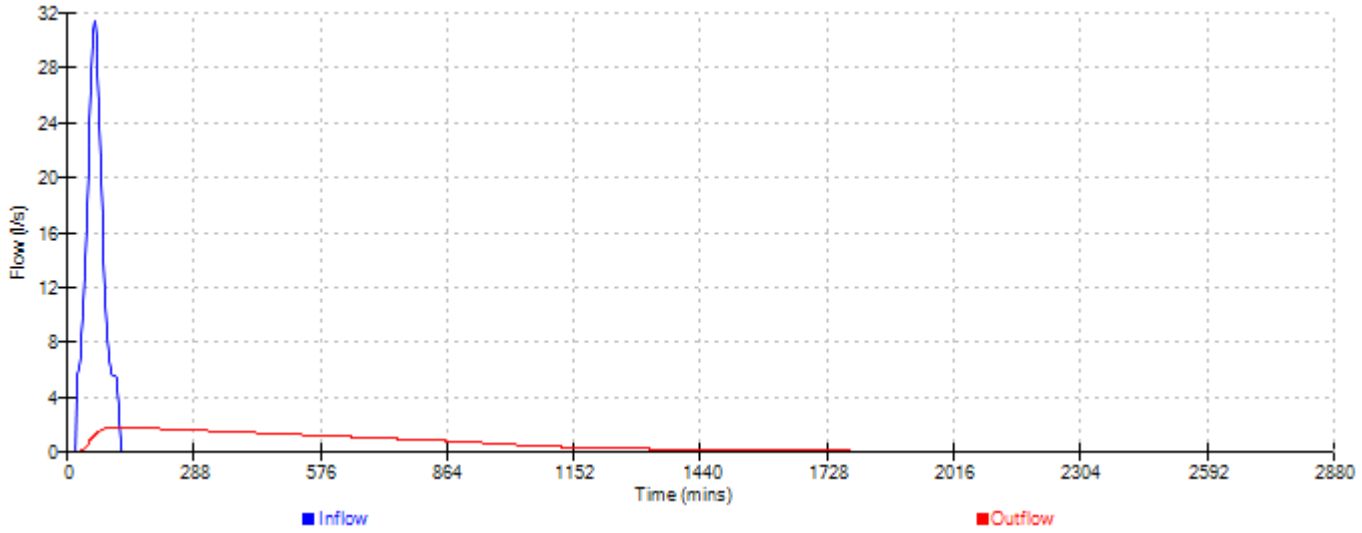


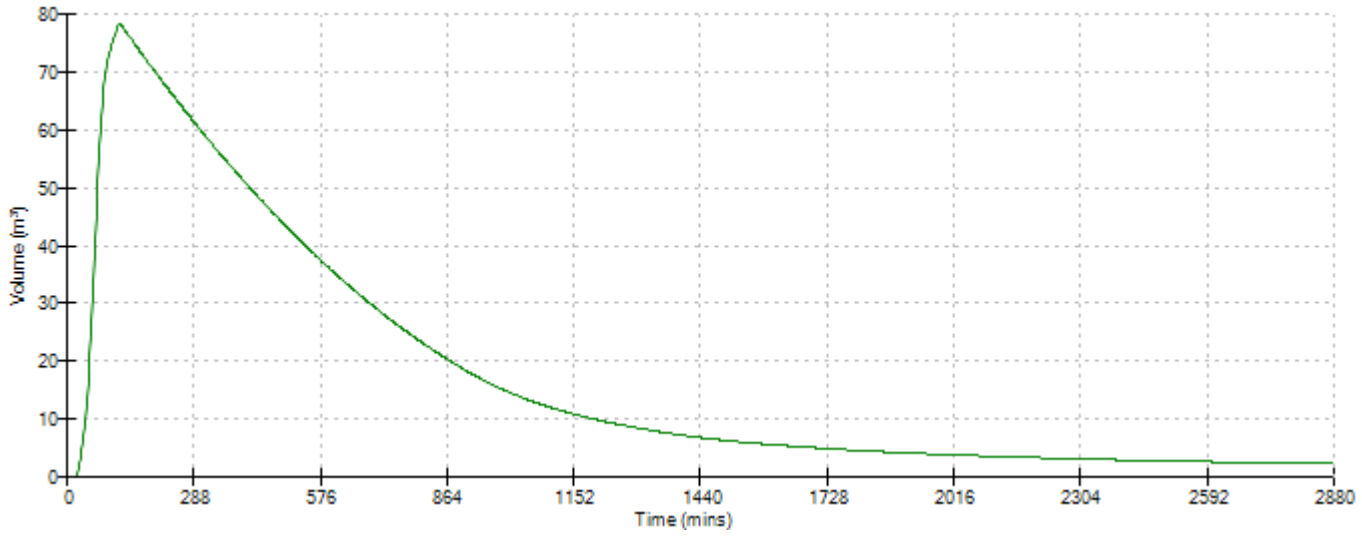


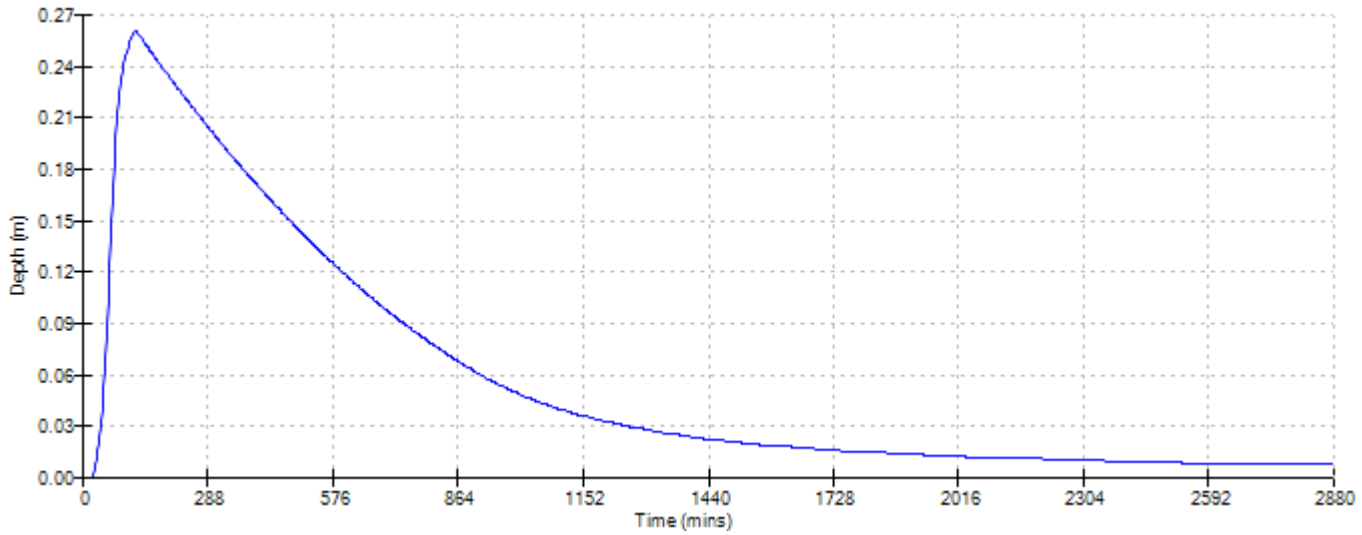


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Event: 120 min Winter

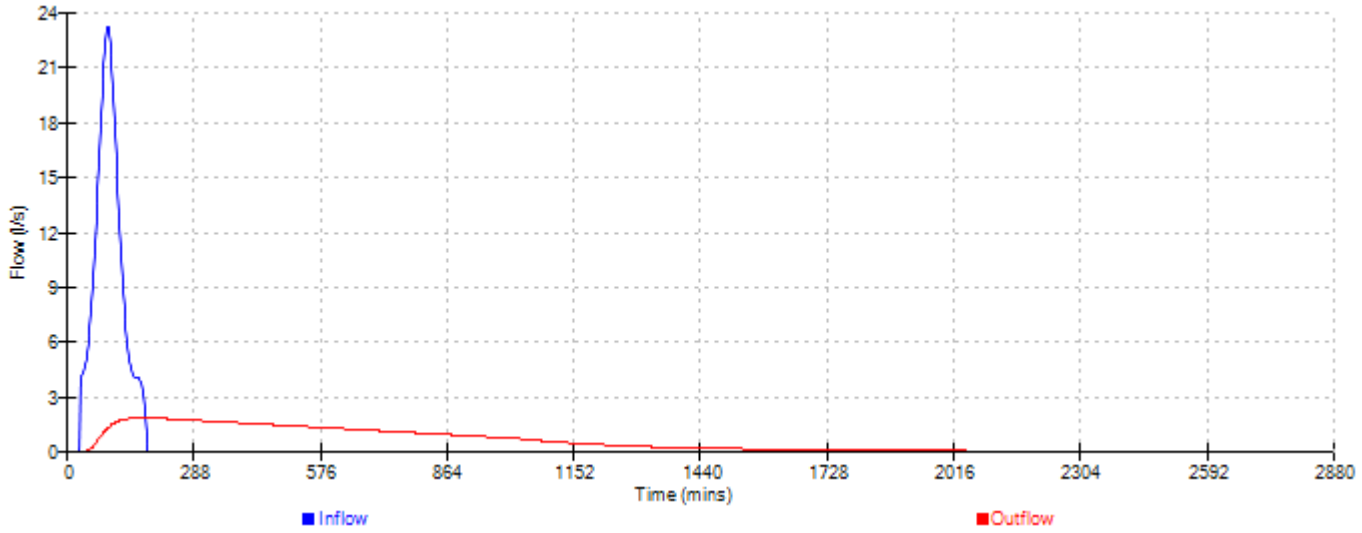


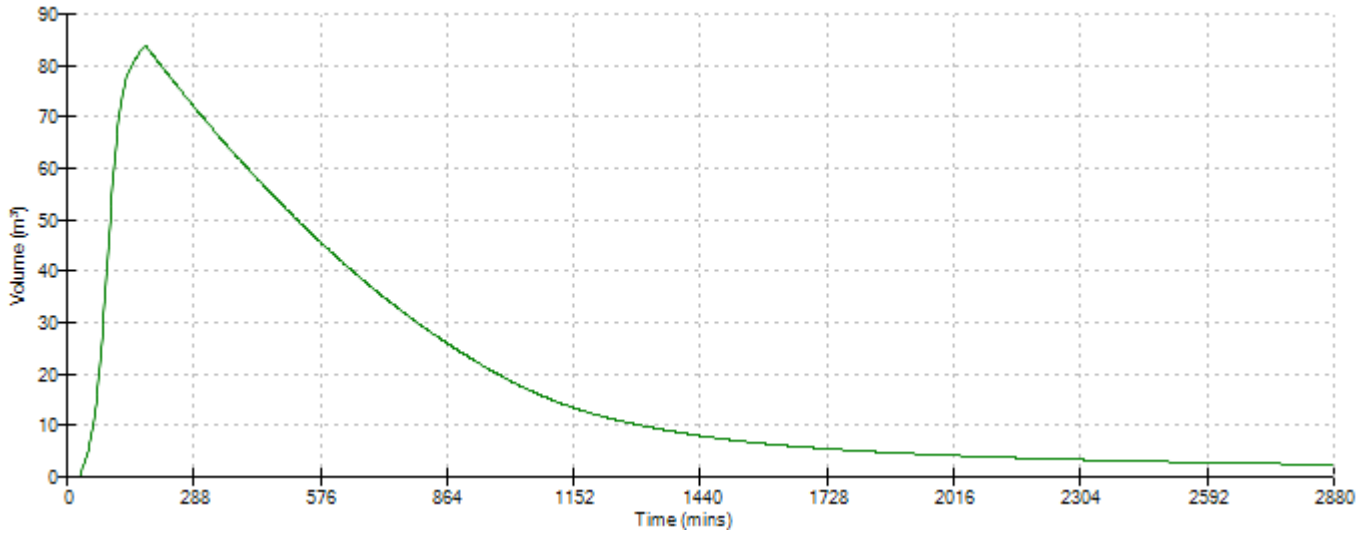


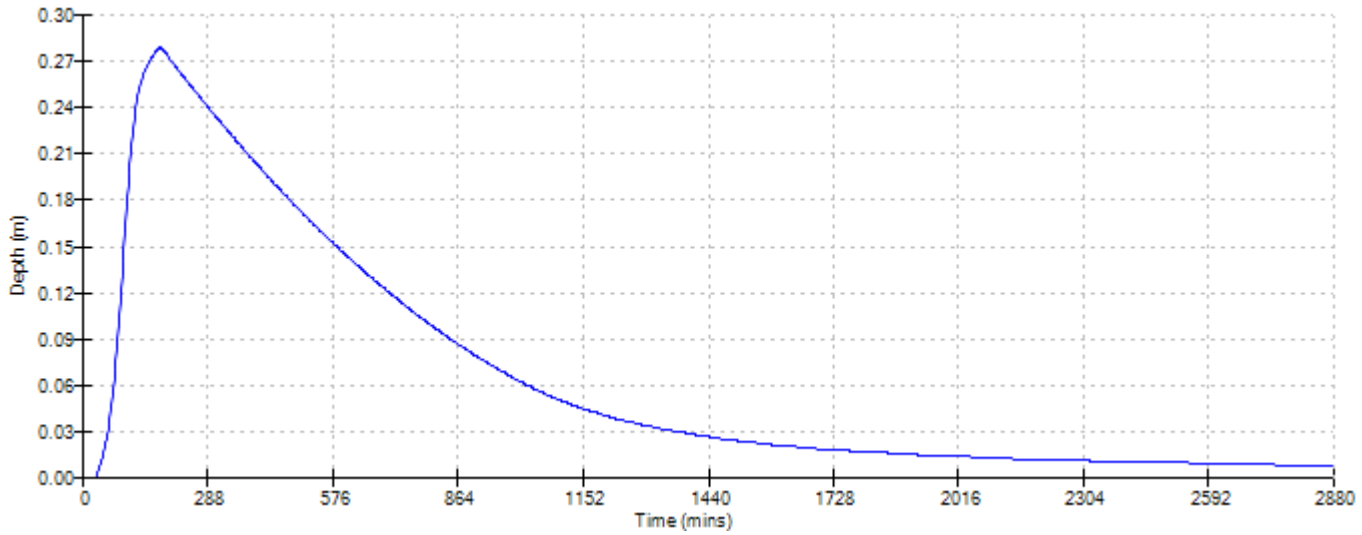


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Event: 180 min Winter

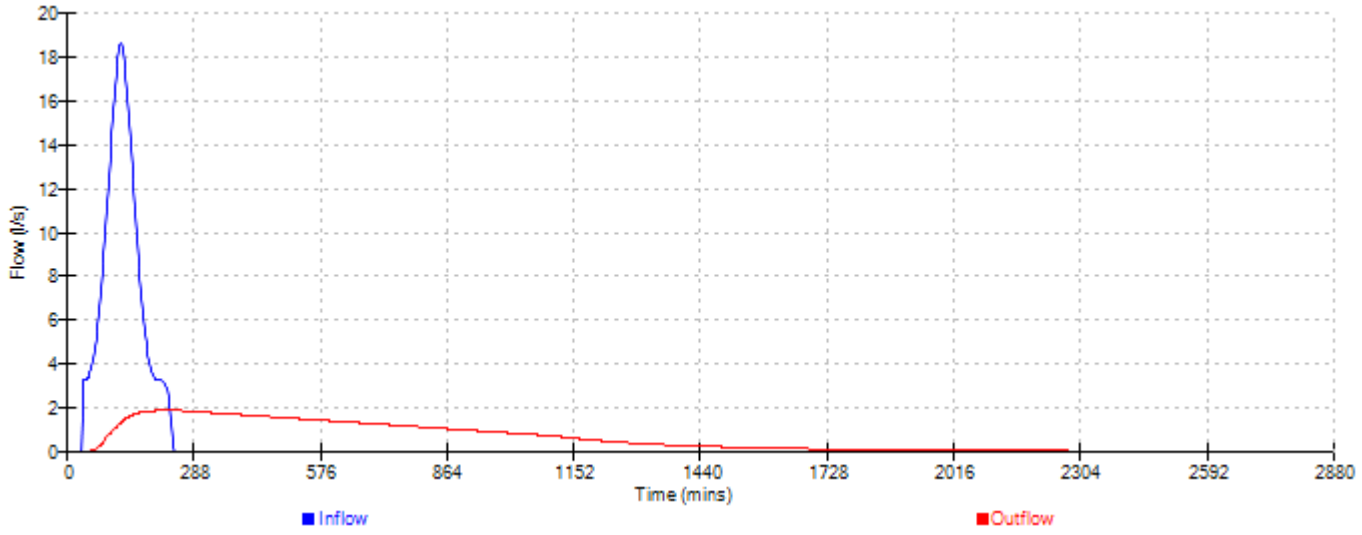


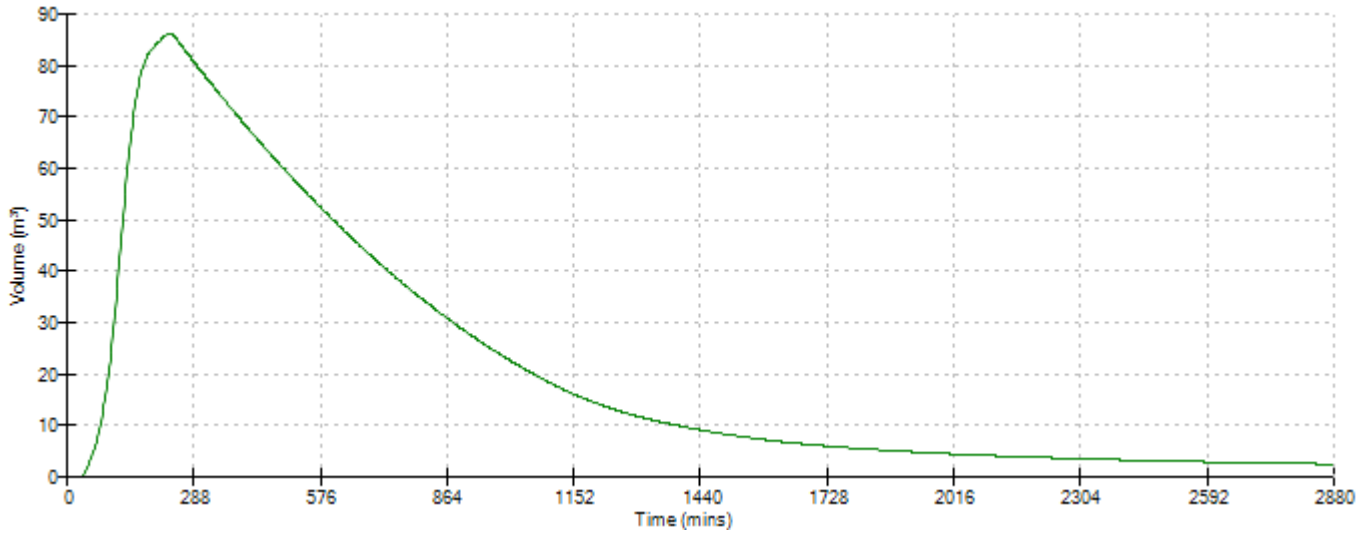


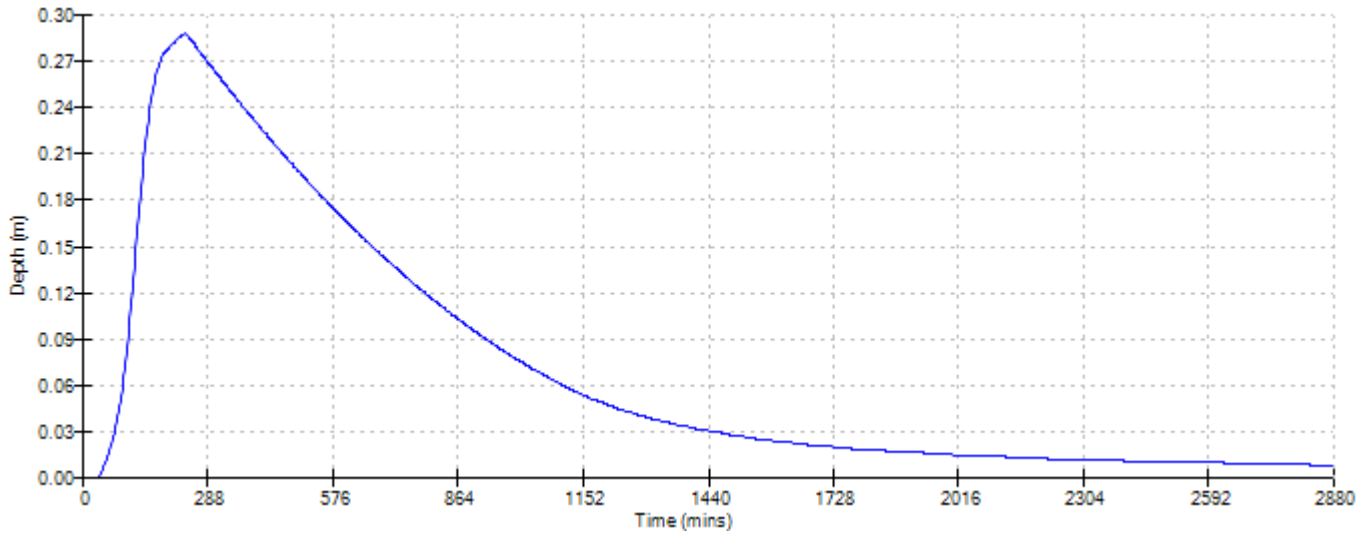


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Event: 240 min Winter

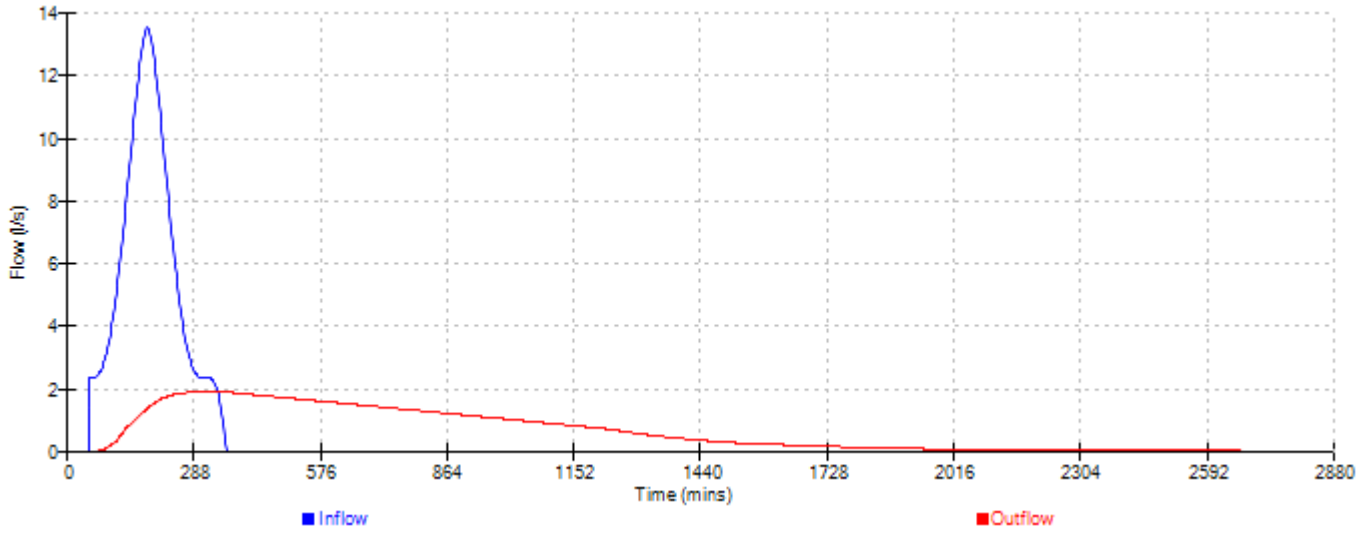


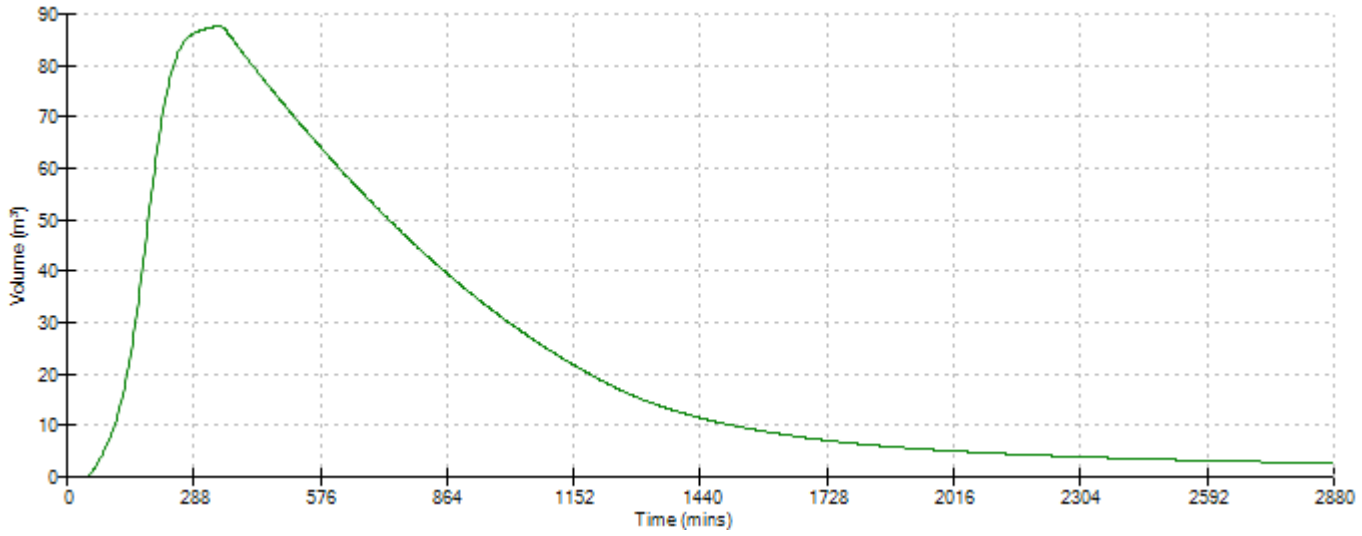


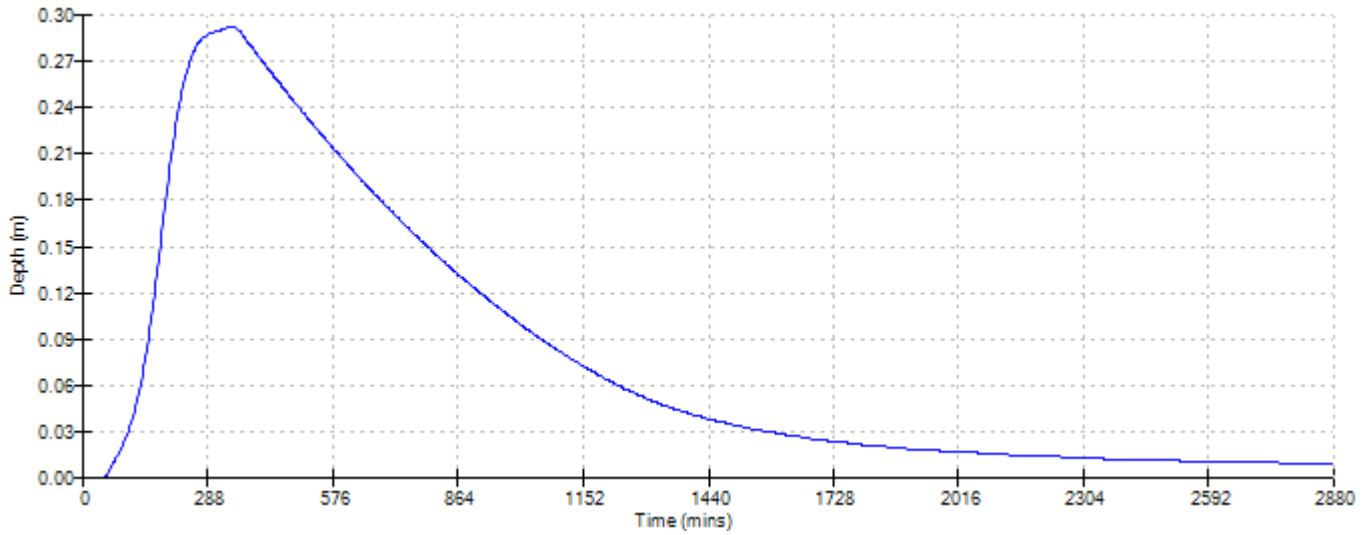


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Event: 360 min Winter

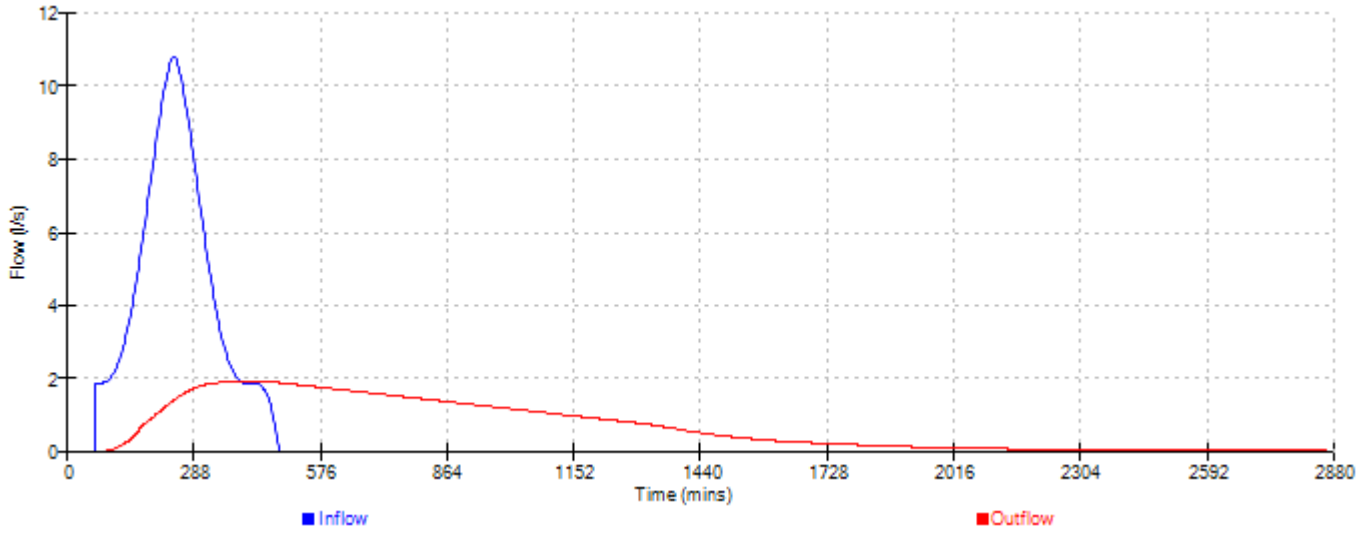


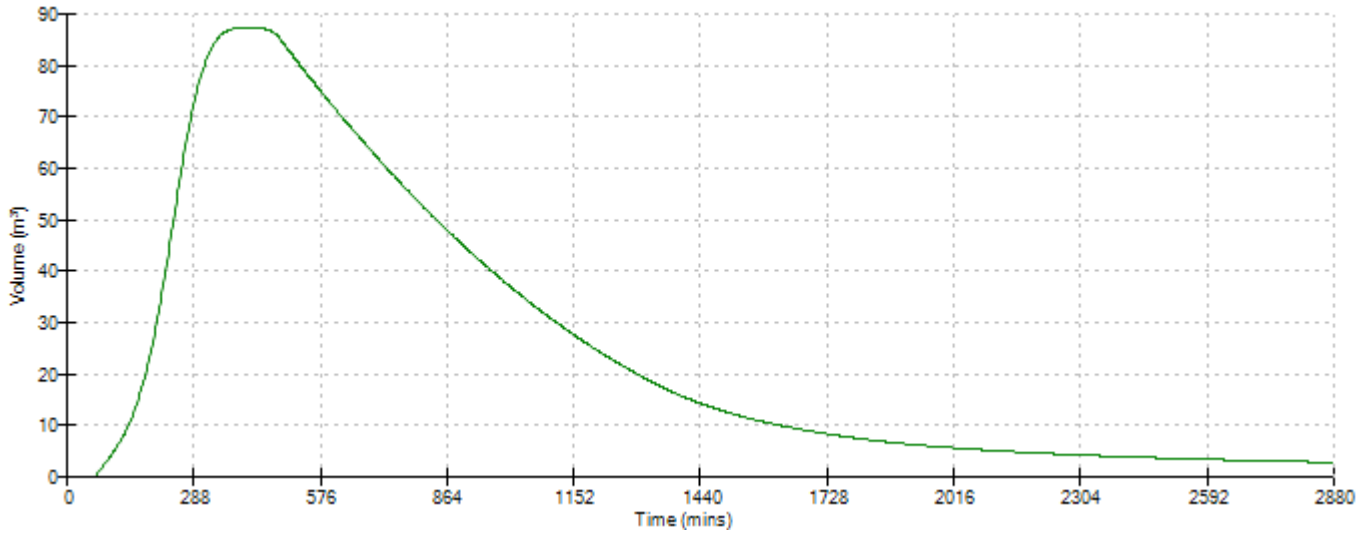


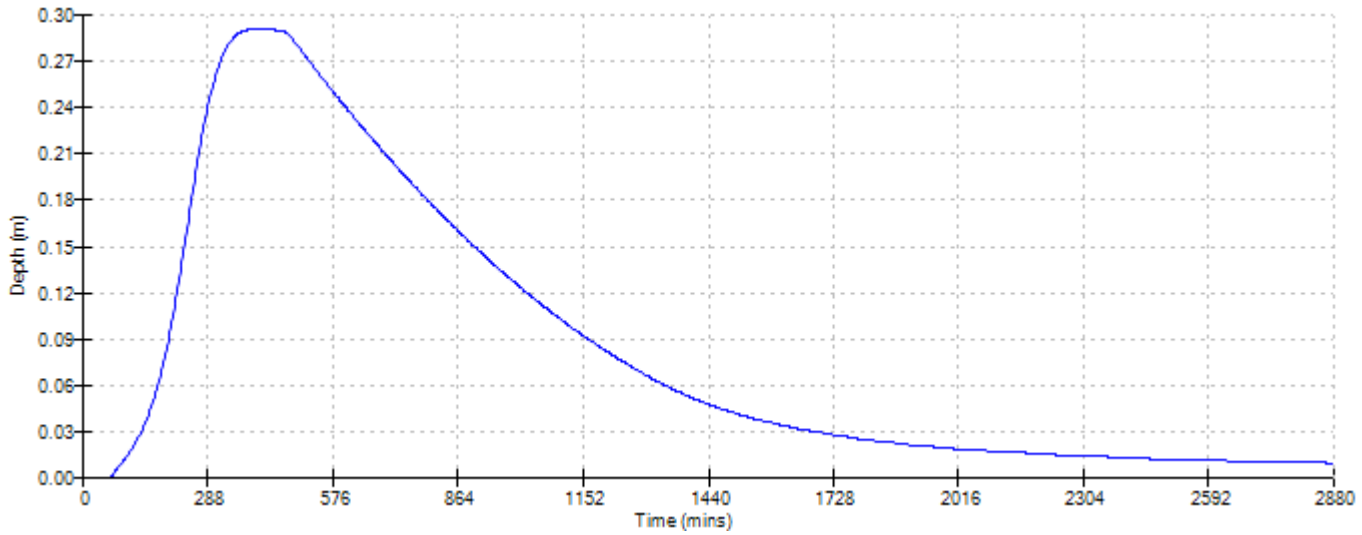


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Event: 480 min Winter

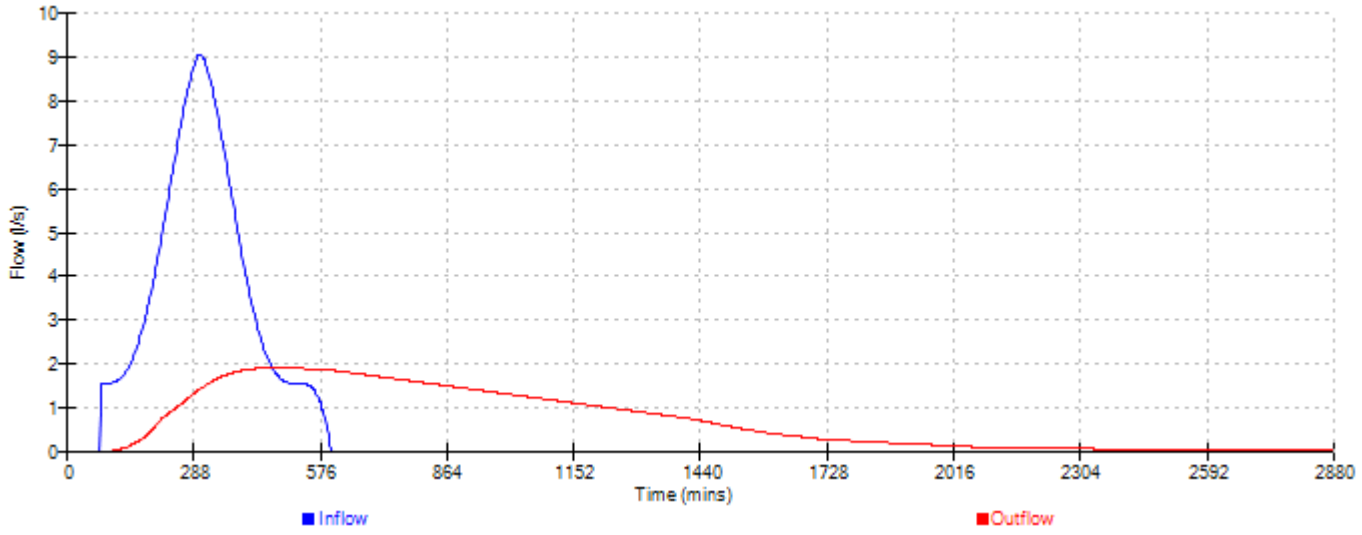


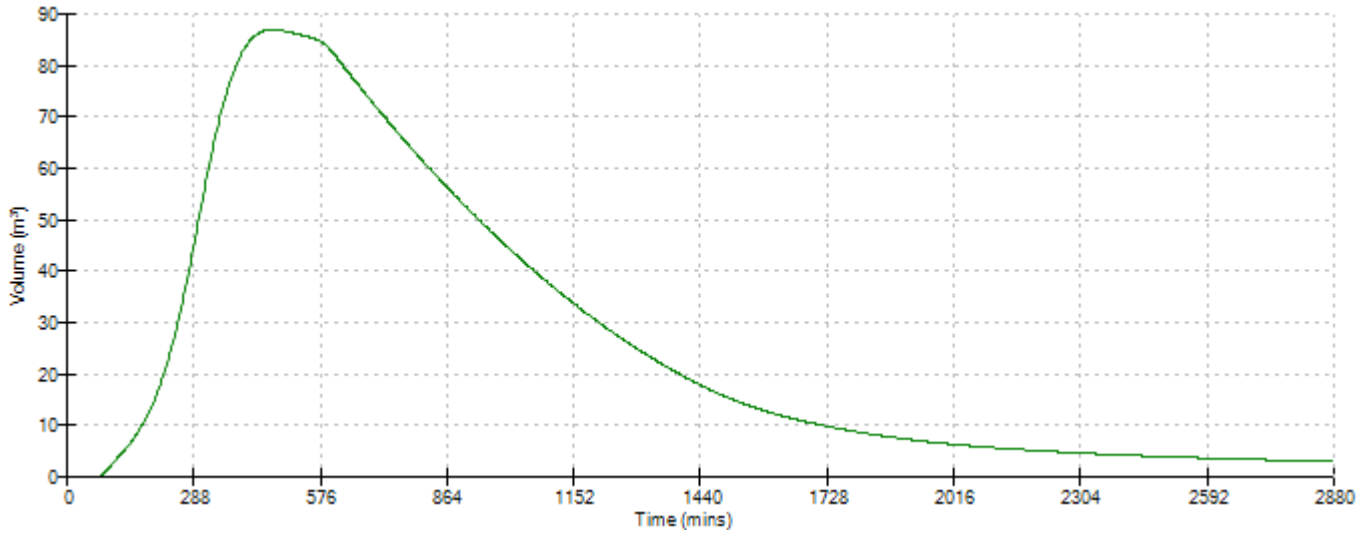


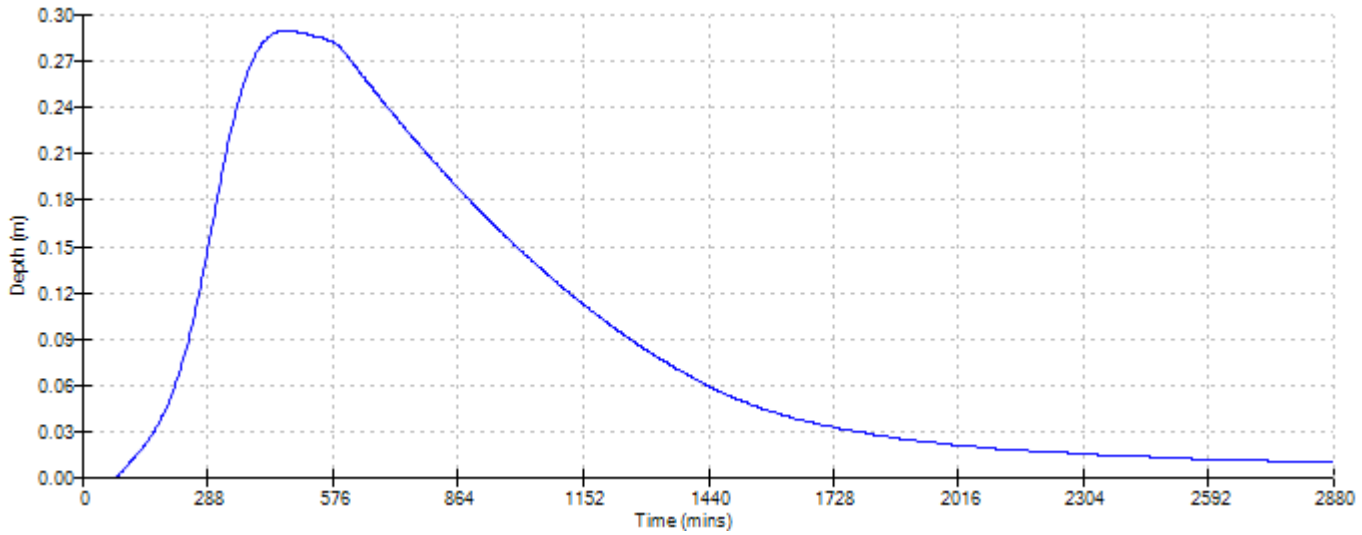


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Event: 600 min Winter

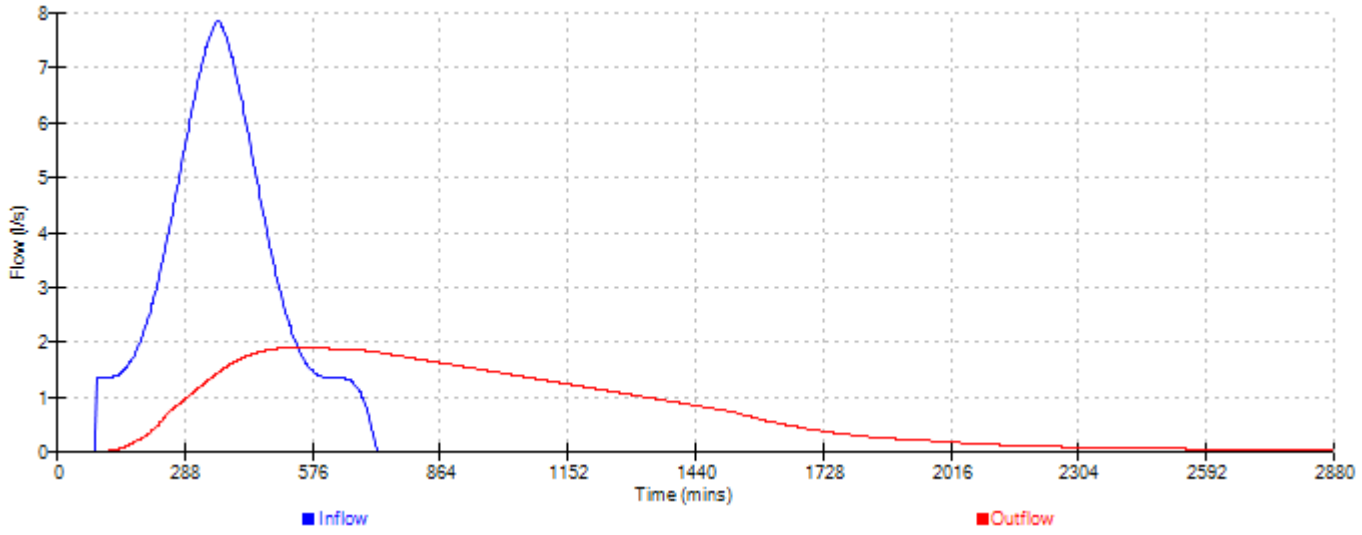


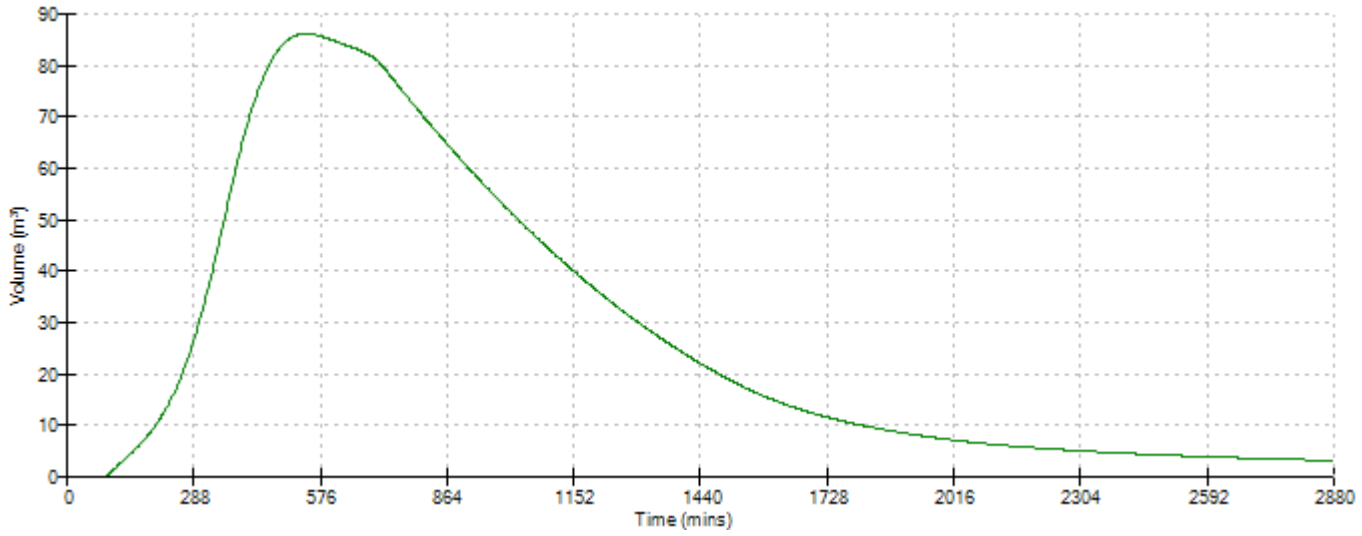


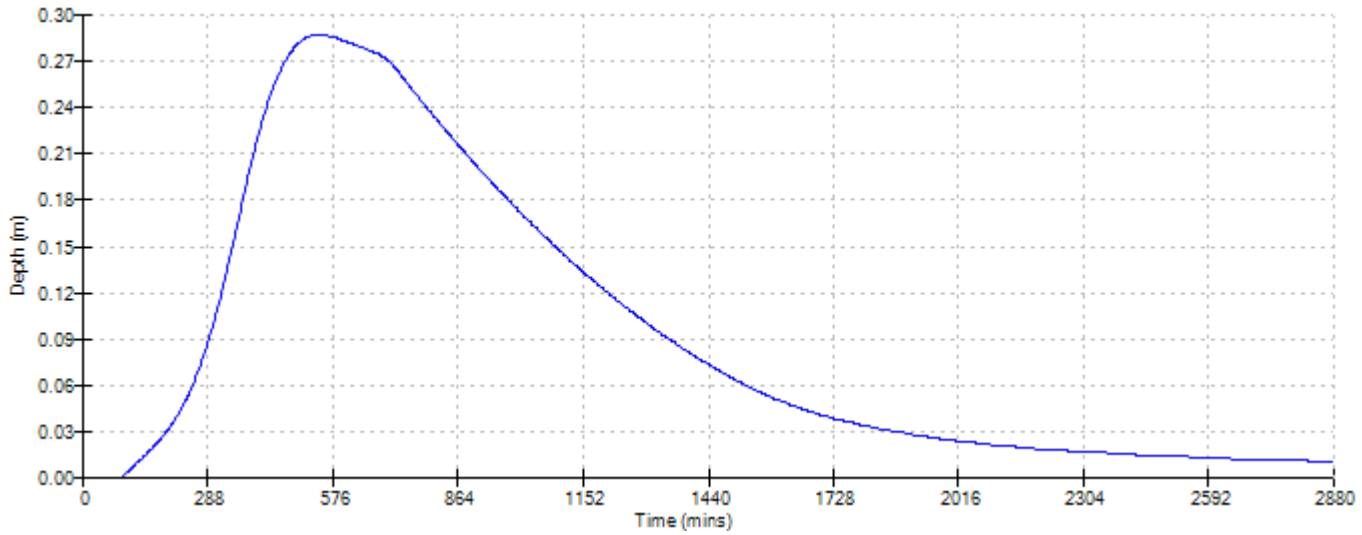


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Event: 720 min Winter

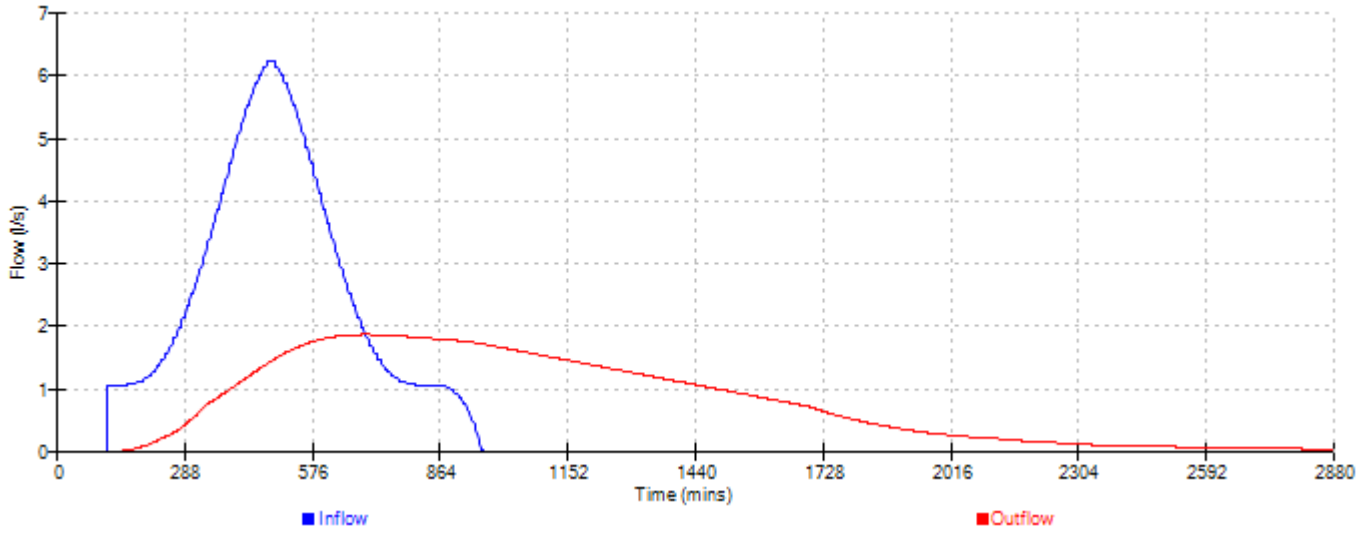


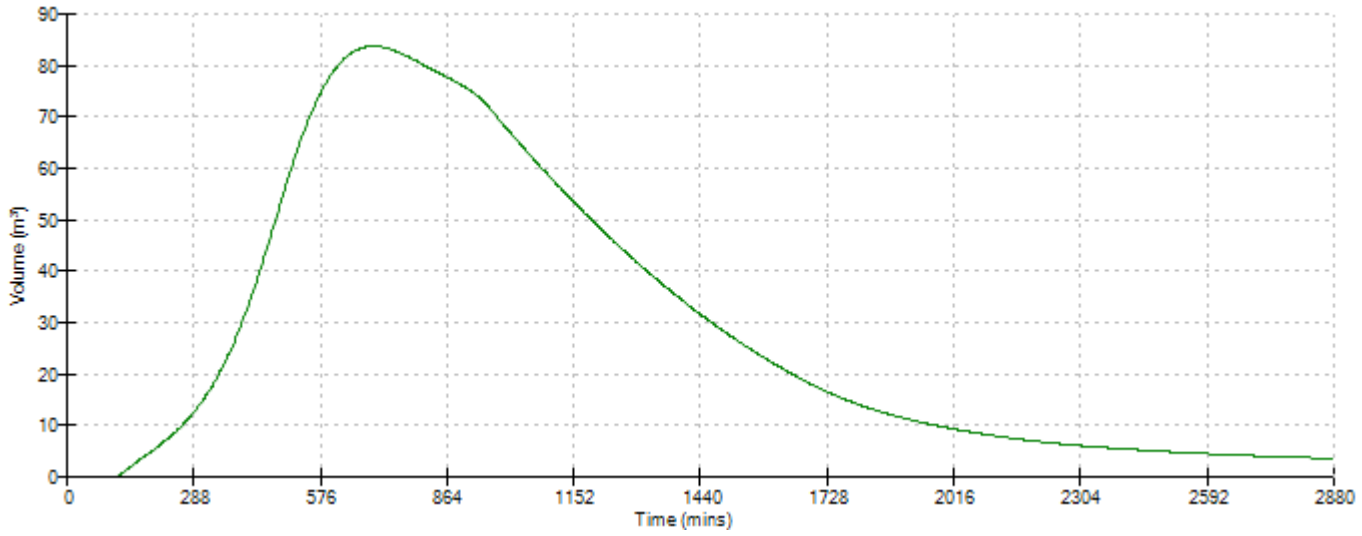


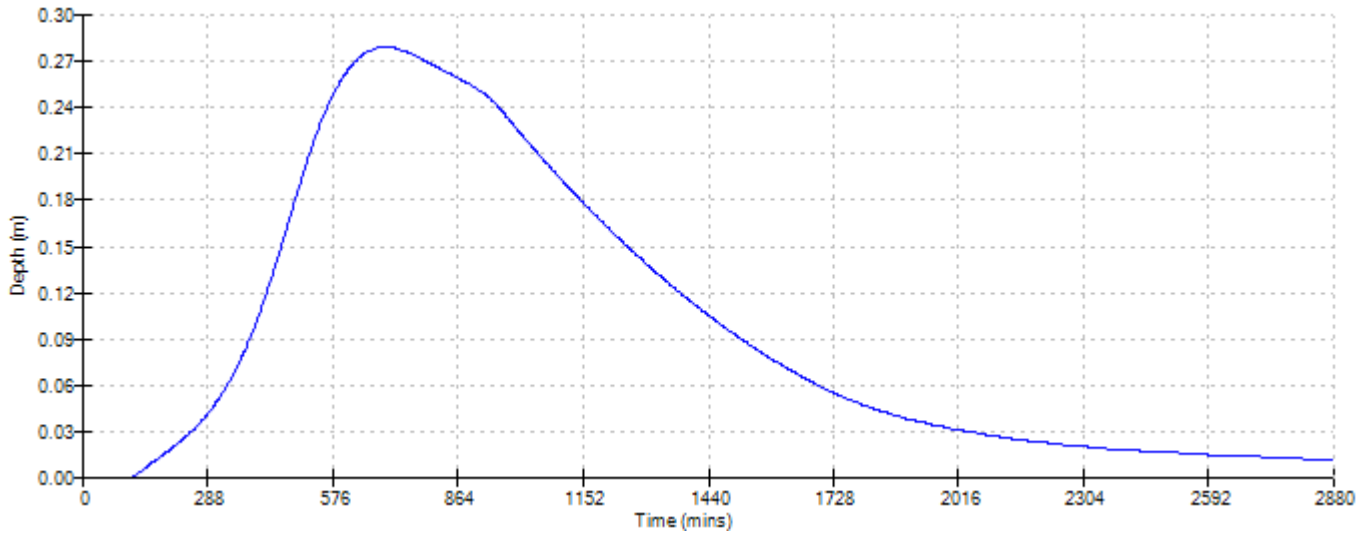


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Event: 960 min Winter

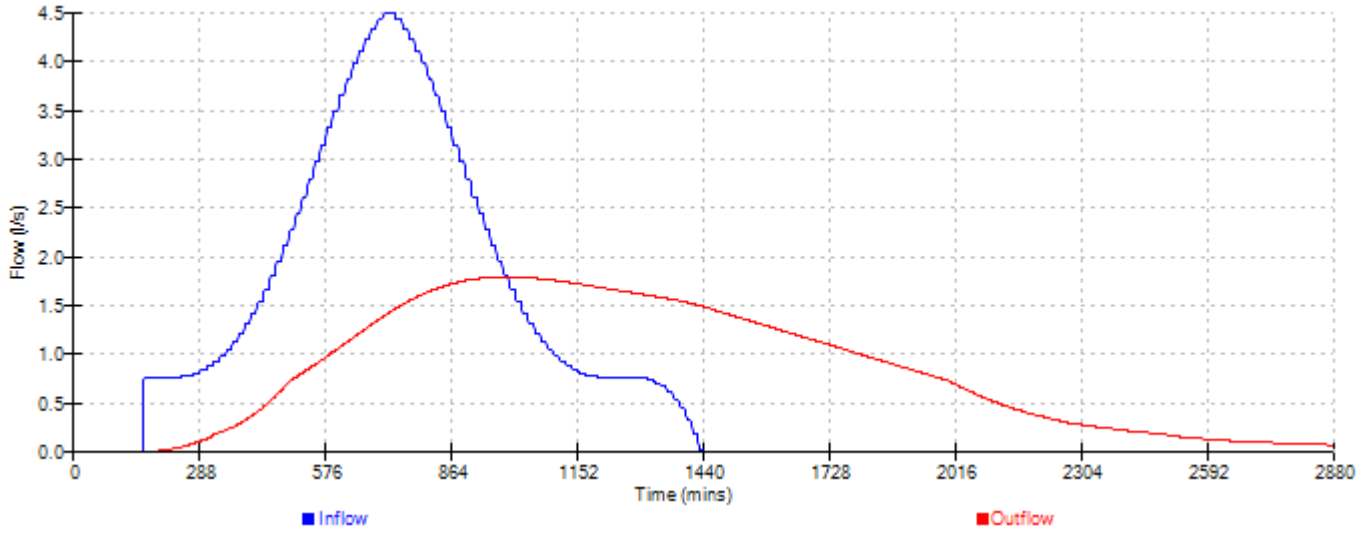


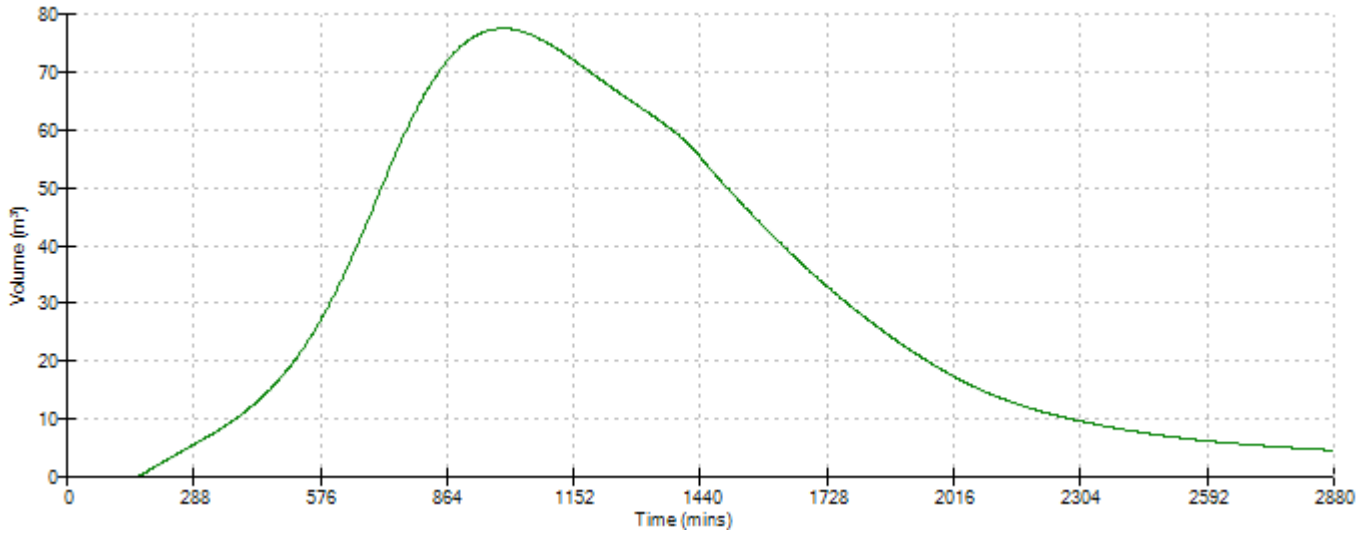


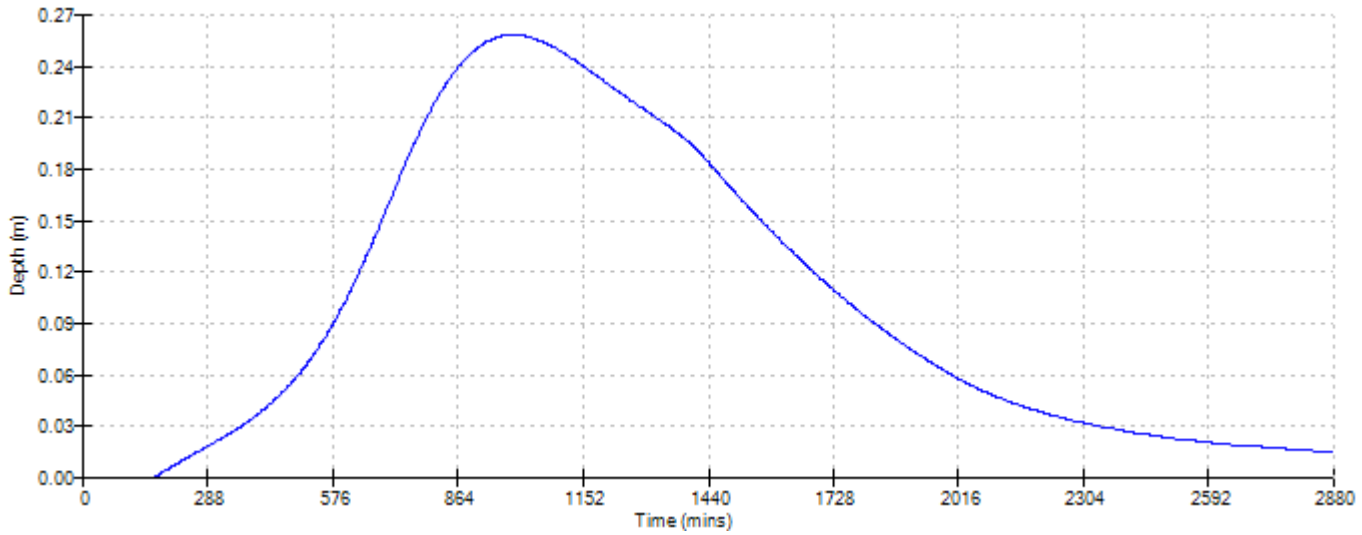


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Event: 1440 min Winter

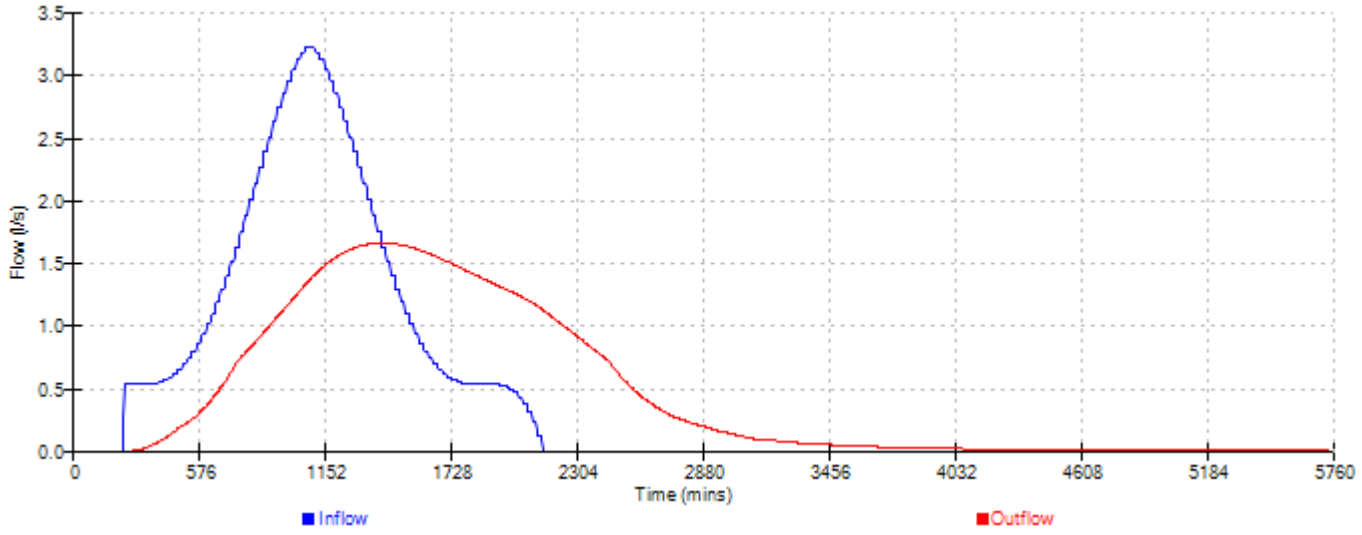


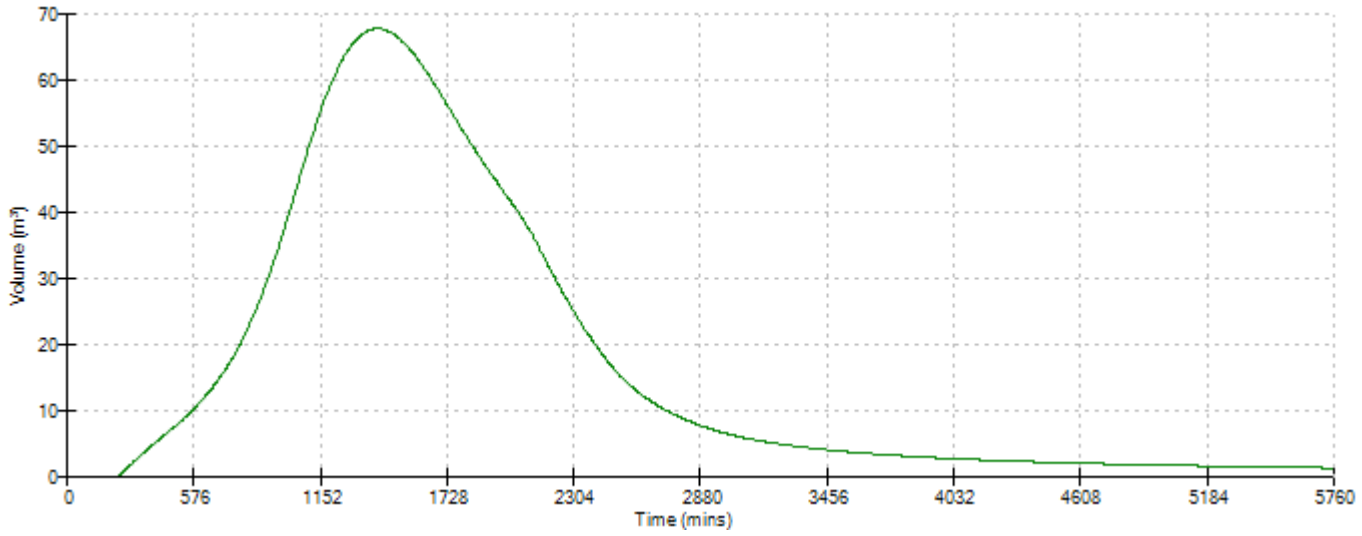


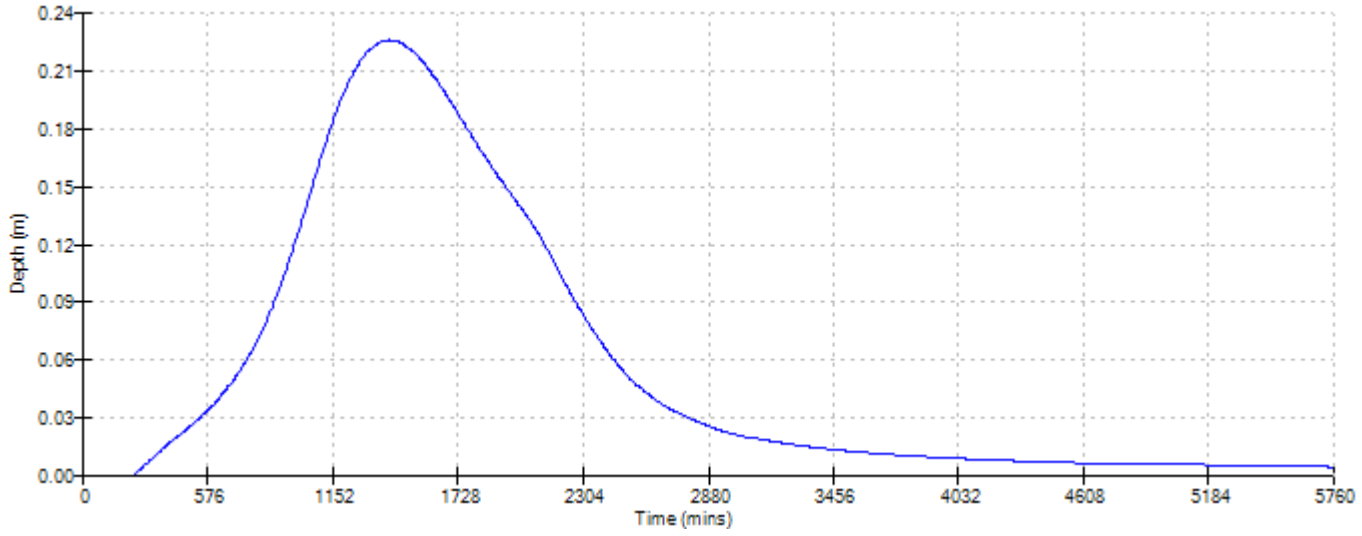


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Event: 2160 min Winter

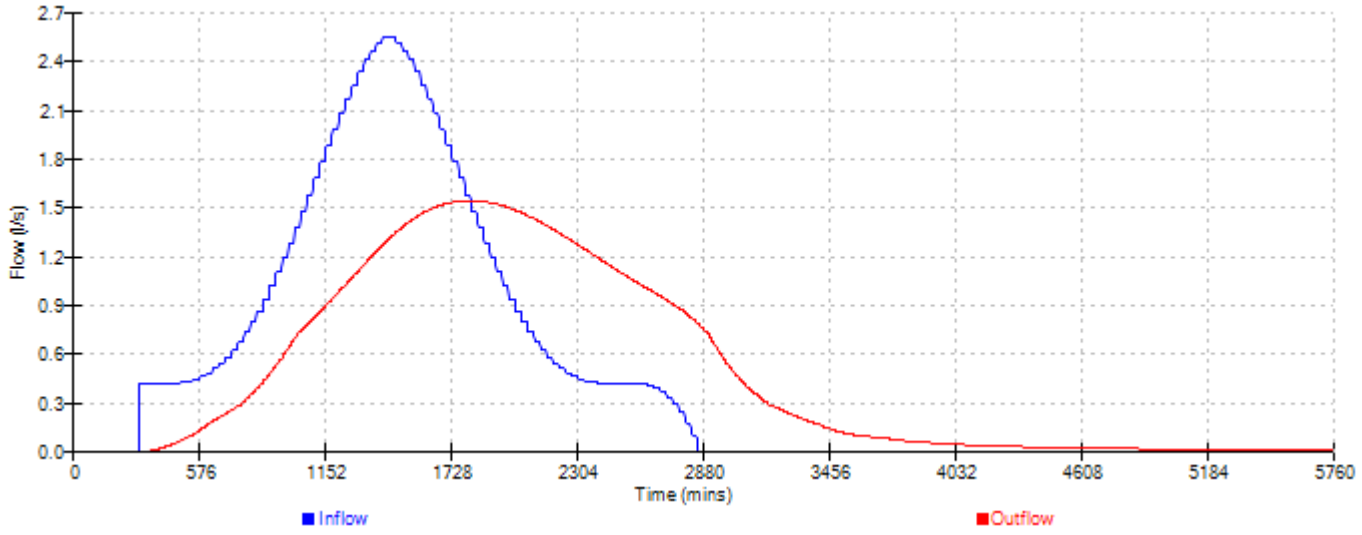


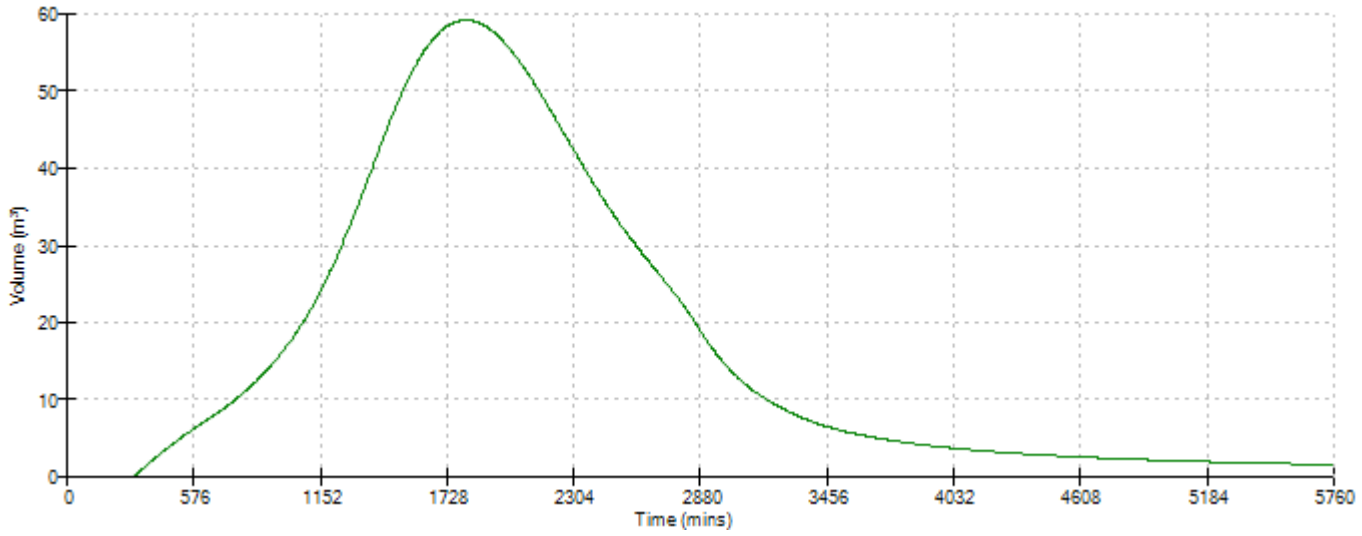


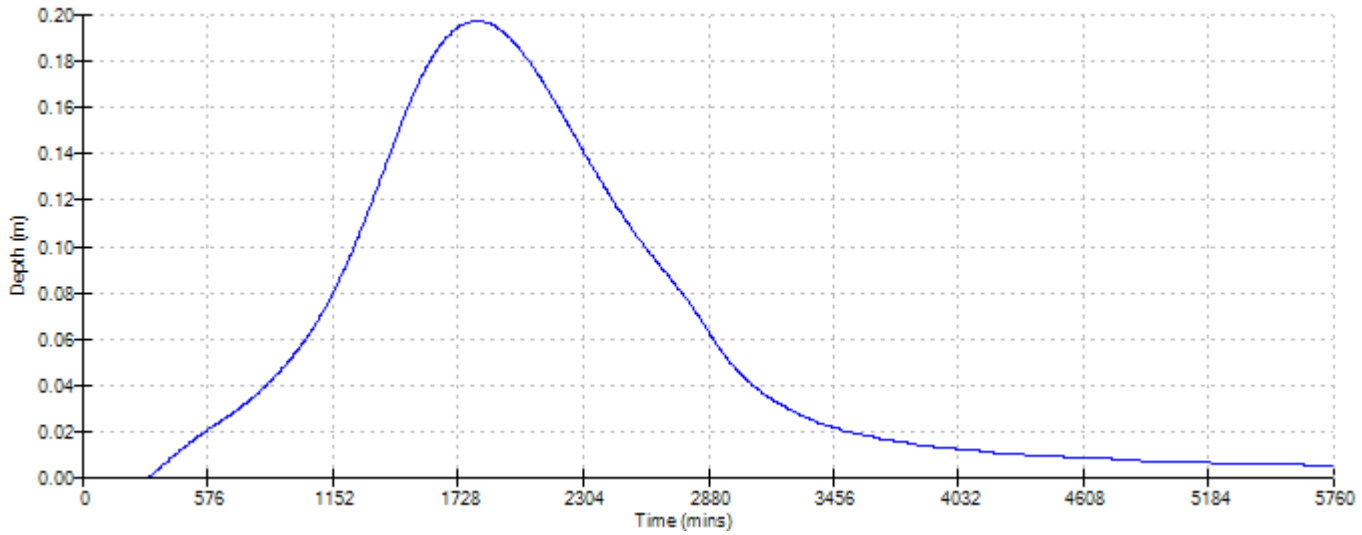


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Event: 2880 min Winter

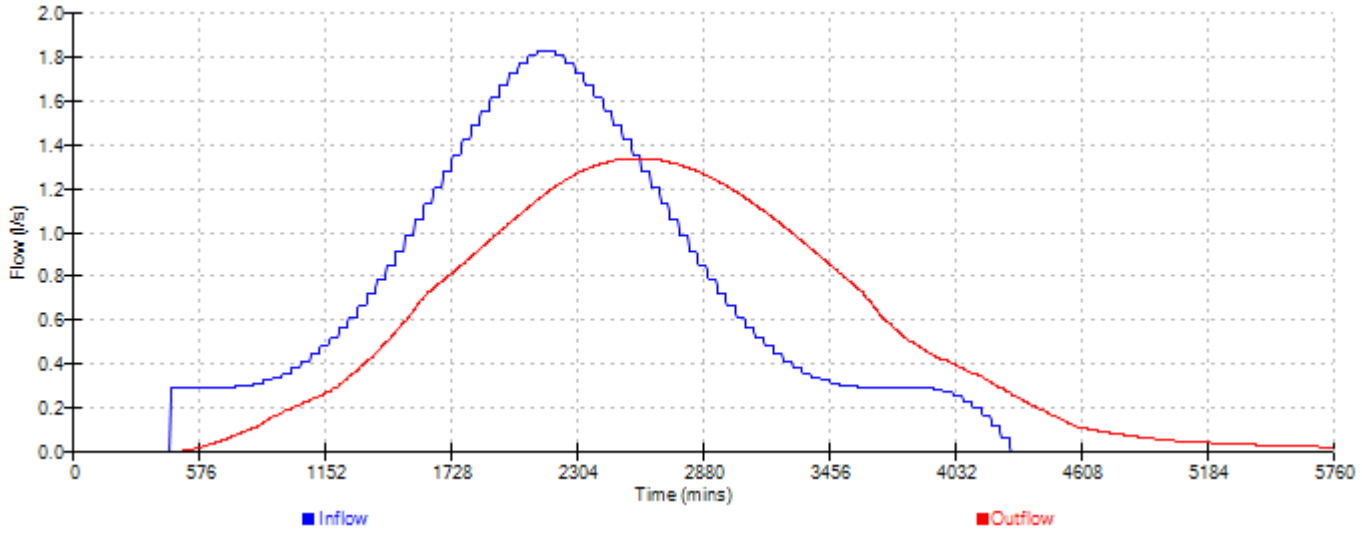


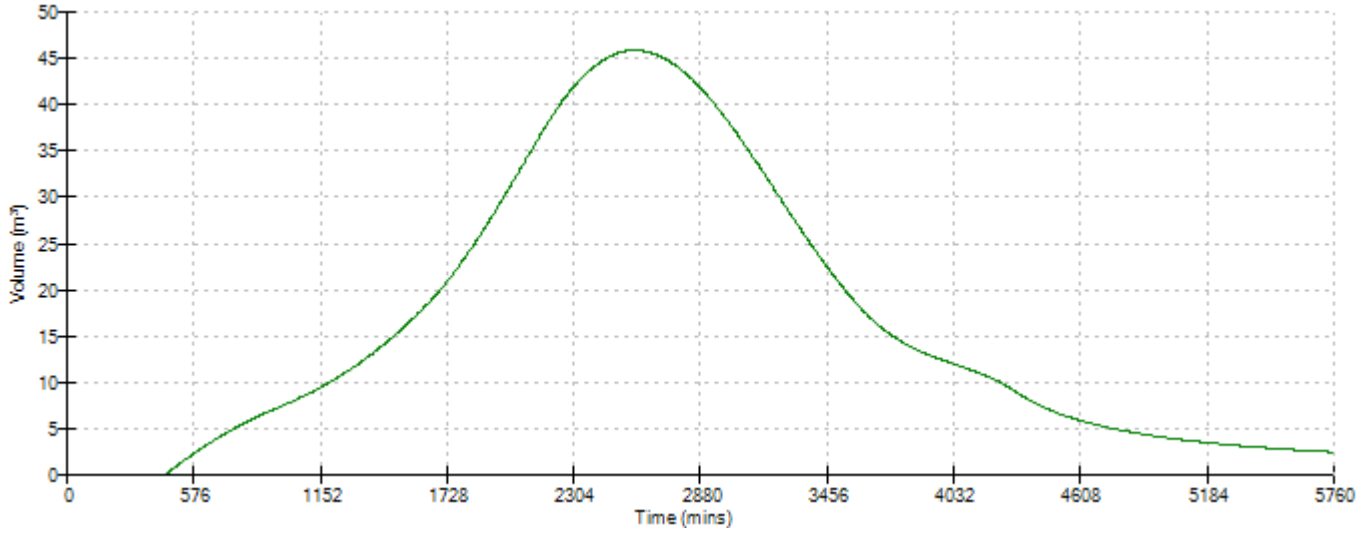


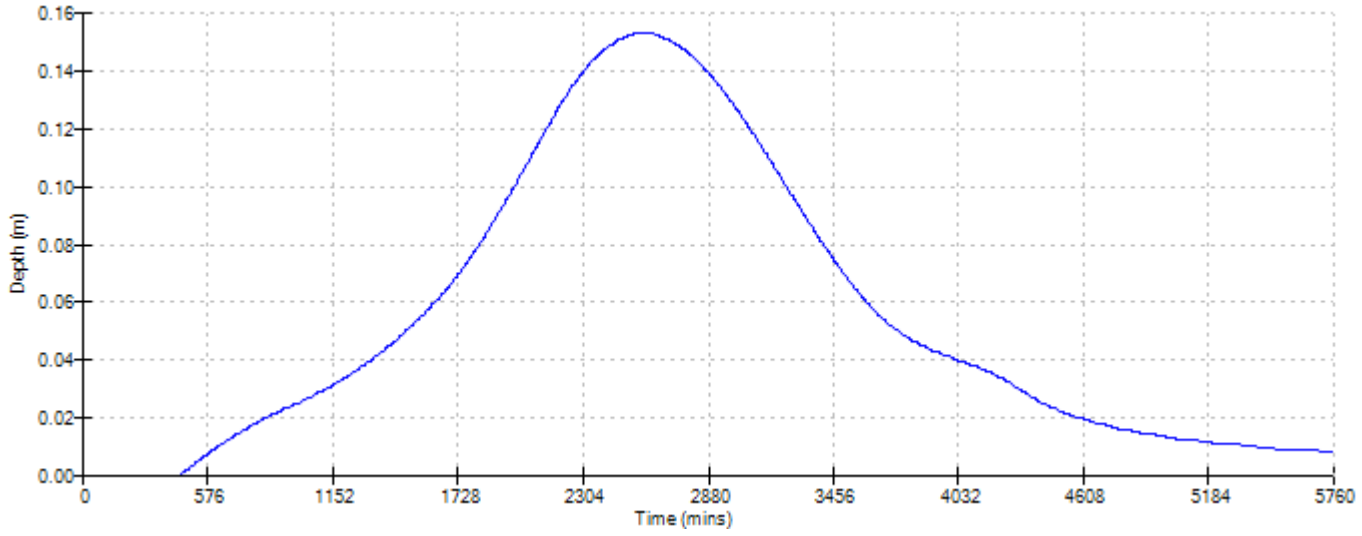


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Event: 4320 min Winter

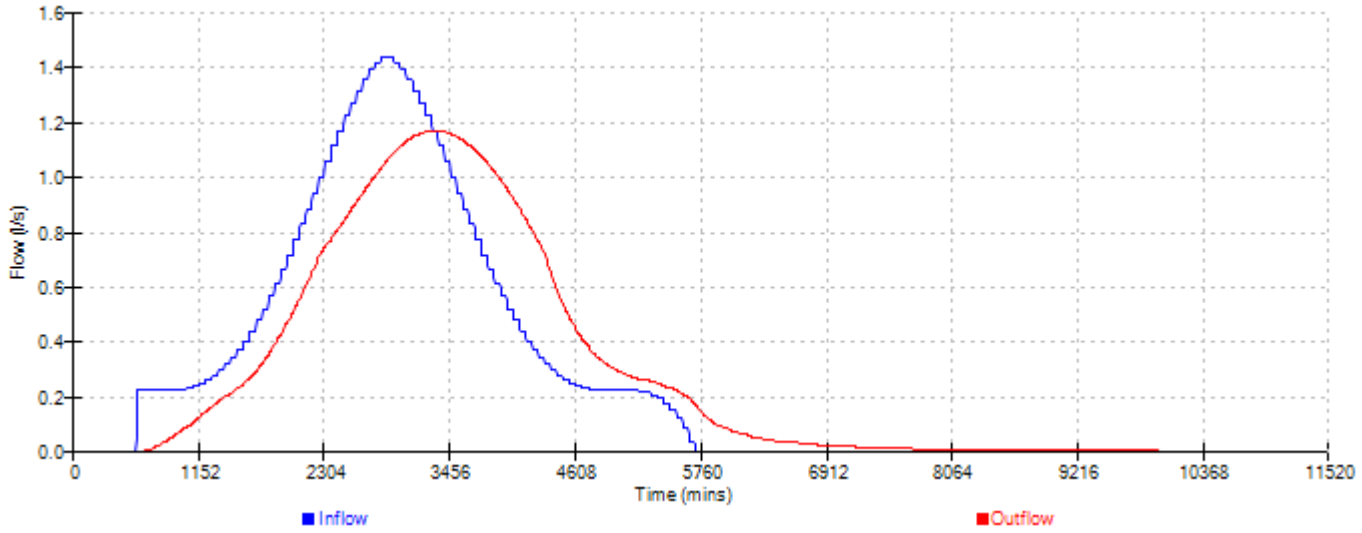


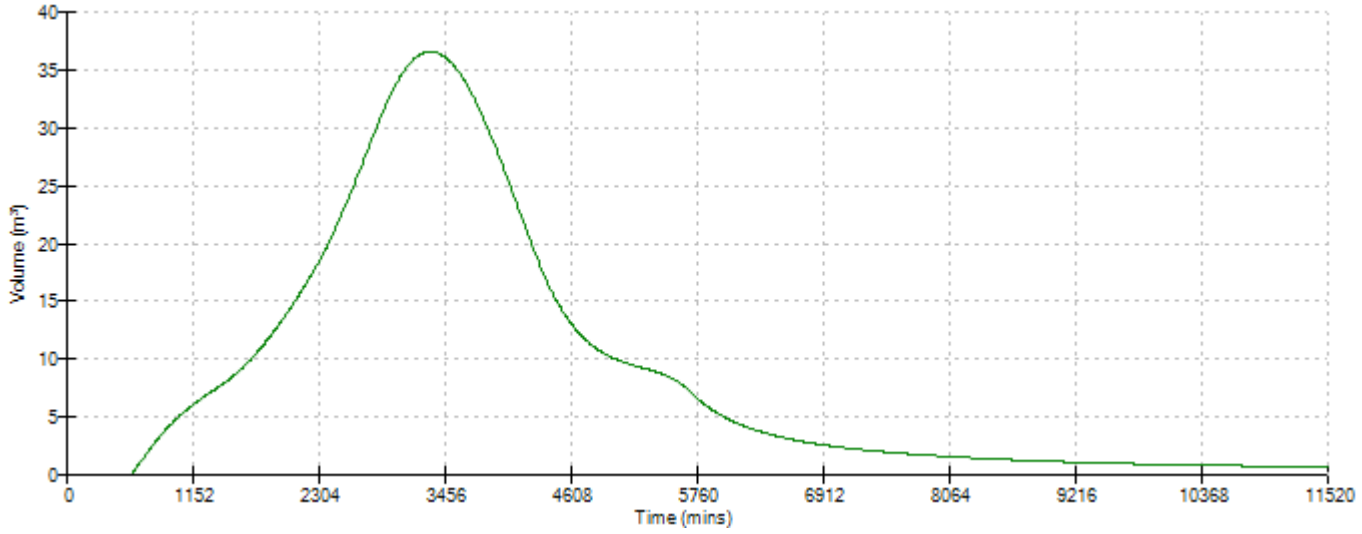


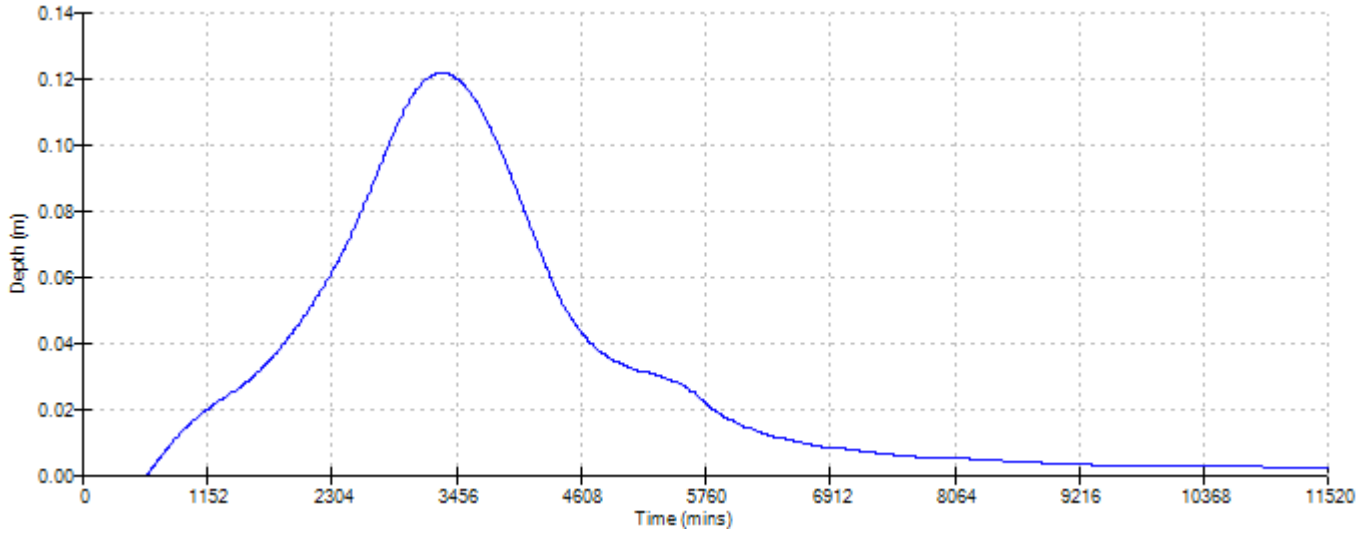


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Event: 5760 min Winter

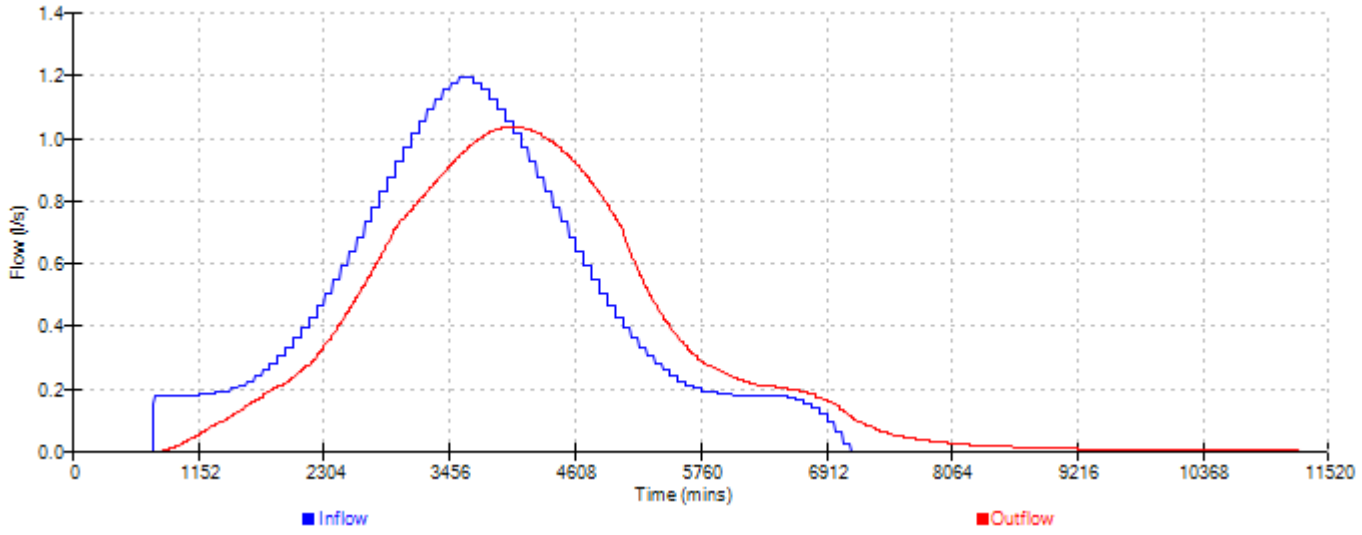


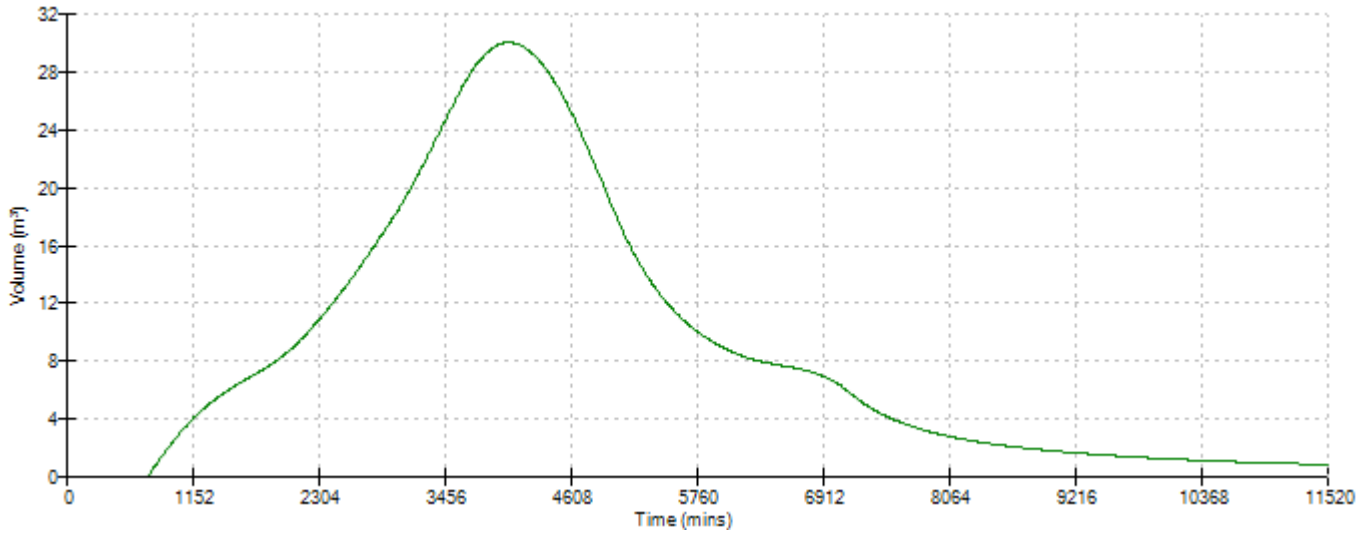


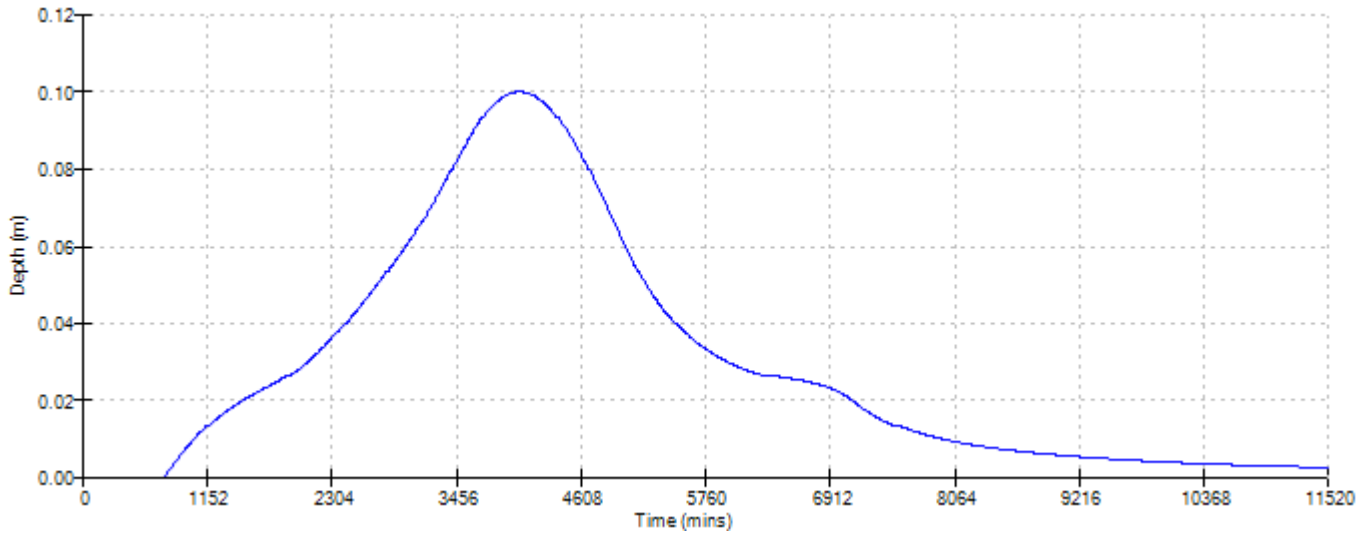


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Event: 7200 min Winter

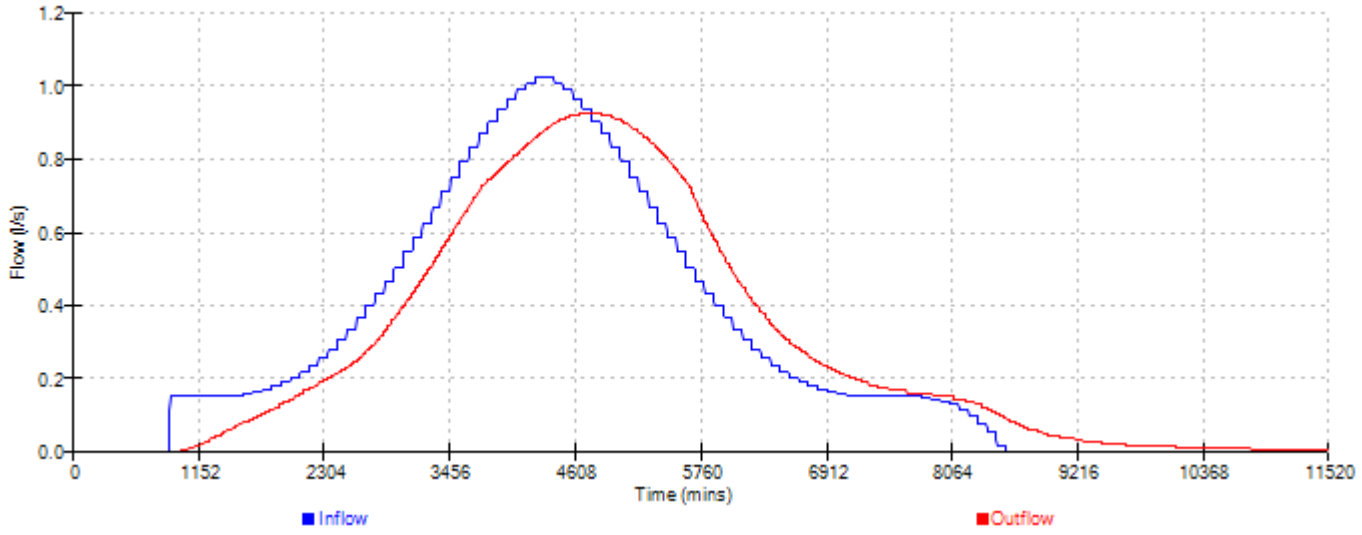


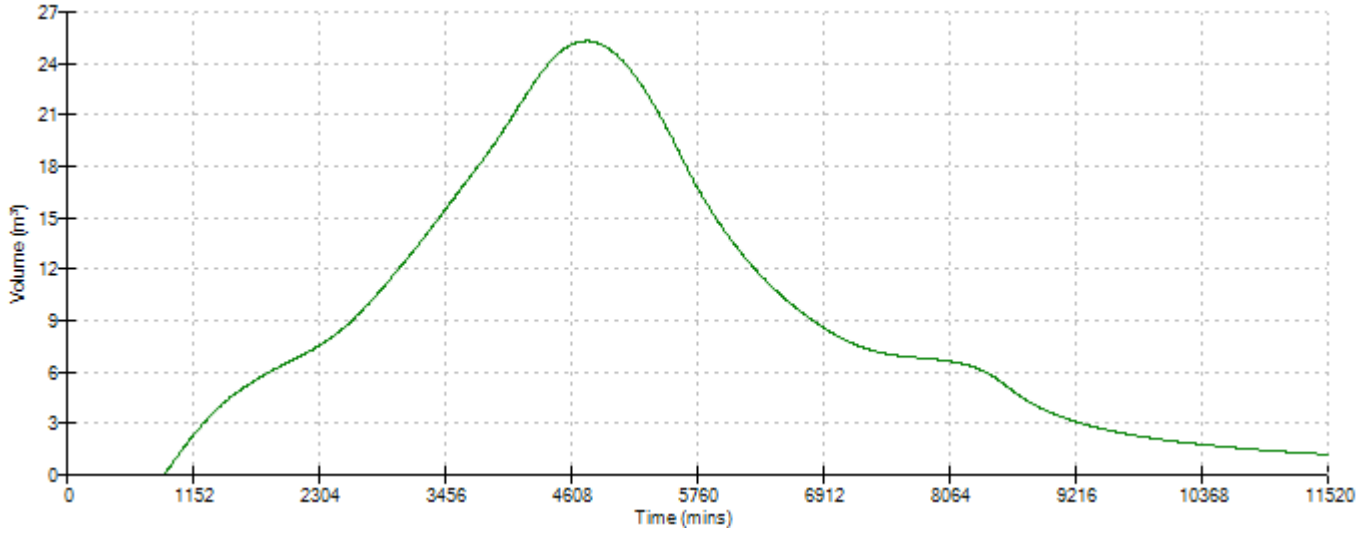


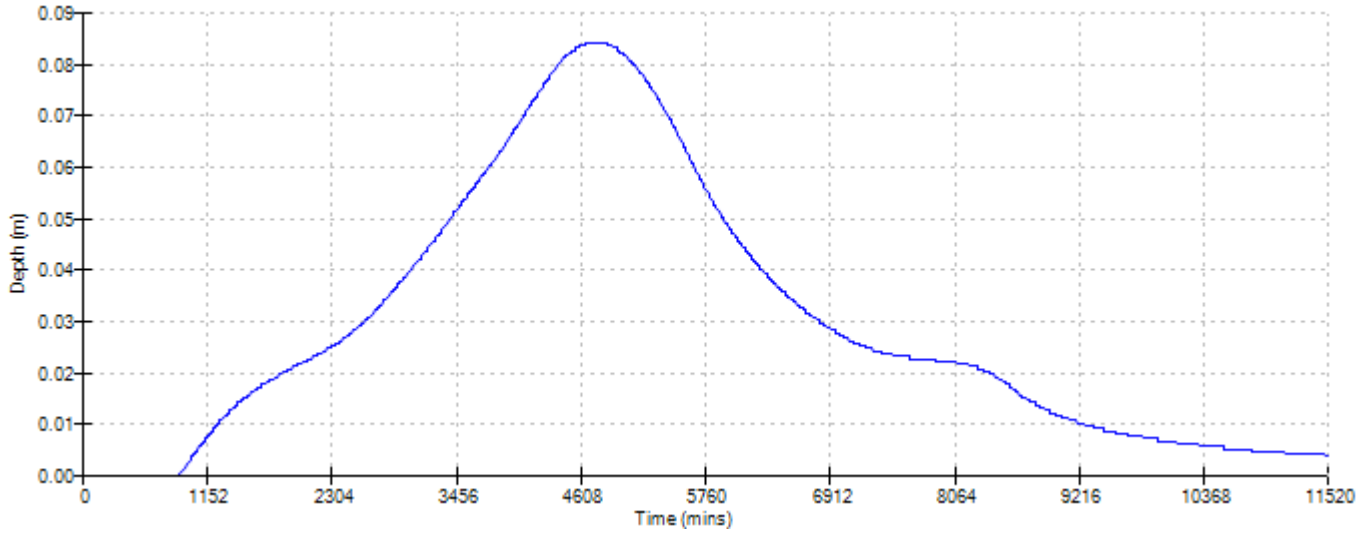


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Event: 8640 min Winter

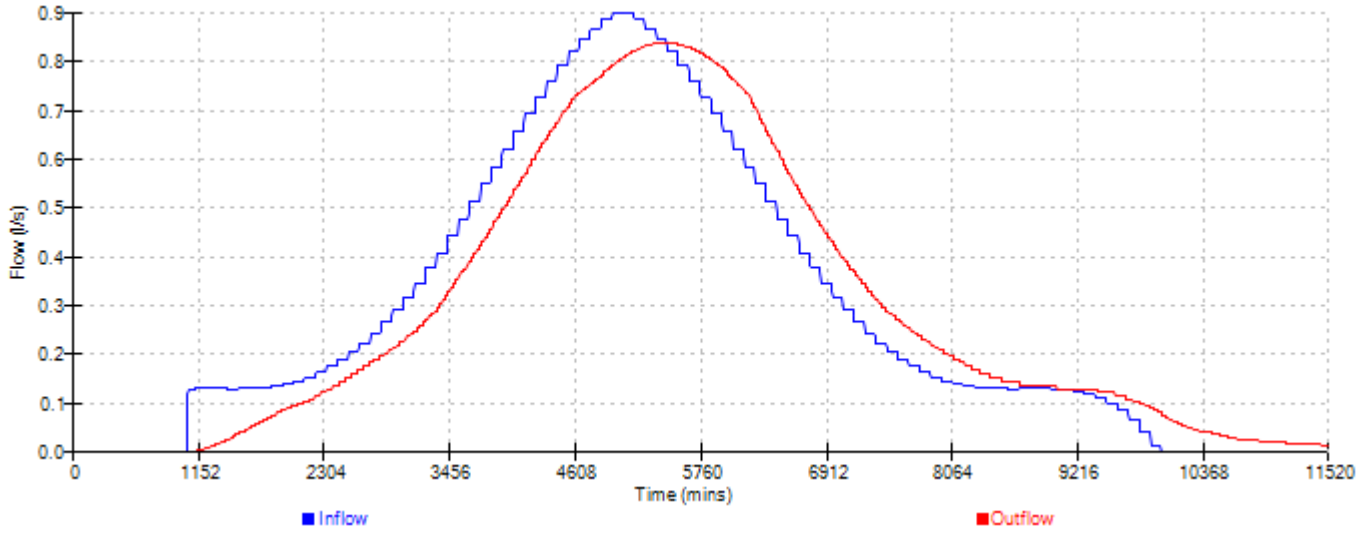


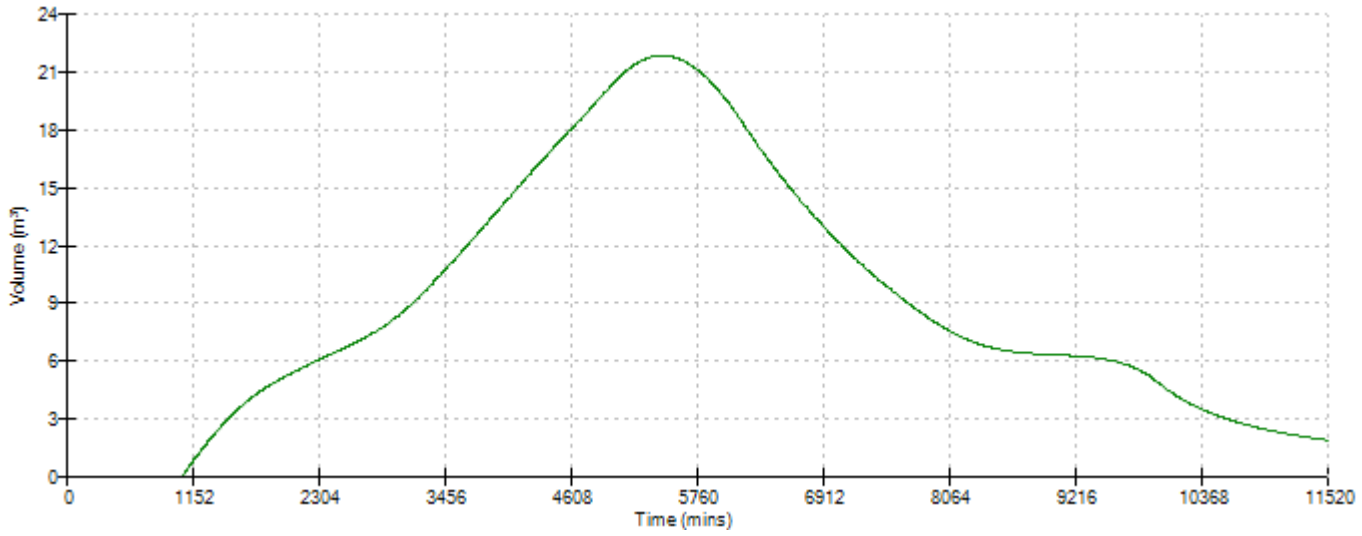


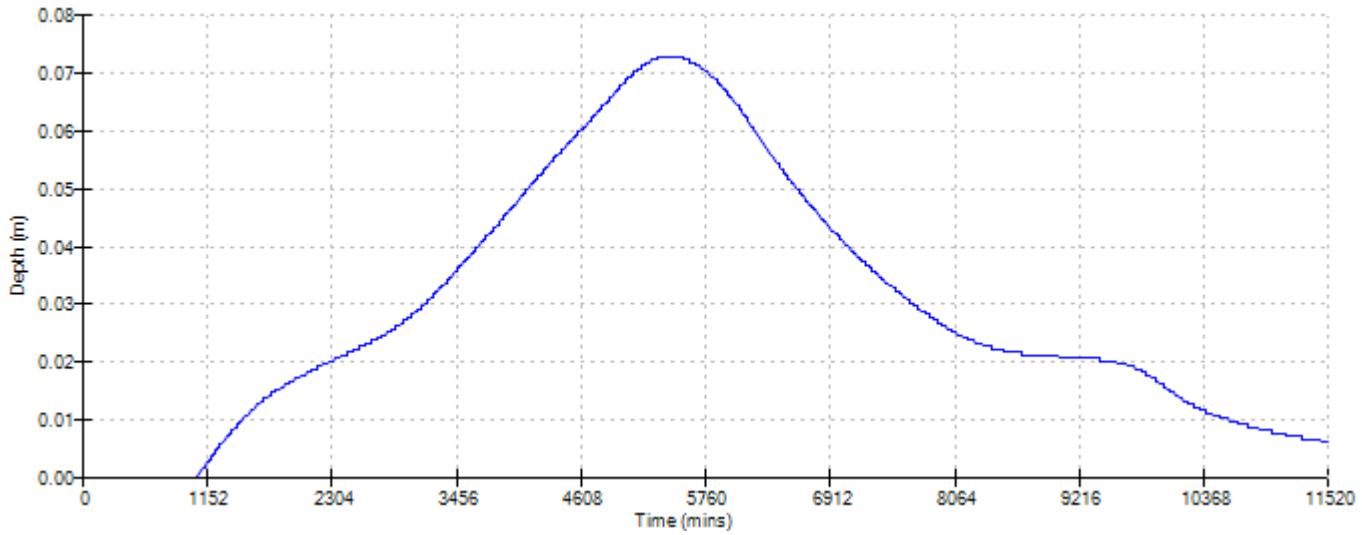


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Event: 10080 min Winter







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