

Appendix J Rainfall Runoff Modelling

Summary 1 in 2 Year event

Easy Flood Risk							Page 1
55 Shepherds Lane Dartford DA1 2NL							
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<u>Summary of Results for 2 year Return Period</u>							
Storm Event	Max Level (m)	Max Depth (m)	Max Control (1/s)	Max Overflow (1/s)	Max Σ Outflow (1/s)	Max Volume (m³)	Status
15 min Summer	88.859	0.109	0.9	0.0	0.9	15.2	O K
30 min Summer	88.888	0.138	1.0	0.0	1.0	19.4	O K
60 min Summer	88.916	0.166	1.0	0.0	1.0	23.3	O K
120 min Summer	88.940	0.190	1.0	0.0	1.0	26.6	O K
180 min Summer	88.950	0.200	1.0	0.0	1.0	28.0	O K
240 min Summer	88.954	0.204	1.0	0.0	1.0	28.5	O K
360 min Summer	88.956	0.206	1.0	0.0	1.0	28.9	O K
480 min Summer	88.956	0.206	1.0	0.0	1.0	28.8	O K
600 min Summer	88.953	0.203	1.0	0.0	1.0	28.4	O K
720 min Summer	88.950	0.200	1.0	0.0	1.0	27.9	O K
960 min Summer	88.941	0.191	1.0	0.0	1.0	26.7	O K
1440 min Summer	88.921	0.171	1.0	0.0	1.0	24.0	O K
2160 min Summer	88.894	0.144	1.0	0.0	1.0	20.1	O K
2880 min Summer	88.871	0.121	0.9	0.0	0.9	16.9	O K
4320 min Summer	88.840	0.090	0.9	0.0	0.9	12.6	O K
5760 min Summer	88.823	0.073	0.8	0.0	0.8	10.2	O K
7200 min Summer	88.813	0.063	0.7	0.0	0.7	8.8	O K
8640 min Summer	88.806	0.056	0.6	0.0	0.6	7.8	O K
10080 min Summer	88.801	0.051	0.6	0.0	0.6	7.1	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)		
15 min Summer	40.058	0.0	15.2	0.0	18		
30 min Summer	25.963	0.0	19.8	0.0	33		
60 min Summer	16.200	0.0	25.2	0.0	62		
120 min Summer	9.897	0.0	30.9	0.0	122		
180 min Summer	7.378	0.0	34.5	0.0	180		
240 min Summer	5.982	0.0	37.4	0.0	218		
360 min Summer	4.435	0.0	41.6	0.0	278		
480 min Summer	3.581	0.0	44.7	0.0	344		
600 min Summer	3.033	0.0	47.4	0.0	412		
720 min Summer	2.647	0.0	49.6	0.0	480		
960 min Summer	2.136	0.0	53.4	0.0	616		
1440 min Summer	1.579	0.0	59.2	0.0	882		
2160 min Summer	1.167	0.0	66.0	0.0	1272		
2880 min Summer	0.941	0.0	70.9	0.0	1640		
4320 min Summer	0.695	0.0	78.4	0.0	2332		
5760 min Summer	0.561	0.0	84.7	0.0	3008		
7200 min Summer	0.475	0.0	89.6	0.0	3744		
8640 min Summer	0.414	0.0	93.8	0.0	4416		
10080 min Summer	0.370	0.0	97.4	0.0	5144		
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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.210

Time (mins)	Area
From:	To: (ha)
0	4 0.210

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Model Details

Storage is Online Cover Level (m) 90.000

Tank or Pond Structure

Invert Level (m) 88.750

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	140.0	0.750	140.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SCI-0048-1000-0750-1000
Design Head (m)	0.750
Design Flow (l/s)	1.0
Flush-Flo™	Calculated
Objective	Minimise blockage risk
Application	Surface
Sump Available	Yes
Diameter (mm)	48
Invert Level (m)	88.750
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.750	1.0	Kick-Flo®	0.424	0.8
Flush-Flo™	0.196	1.0	Mean Flow over Head Range	-	0.9

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	0.9	1.200	1.2	3.000	1.9	7.000	2.8
0.200	1.0	1.400	1.3	3.500	2.0	7.500	2.9
0.300	0.9	1.600	1.4	4.000	2.1	8.000	2.9
0.400	0.9	1.800	1.5	4.500	2.3	8.500	3.0
0.500	0.8	2.000	1.6	5.000	2.4	9.000	3.1
0.600	0.9	2.200	1.6	5.500	2.5	9.500	3.2
0.800	1.0	2.400	1.7	6.000	2.6		
1.000	1.1	2.600	1.7	6.500	2.7		

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Hydro-Brake® Optimum Overflow Control

Unit Reference	MD-SCL-0051-1000-0500-1000
Design Head (m)	0.500
Design Flow (l/s)	1.0
Flush-Flo™	Calculated
Objective	Minimise blockage risk
Application	Surface
Sump Available	Yes
Diameter (mm)	51
Invert Level (m)	89.500
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.500	1.0	Kick-Flo®	0.306	0.8
Flush-Flo™	0.127	1.0	Mean Flow over Head Range	-	0.9

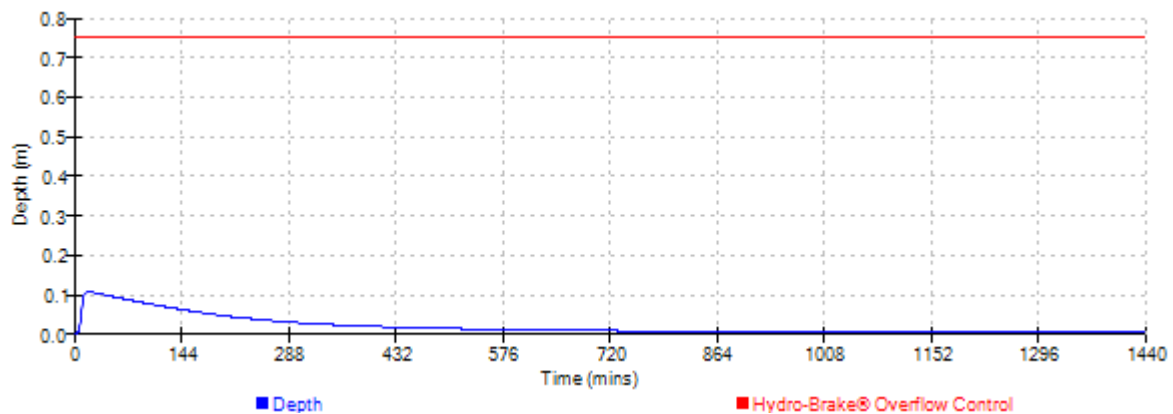
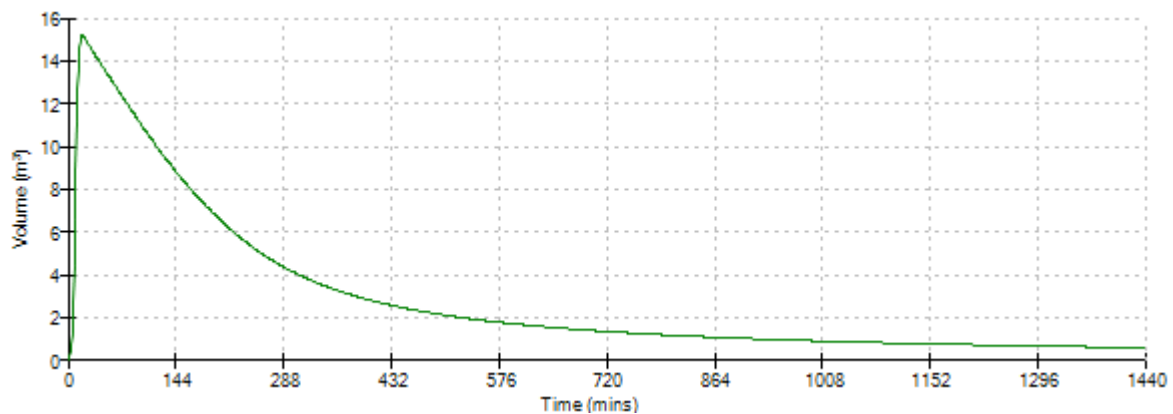
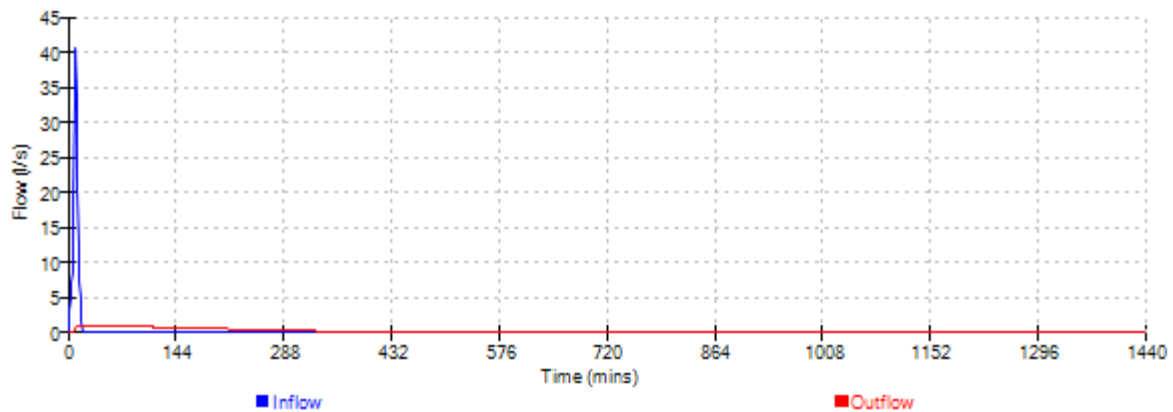
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.0	1.200	1.5	3.000	2.2	7.000	3.3
0.200	1.0	1.400	1.6	3.500	2.4	7.500	3.4
0.300	0.8	1.600	1.7	4.000	2.5	8.000	3.6
0.400	0.9	1.800	1.8	4.500	2.7	8.500	3.7
0.500	1.0	2.000	1.9	5.000	2.8	9.000	3.8
0.600	1.1	2.200	1.9	5.500	2.9	9.500	3.9
0.800	1.2	2.400	2.0	6.000	3.1		
1.000	1.4	2.600	2.1	6.500	3.2		

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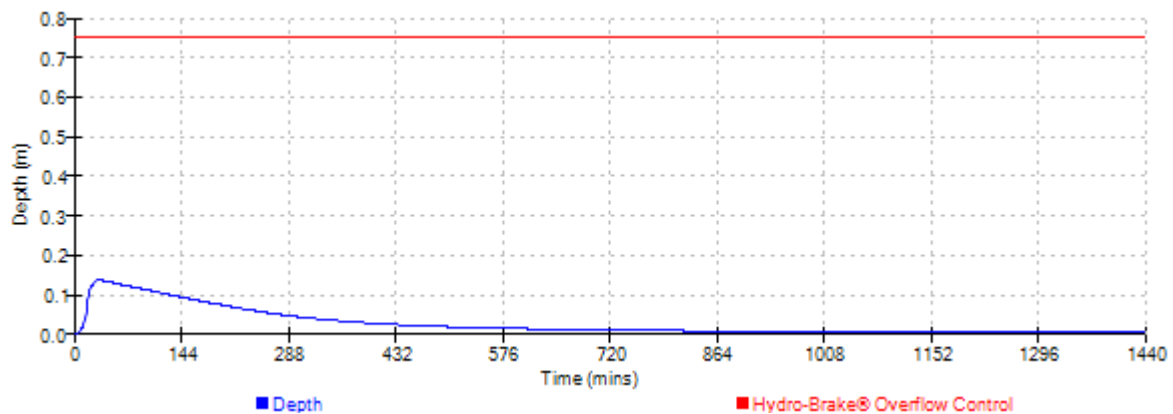
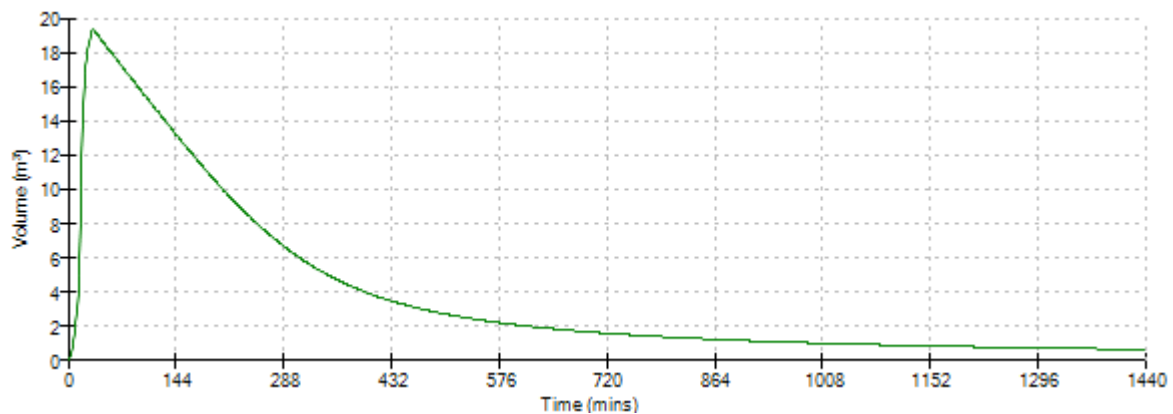
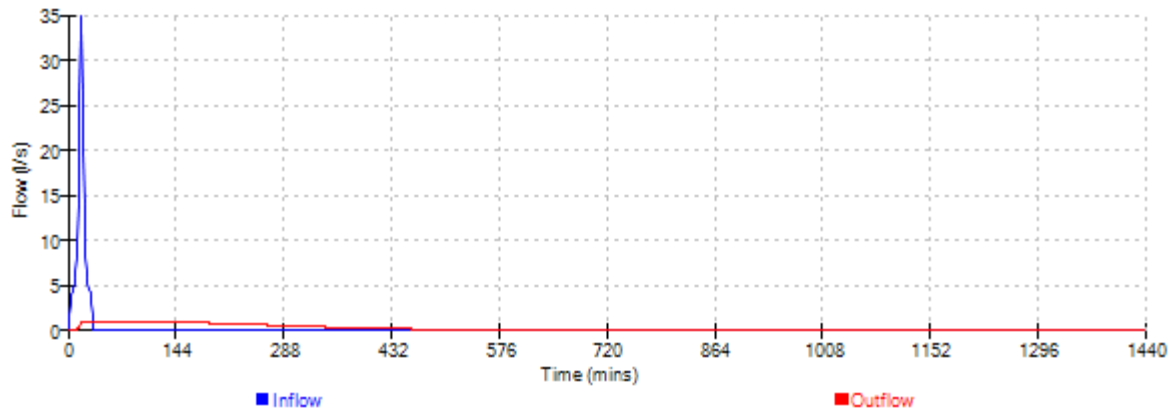
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Event: 15 min Summer



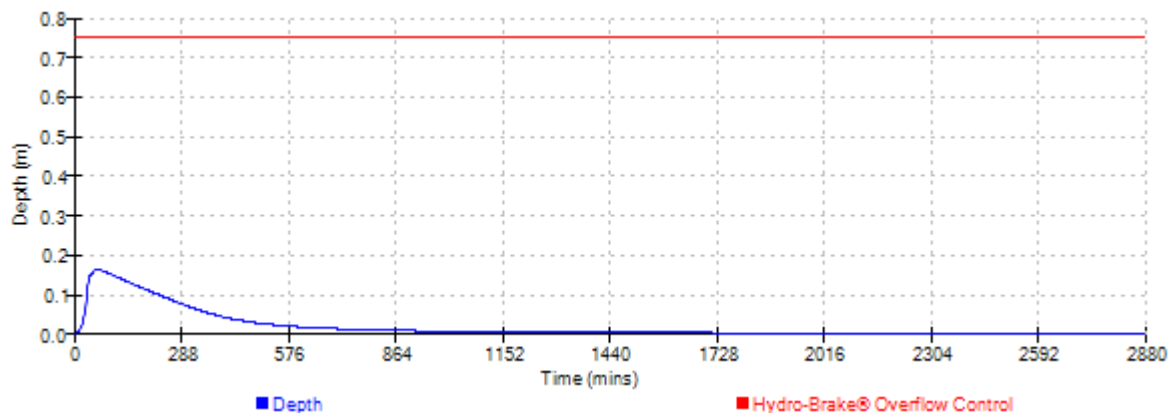
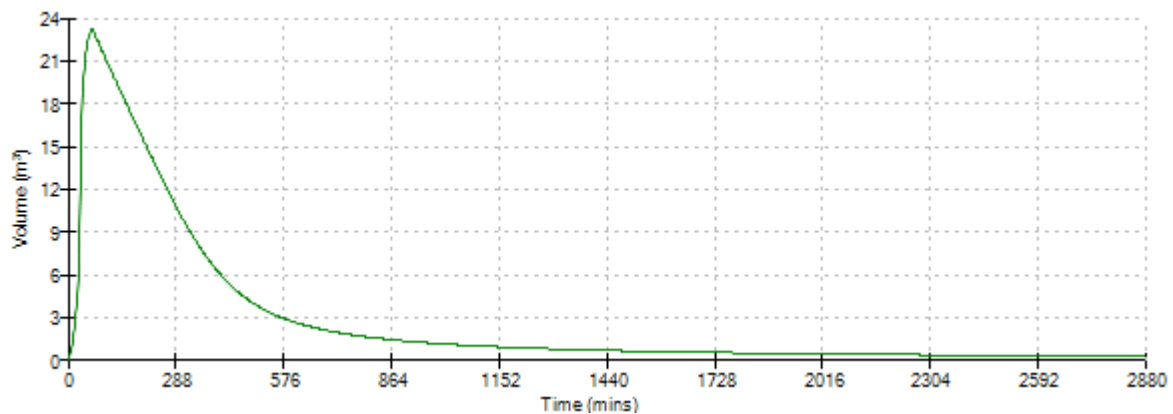
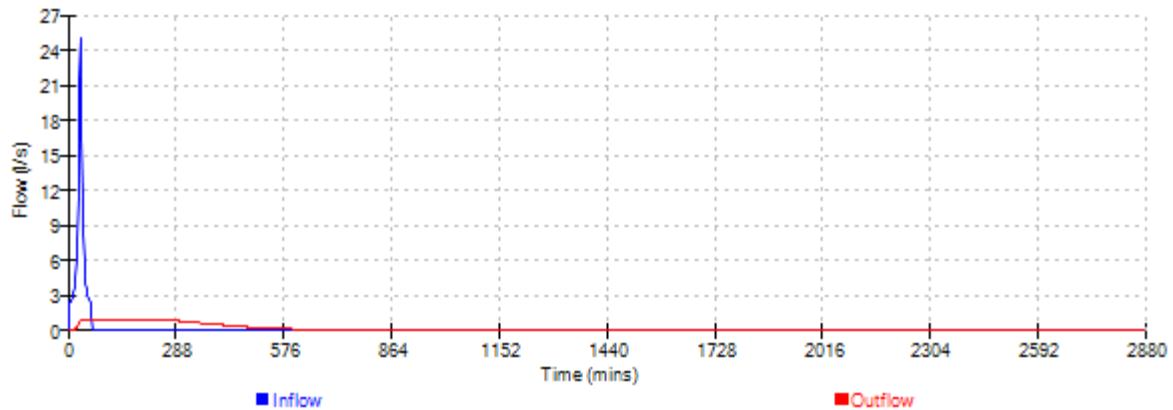
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Event: 30 min Summer



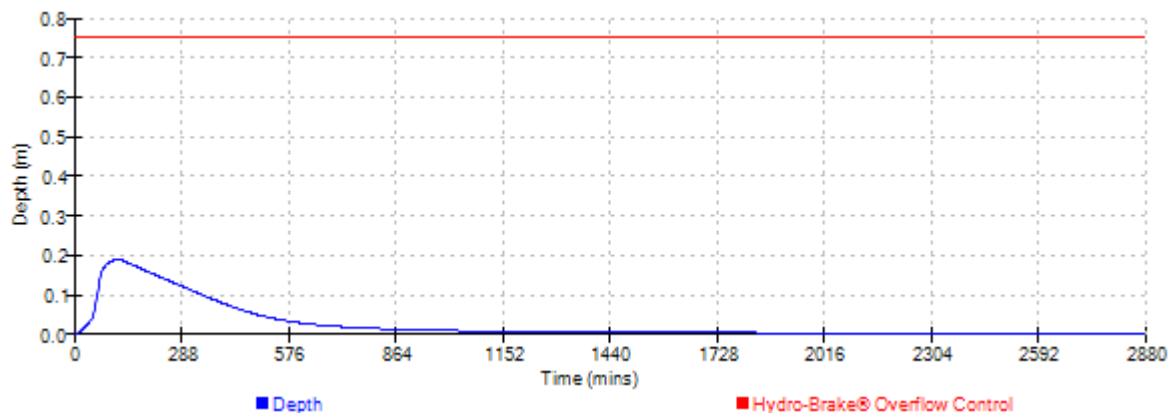
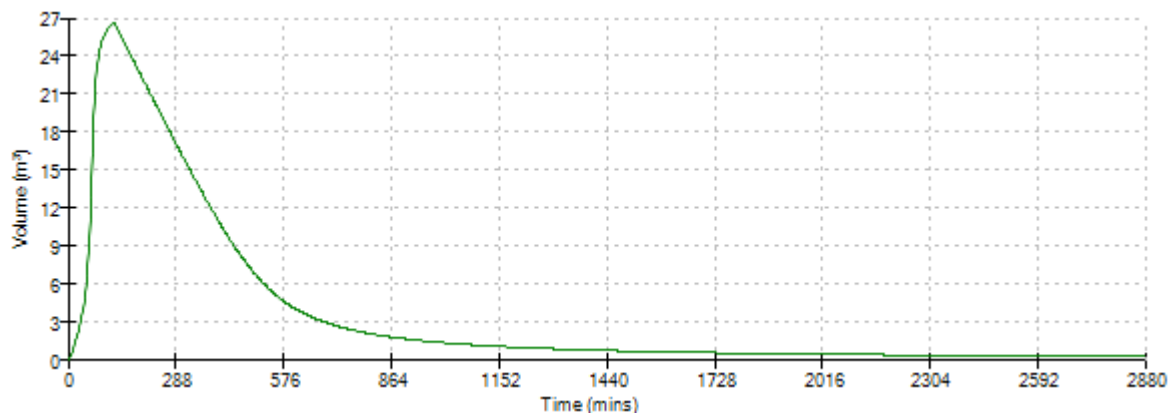
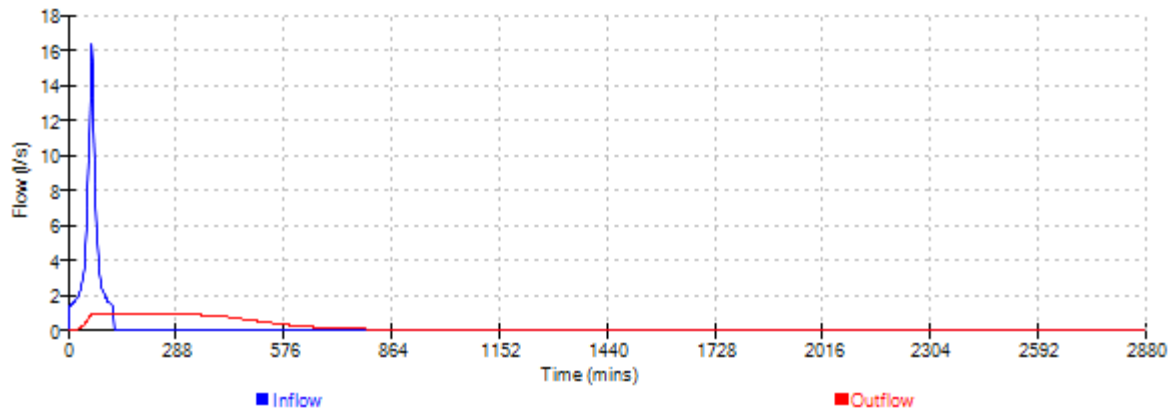
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Event: 60 min Summer



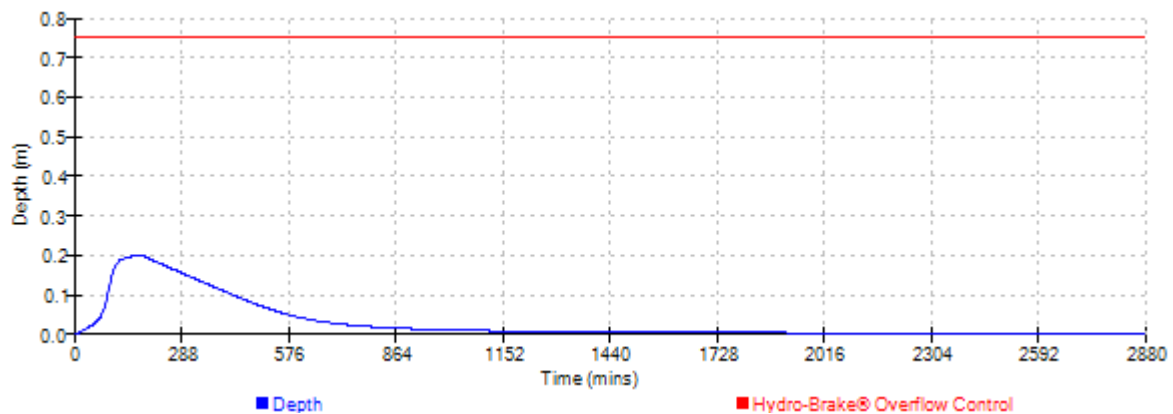
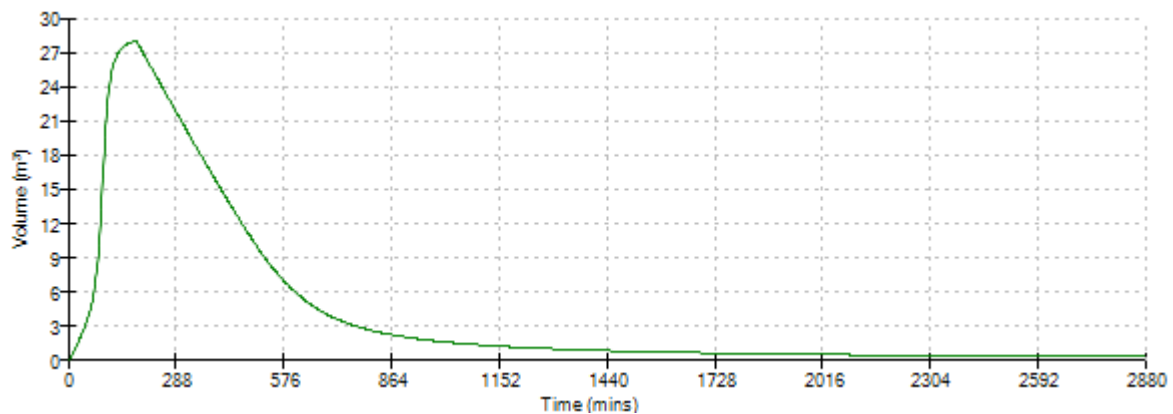
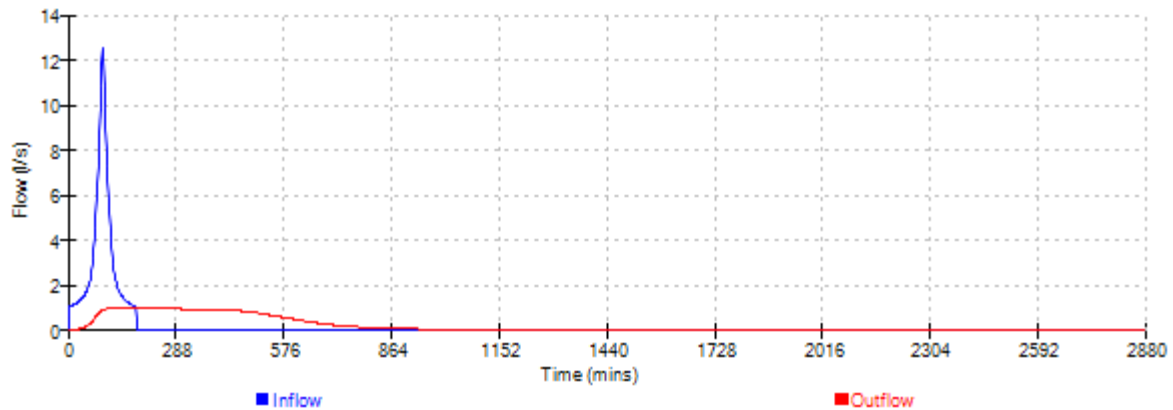
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Event: 120 min Summer



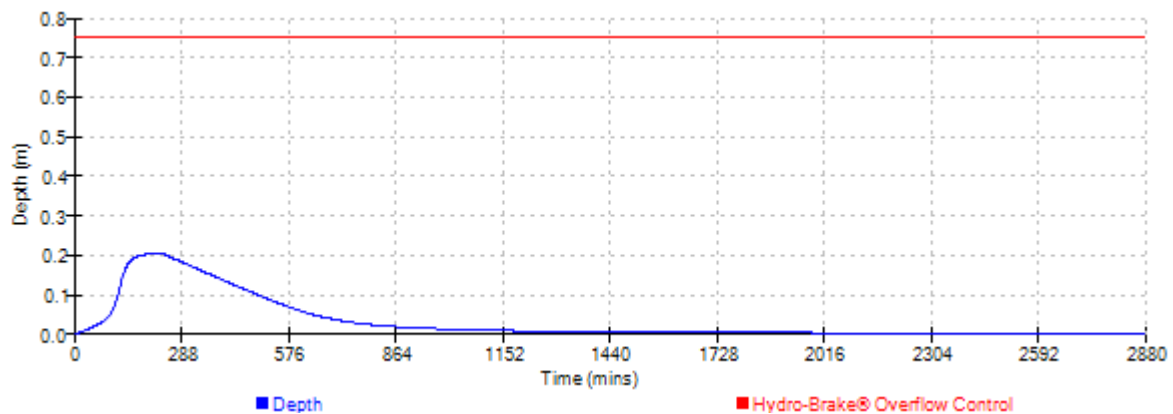
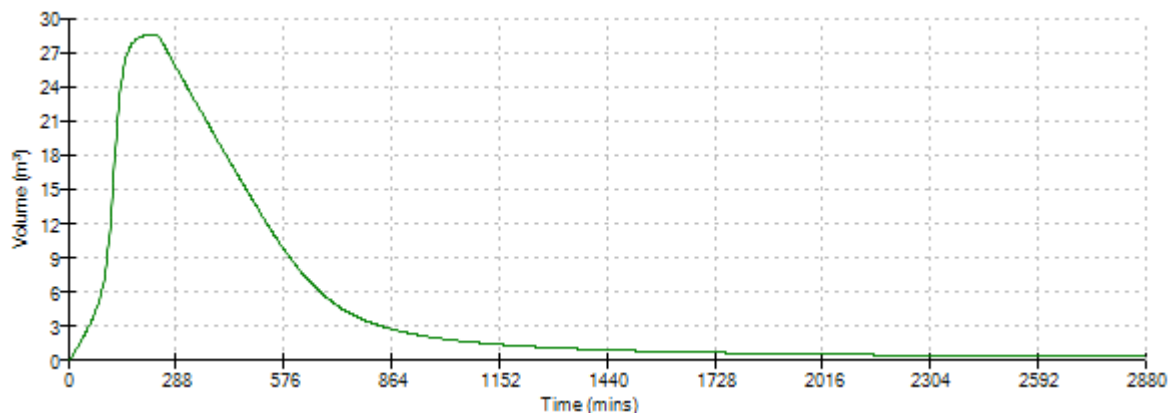
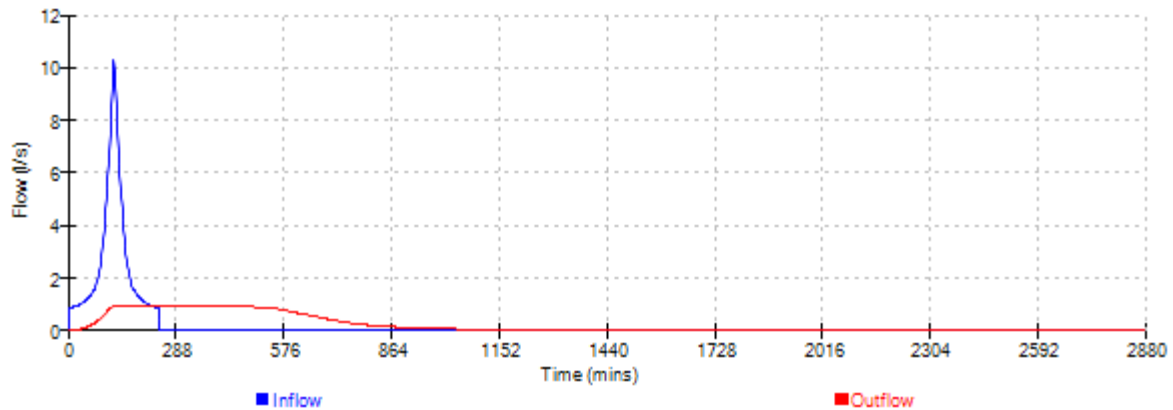
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Event: 180 min Summer



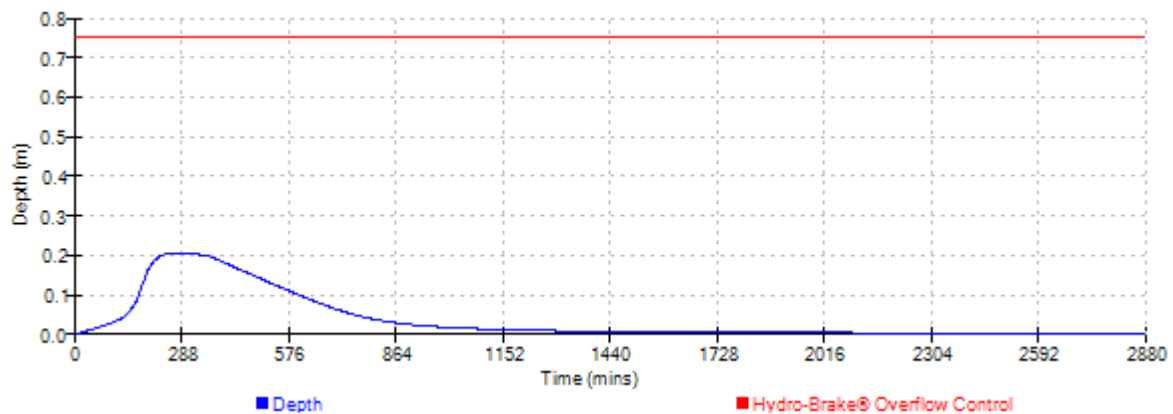
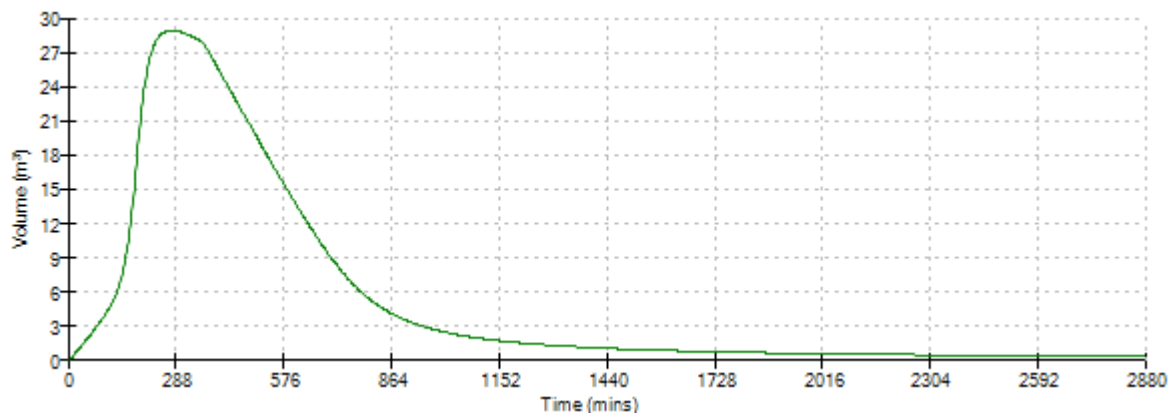
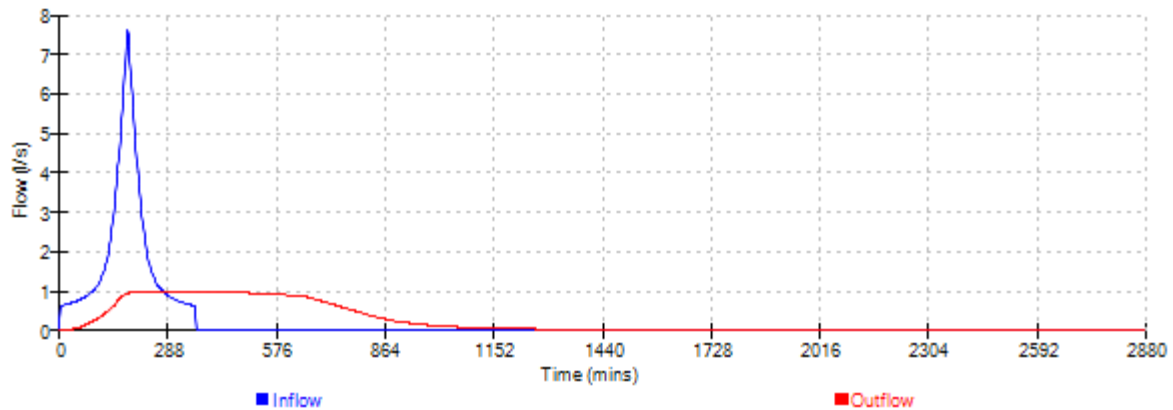
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Event: 240 min Summer



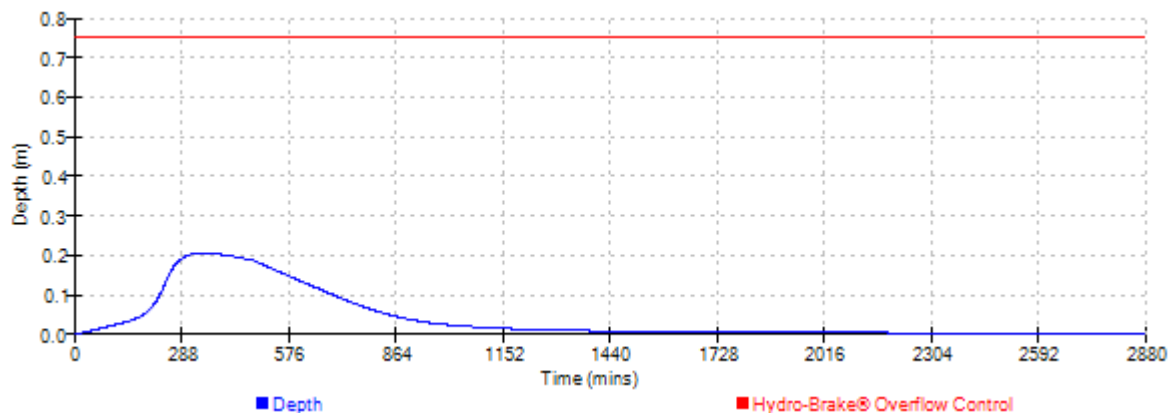
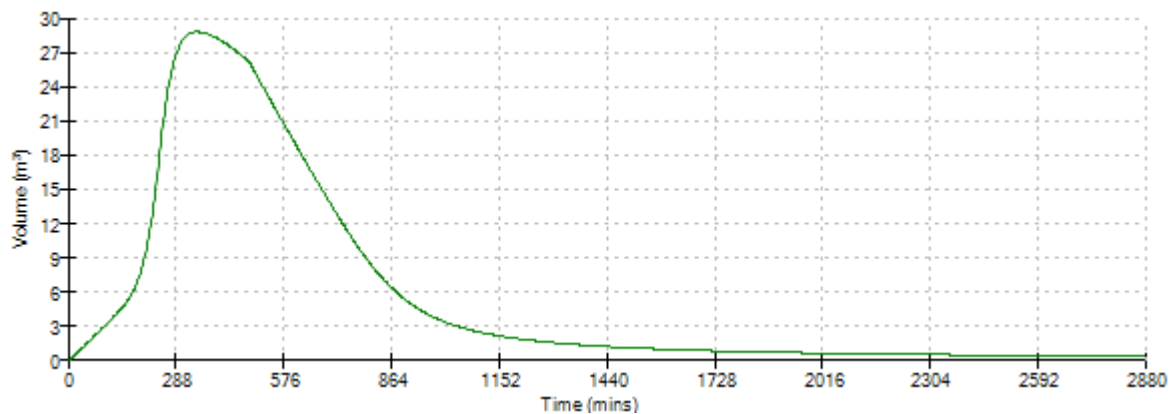
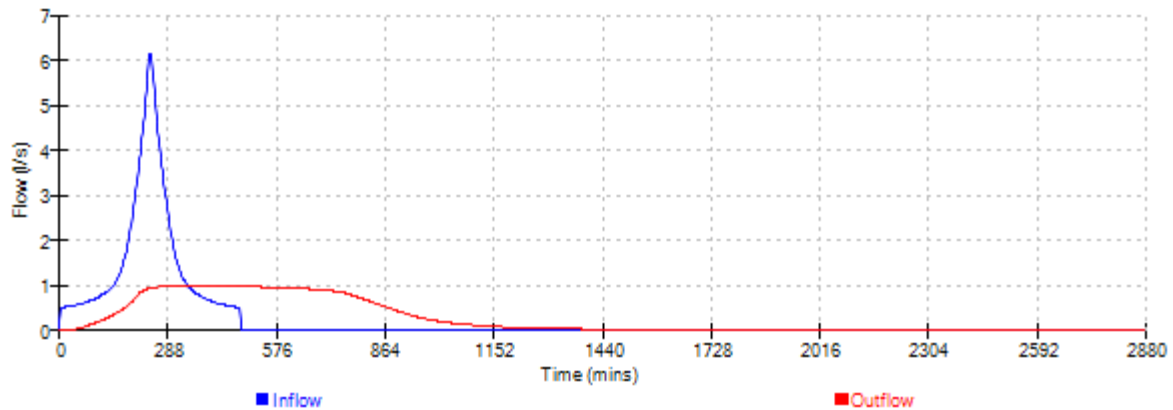
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Event: 360 min Summer



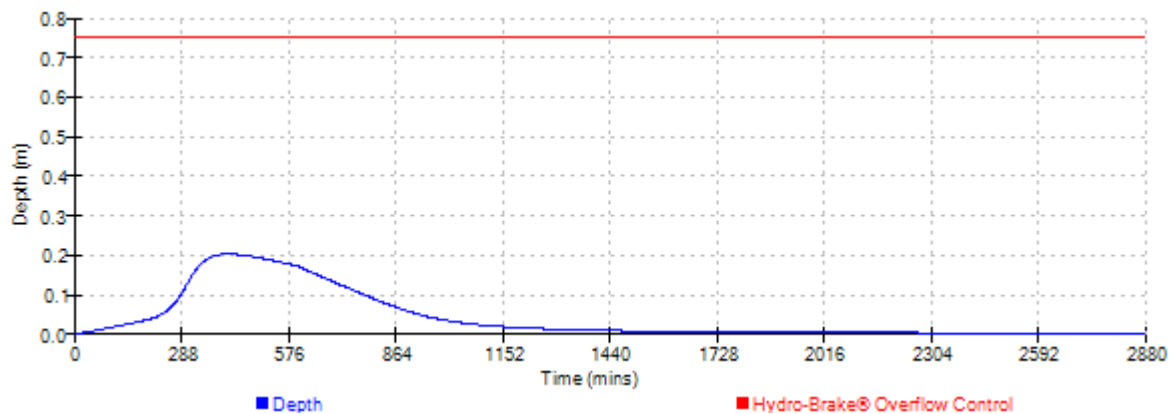
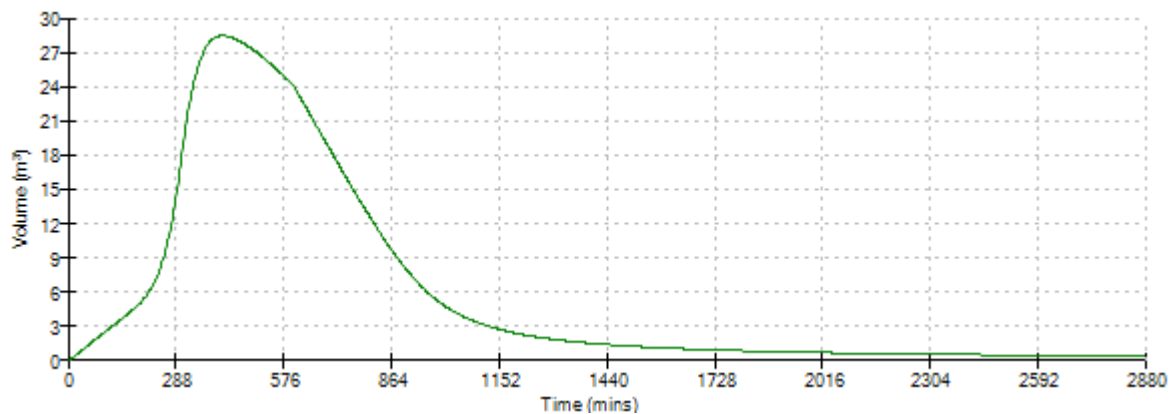
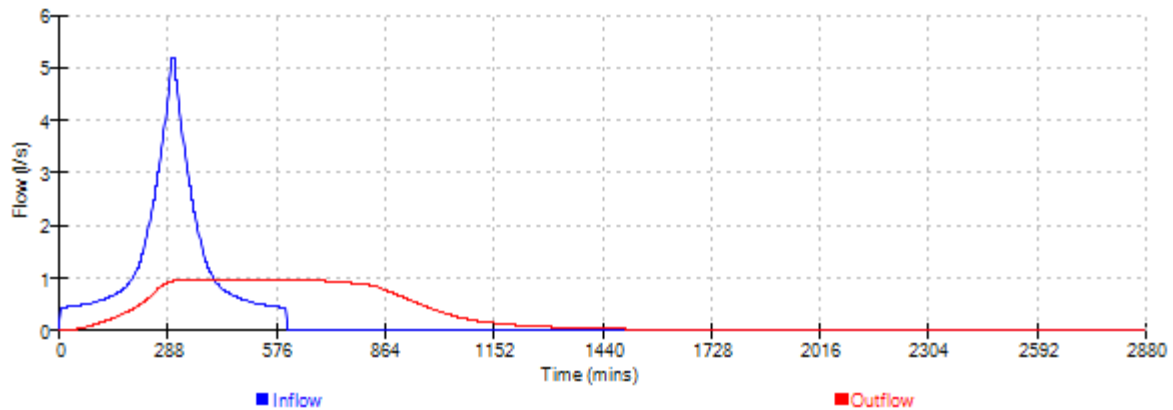
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Event: 480 min Summer



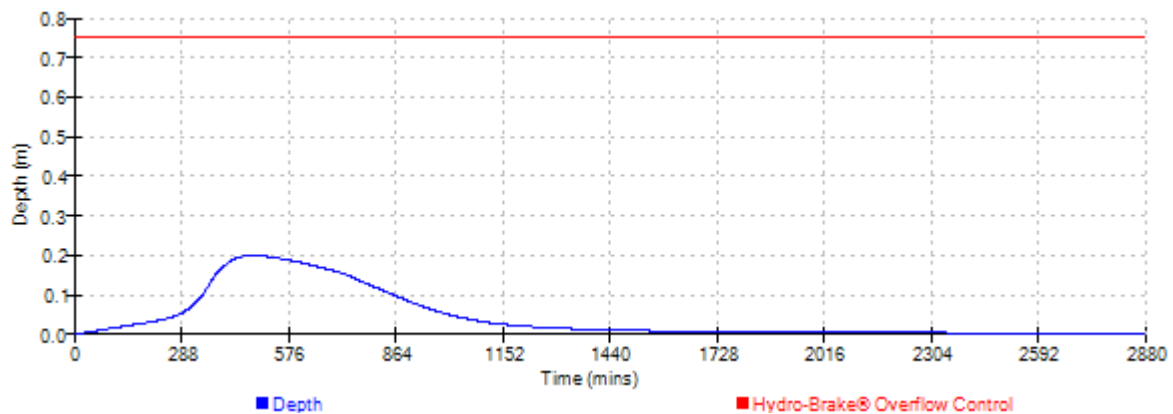
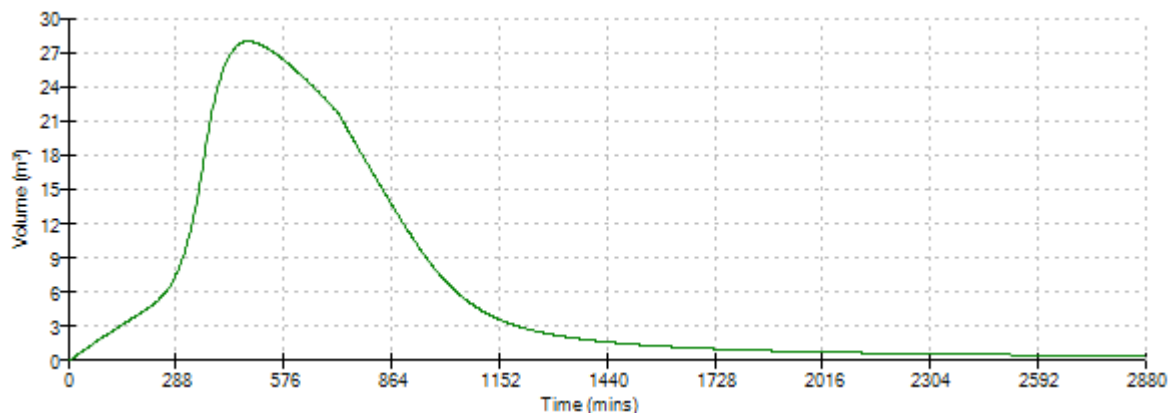
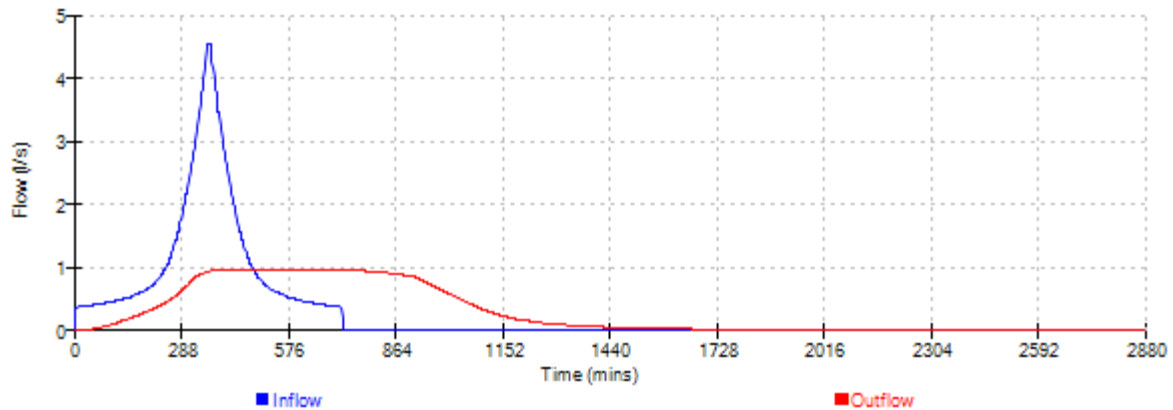
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Event: 600 min Summer



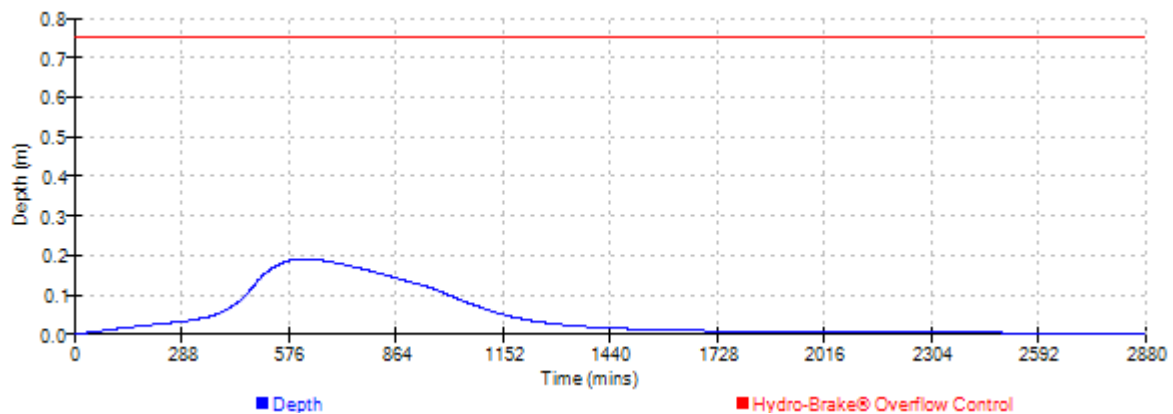
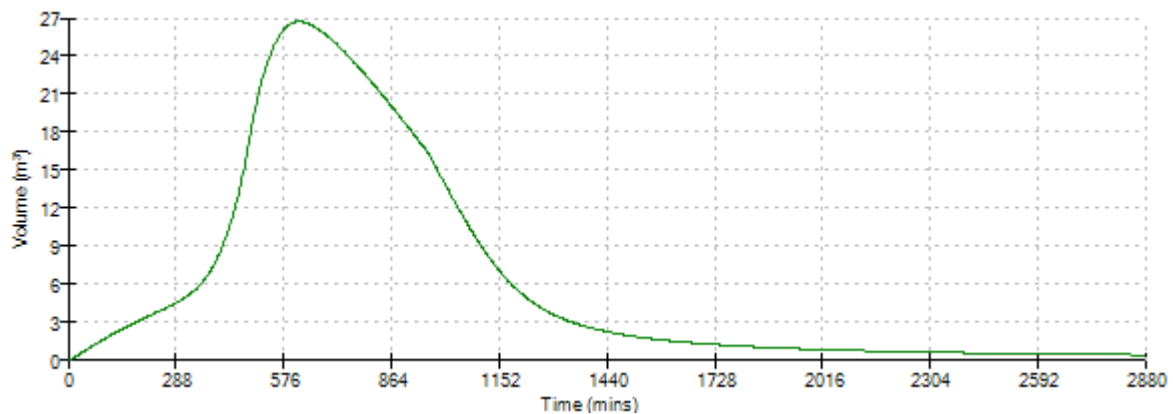
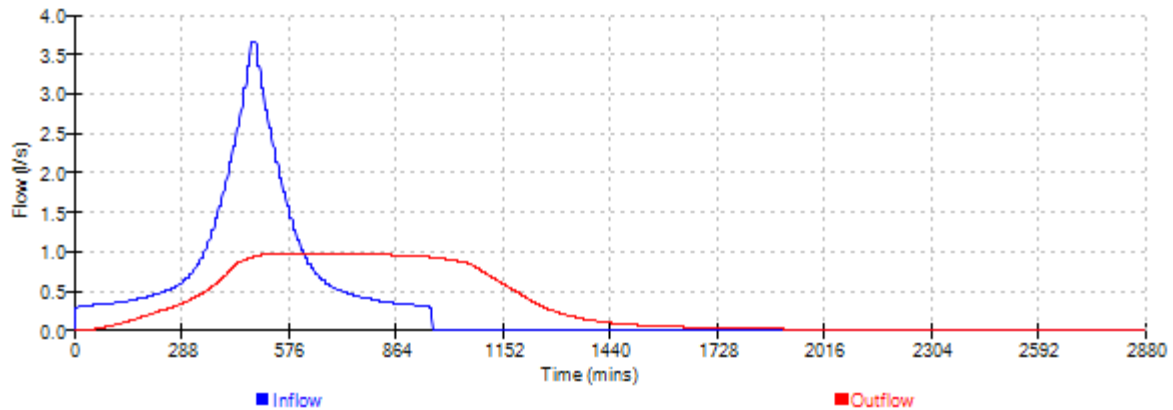
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Event: 720 min Summer



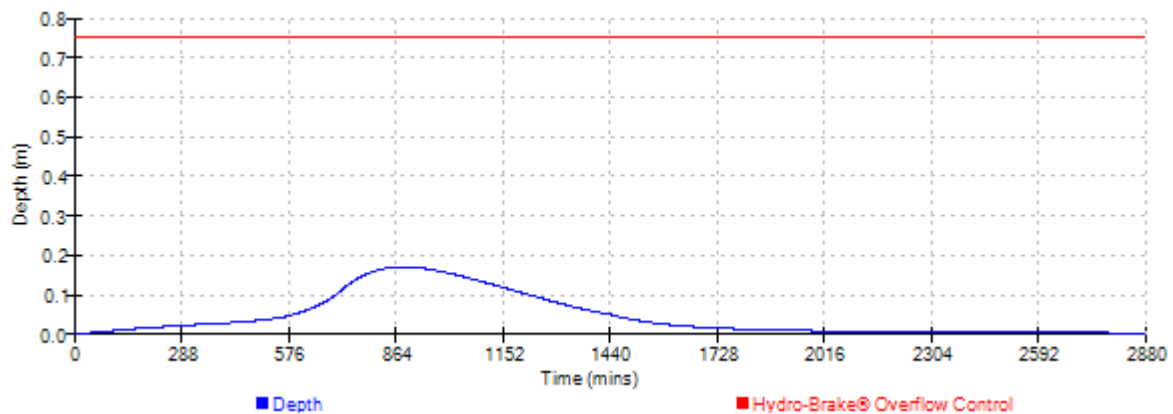
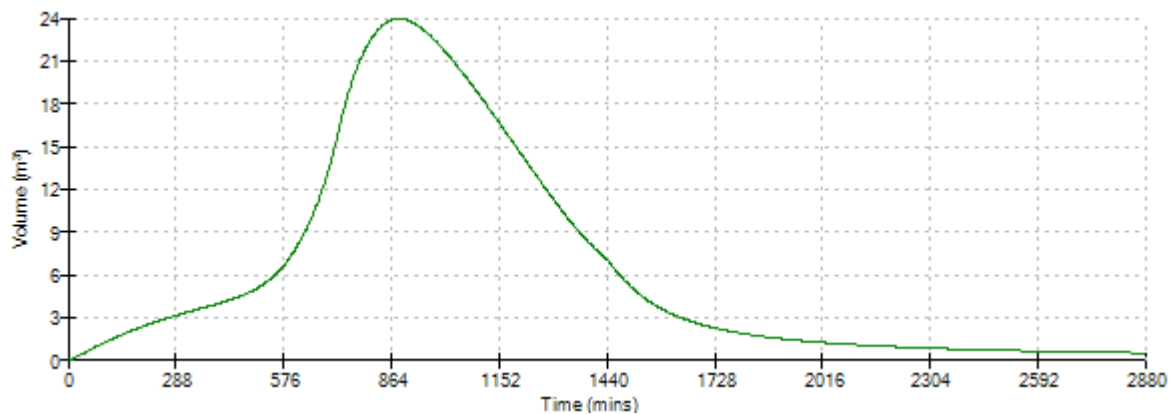
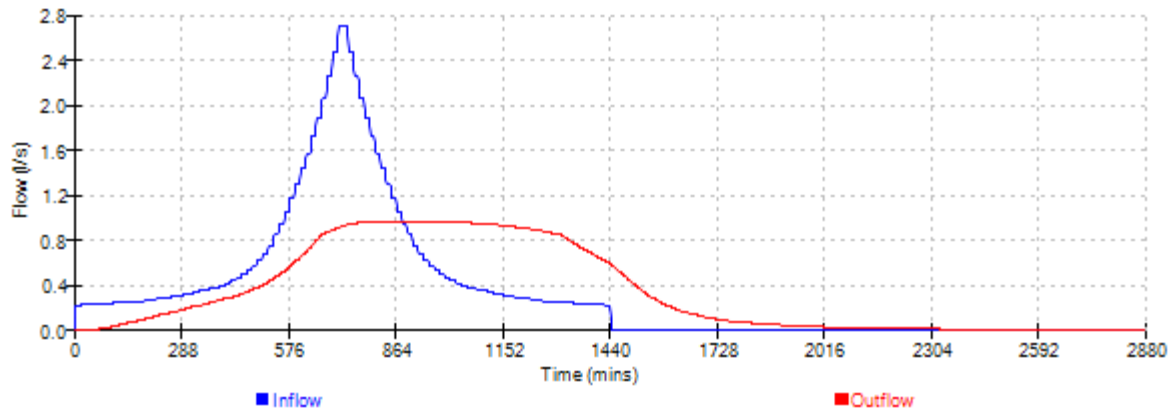
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Event: 960 min Summer



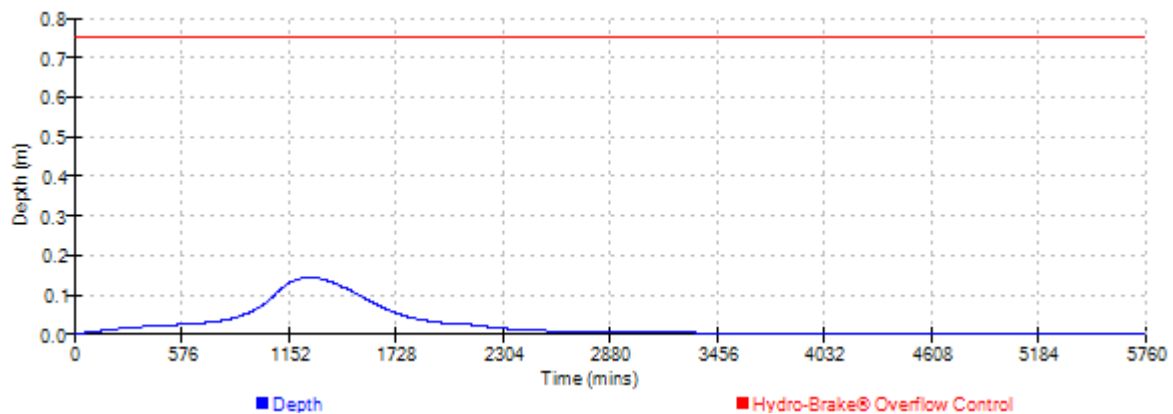
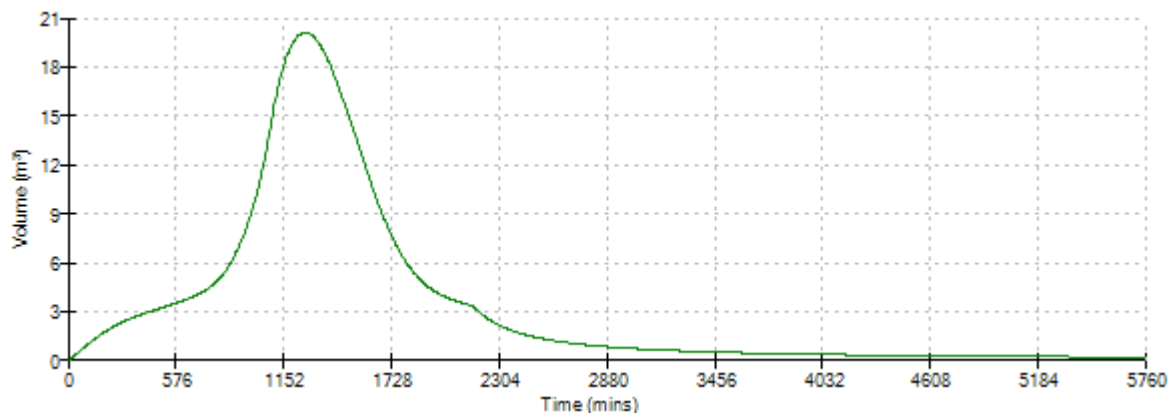
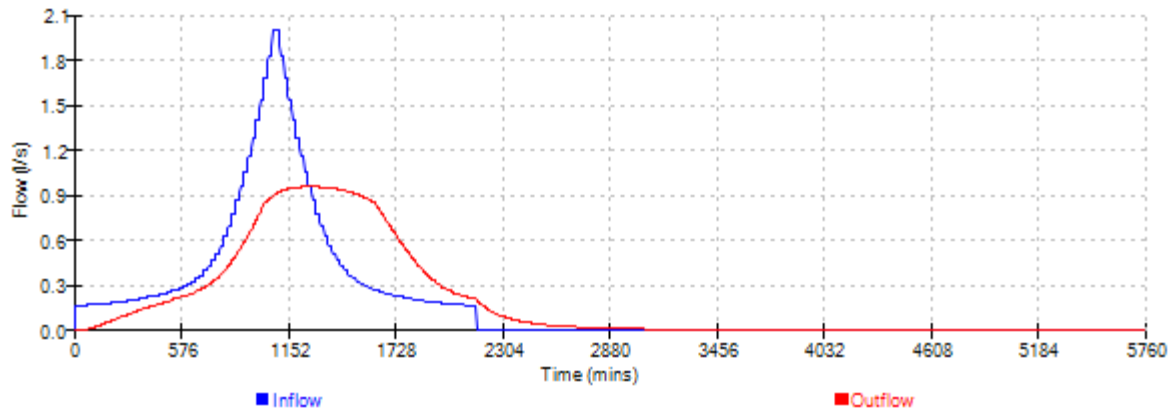
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Event: 1440 min Summer



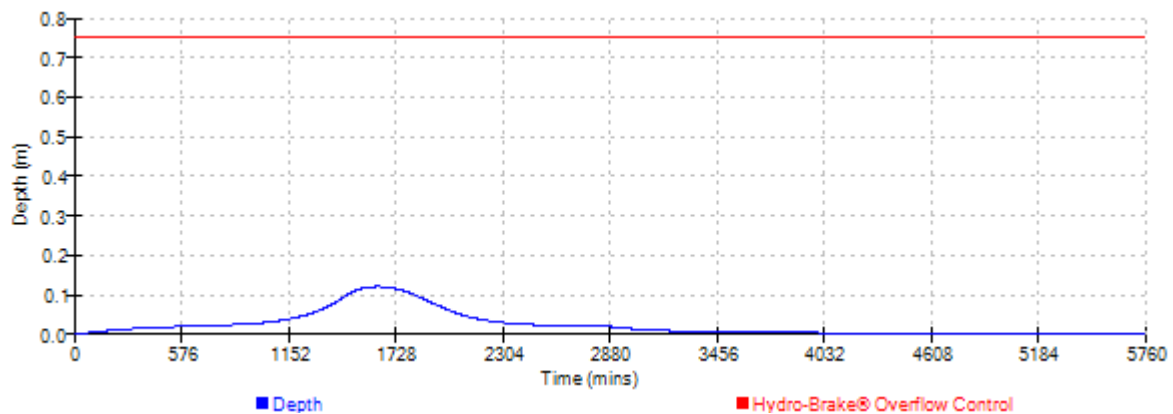
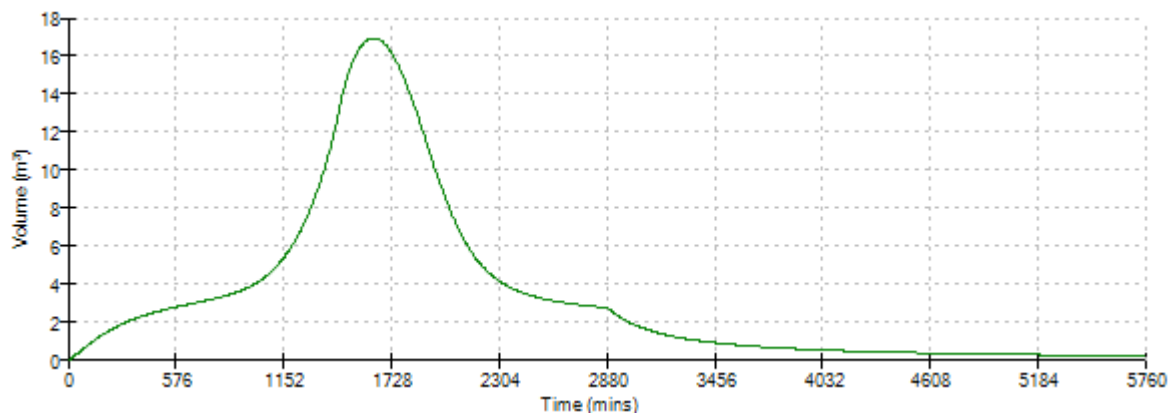
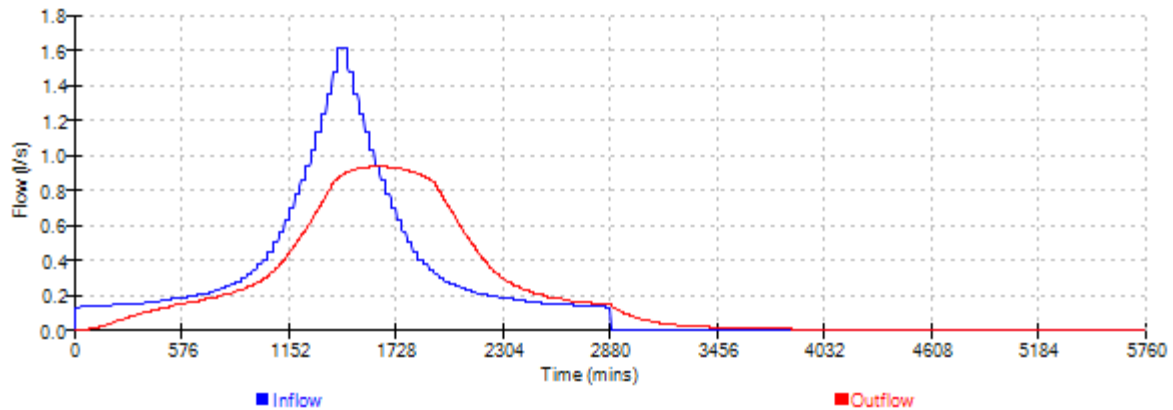
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Event: 2160 min Summer



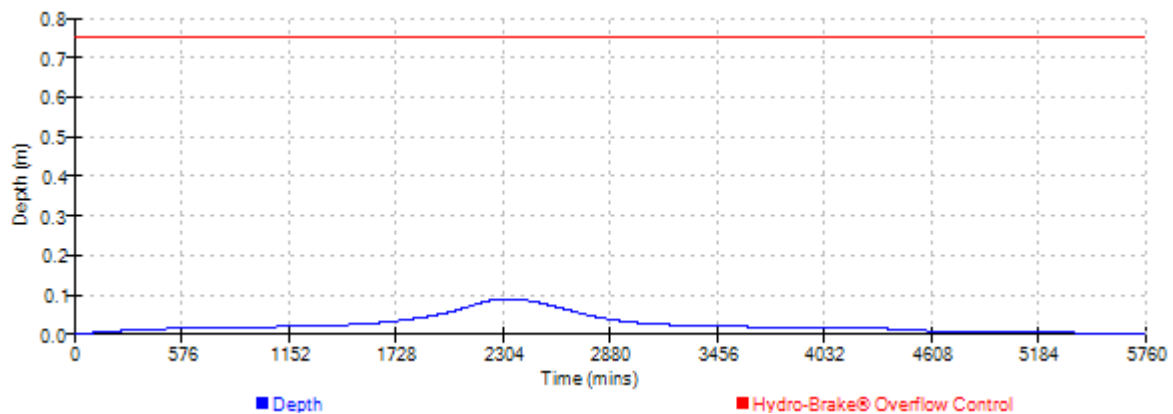
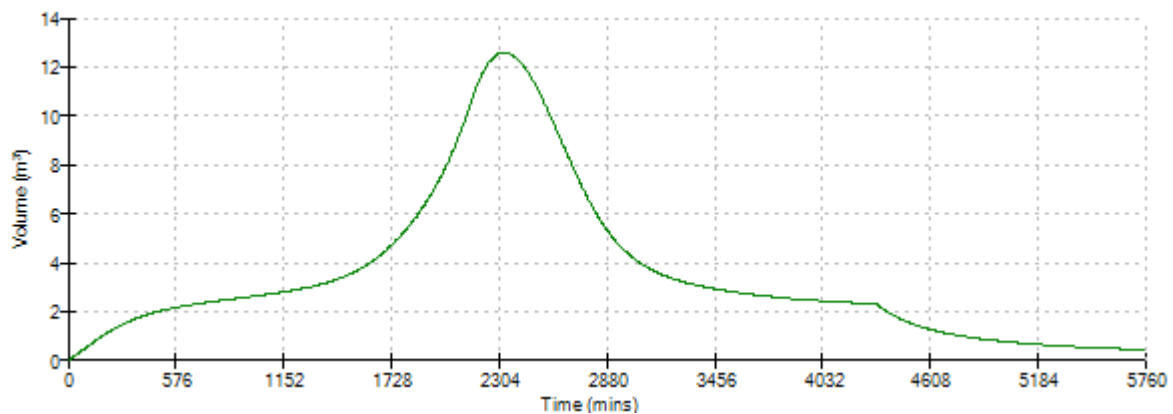
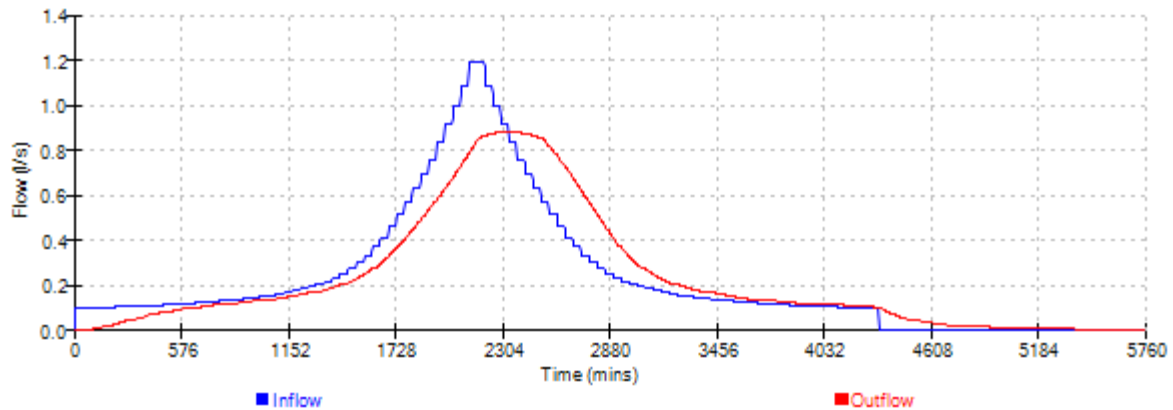
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Event: 2880 min Summer



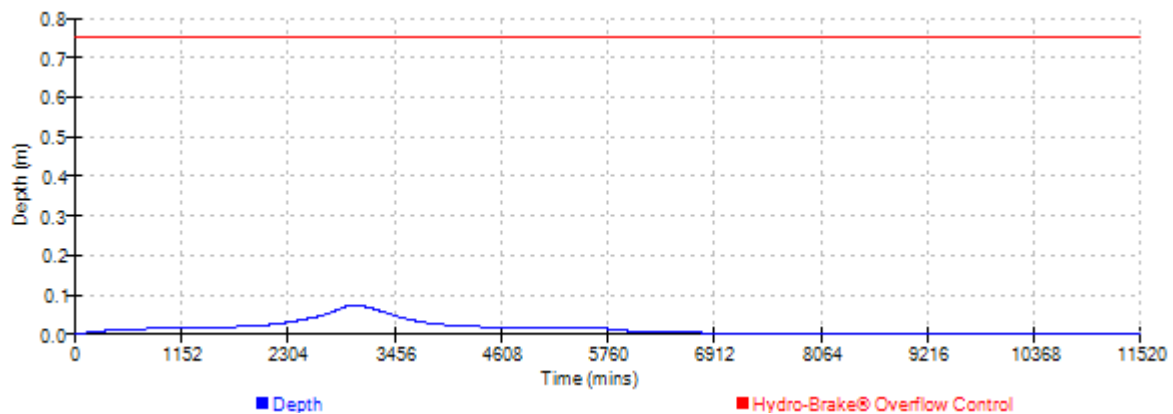
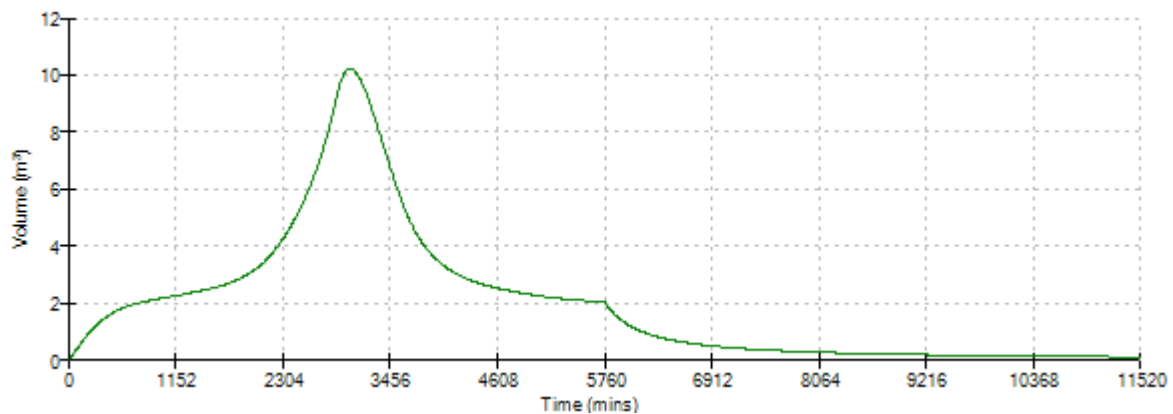
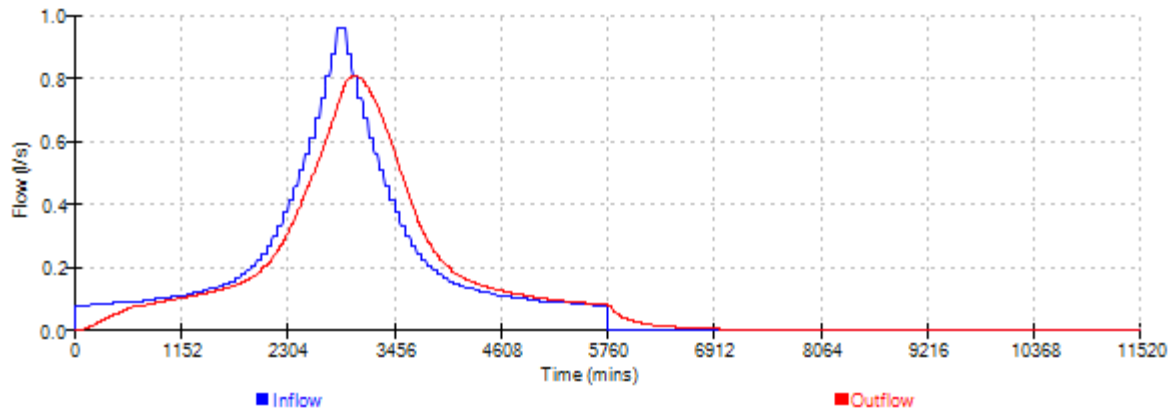
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Event: 4320 min Summer



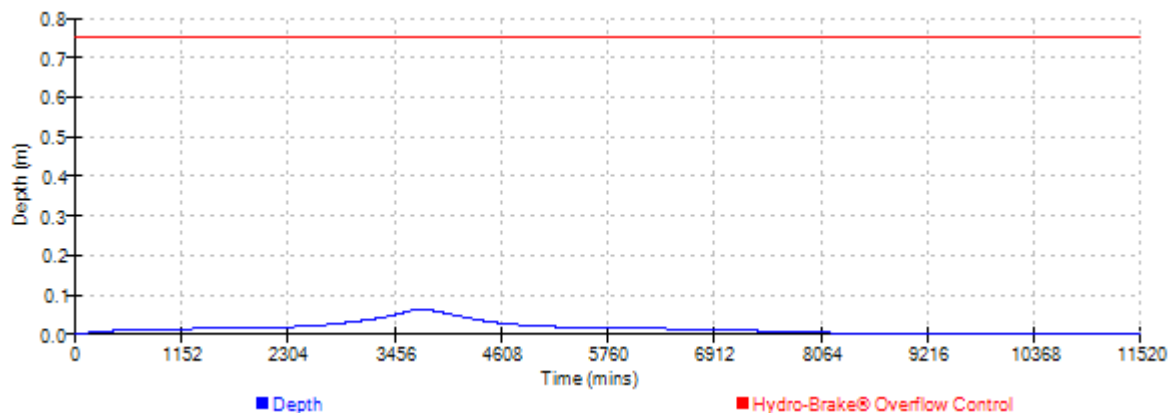
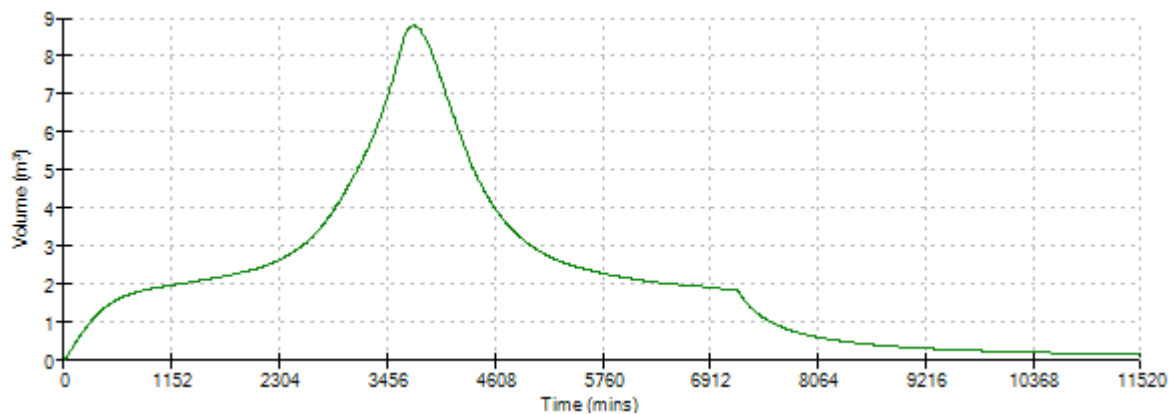
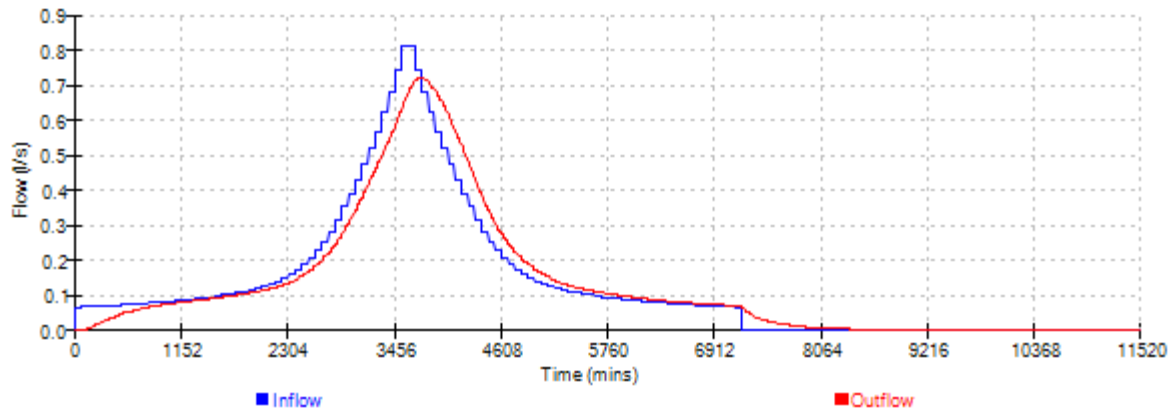
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55 Shepherds Lane Dartford DA1 2NL		
Date 24/01/2023 07:19 File Nutts Lane.SRCX	Designed by sheph Checked by	
Innovyze	Source Control 2020.1	

Event: 5760 min Summer



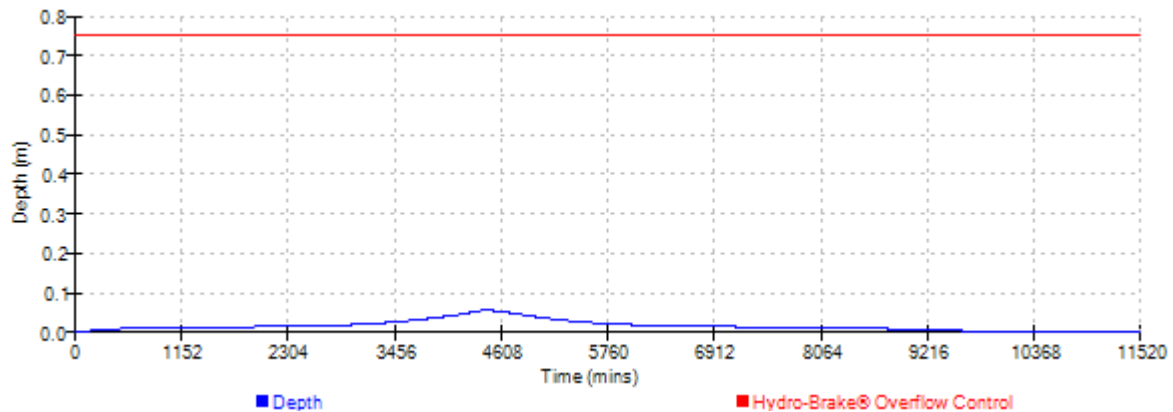
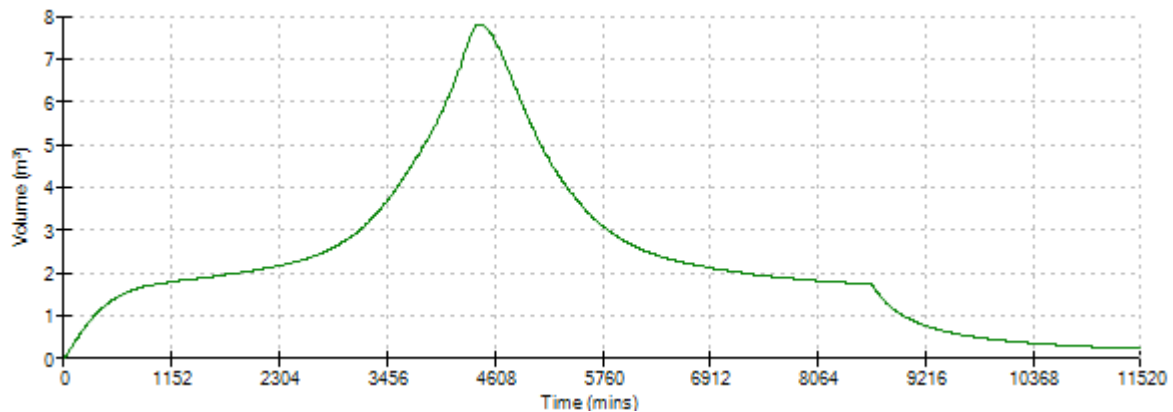
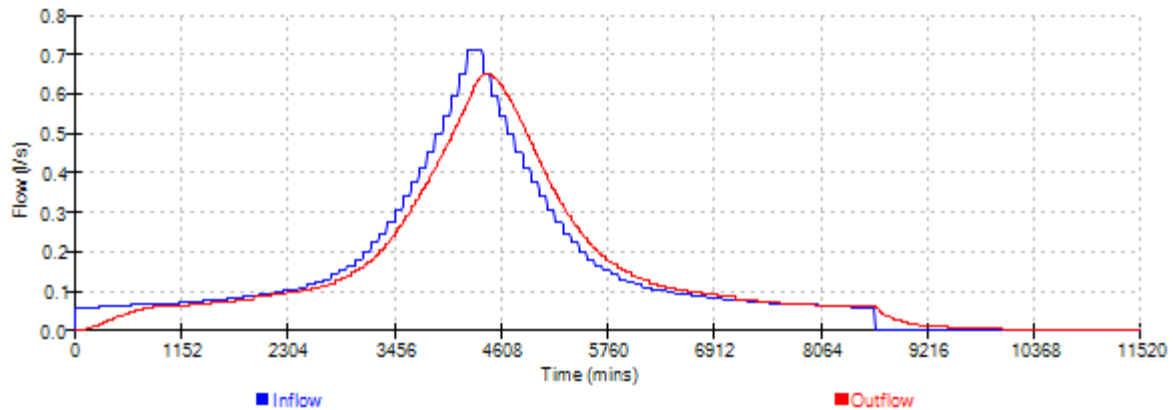
Easy Flood Risk		Page 22
55 Shepherds Lane Dartford DA1 2NL		
Date 24/01/2023 07:19 File Nutts Lane.SRCX	Designed by sheph Checked by	
Innovyze	Source Control 2020.1	

Event: 7200 min Summer



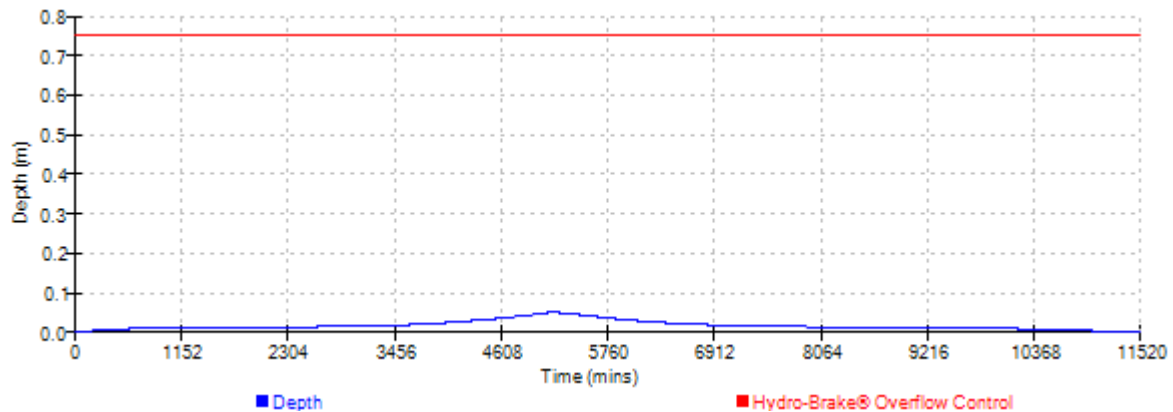
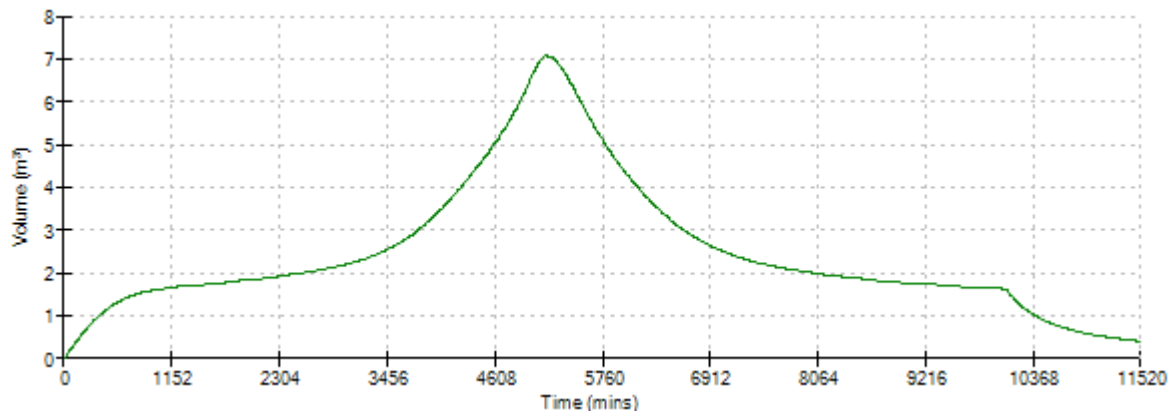
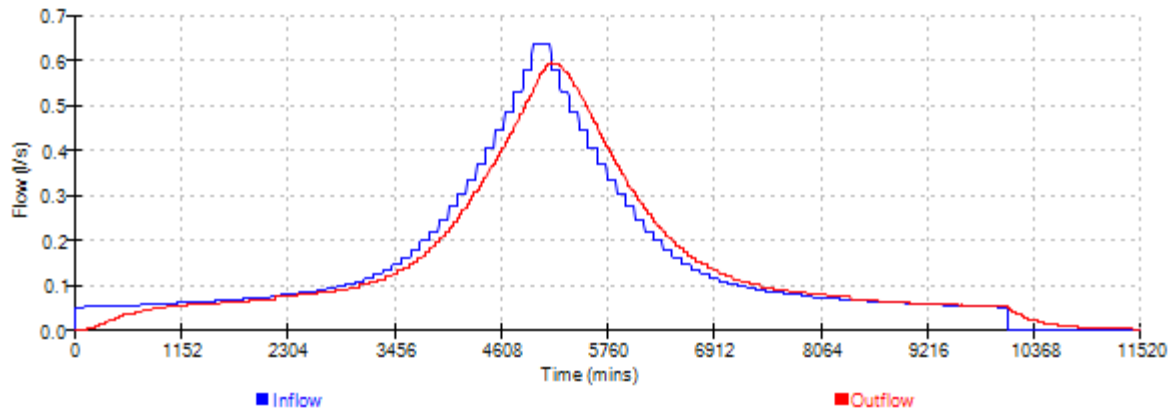
Easy Flood Risk		Page 23
55 Shepherds Lane Dartford DA1 2NL		
Date 24/01/2023 07:19 File Nutts Lane.SRCX	Designed by sheph Checked by	
Innovyze	Source Control 2020.1	

Event: 8640 min Summer



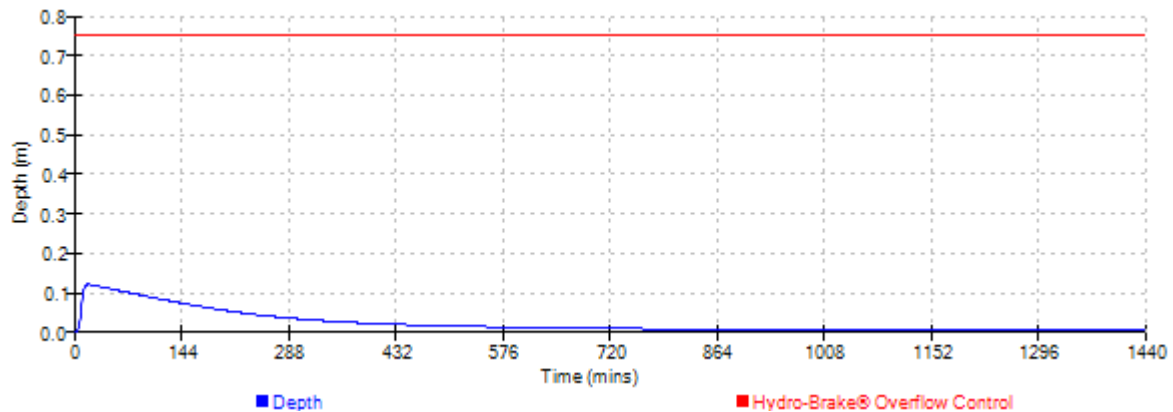
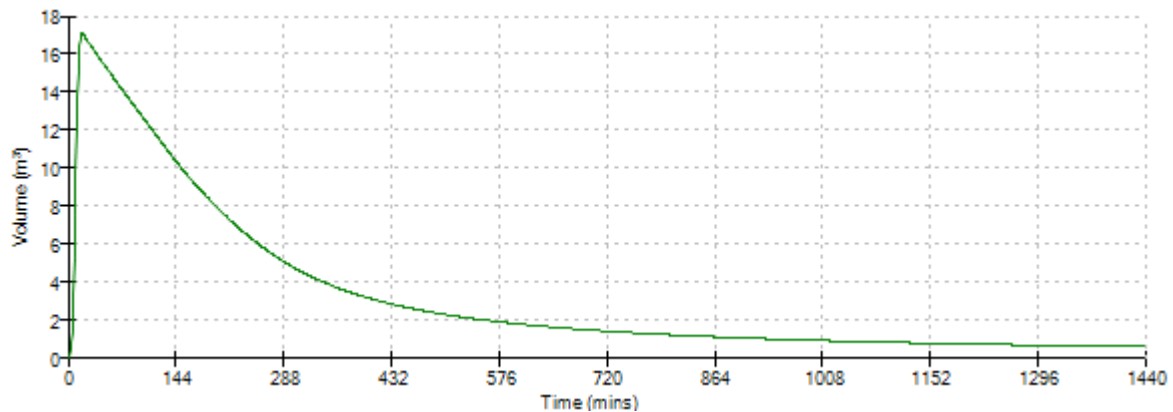
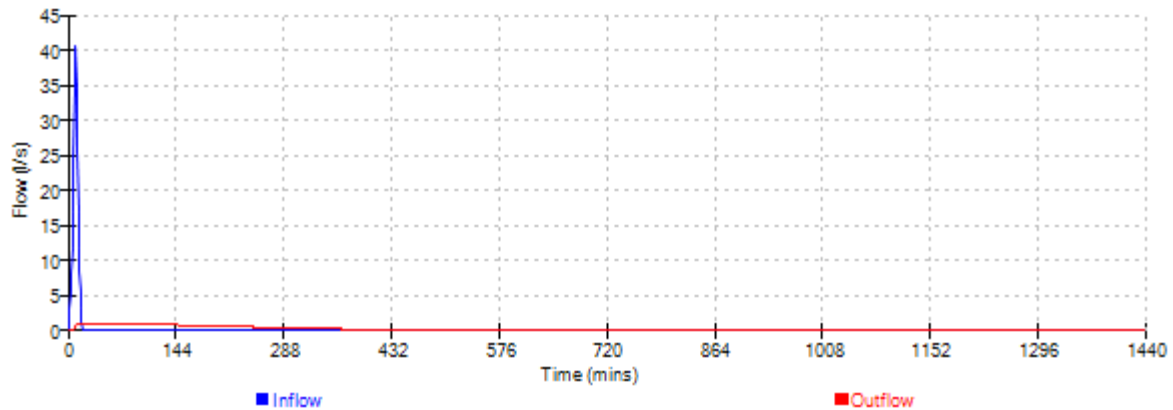
Easy Flood Risk		Page 24
55 Shepherds Lane Dartford DA1 2NL		
Date 24/01/2023 07:19 File Nutts Lane.SRCX	Designed by sheph Checked by	
Innovyze	Source Control 2020.1	

Event: 10080 min Summer



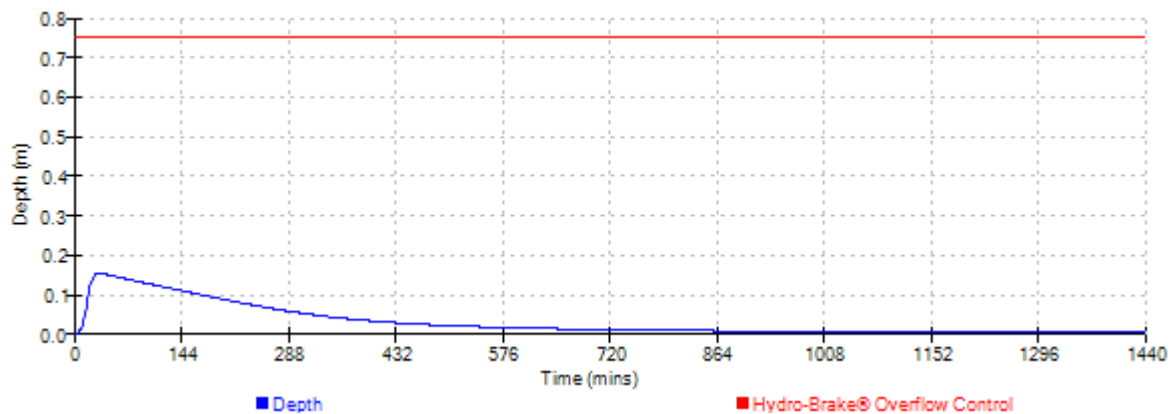
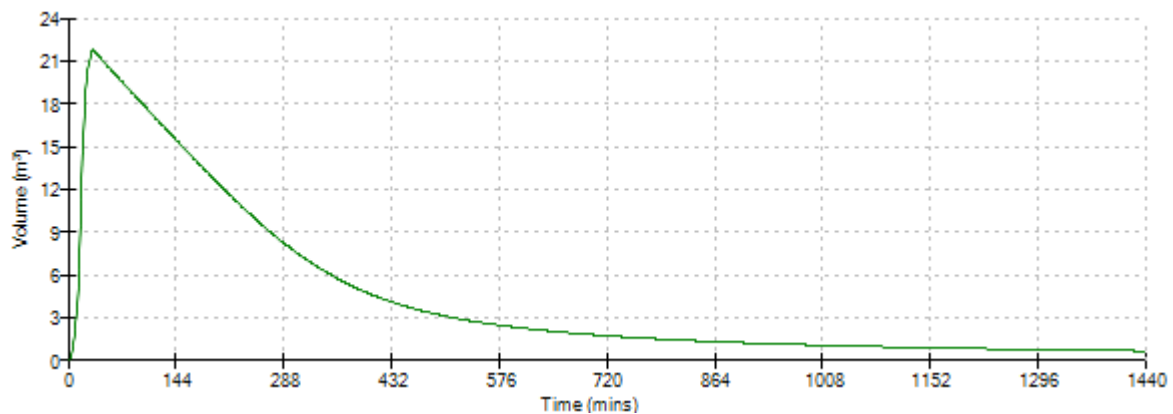
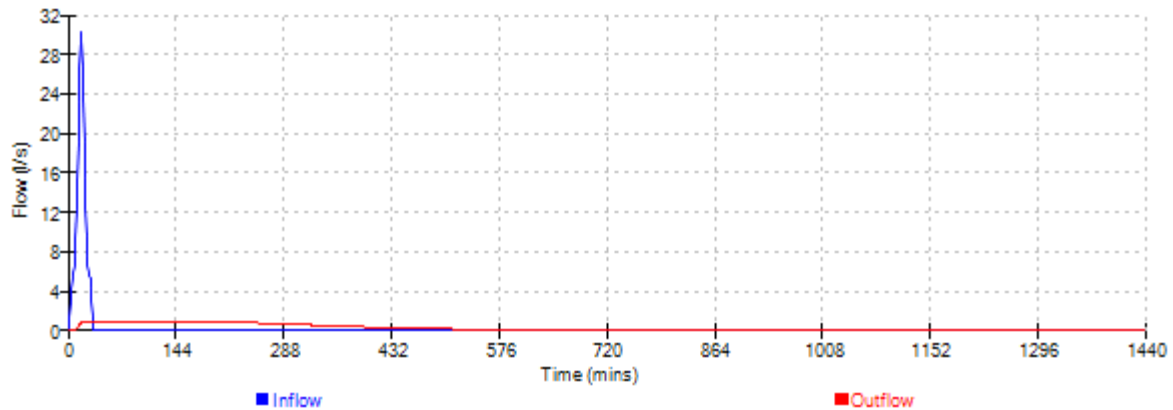
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55 Shepherds Lane Dartford DA1 2NL		
Date 24/01/2023 07:19 File Nutts Lane.SRCX	Designed by sheph Checked by	
Innovyze	Source Control 2020.1	

Event: 15 min Winter



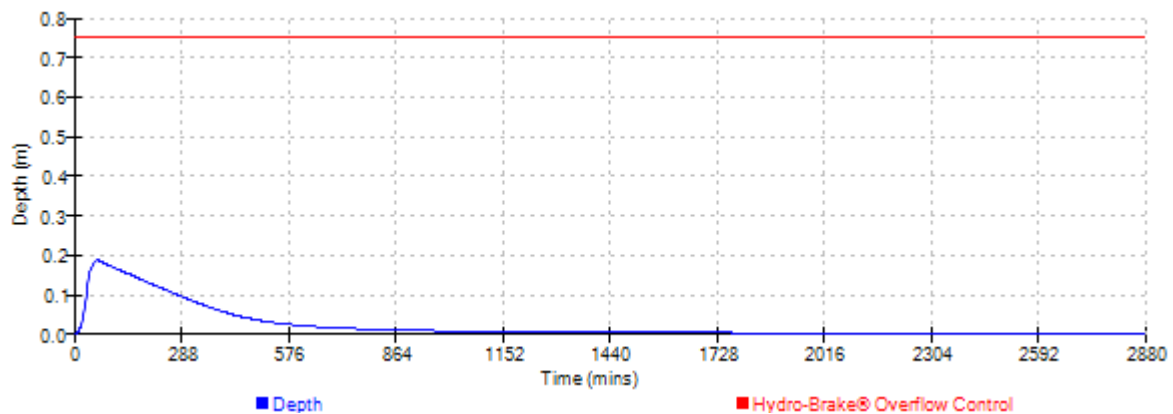
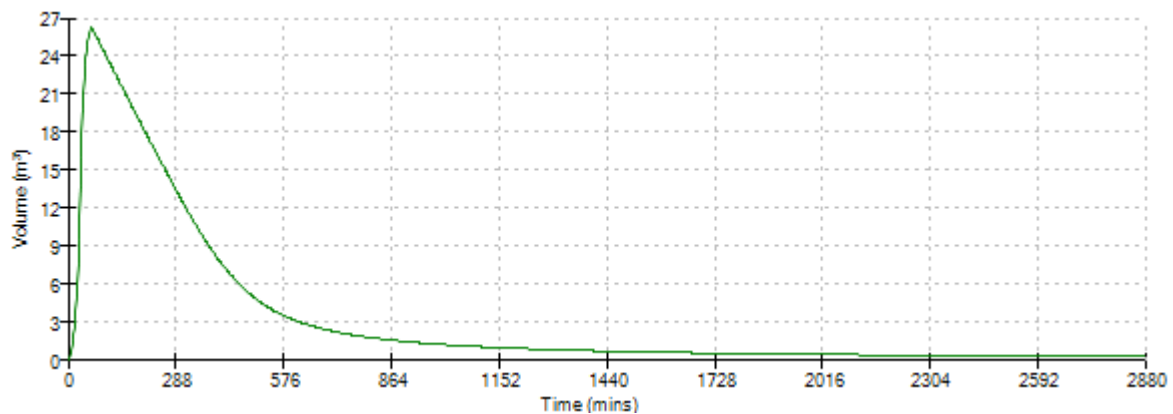
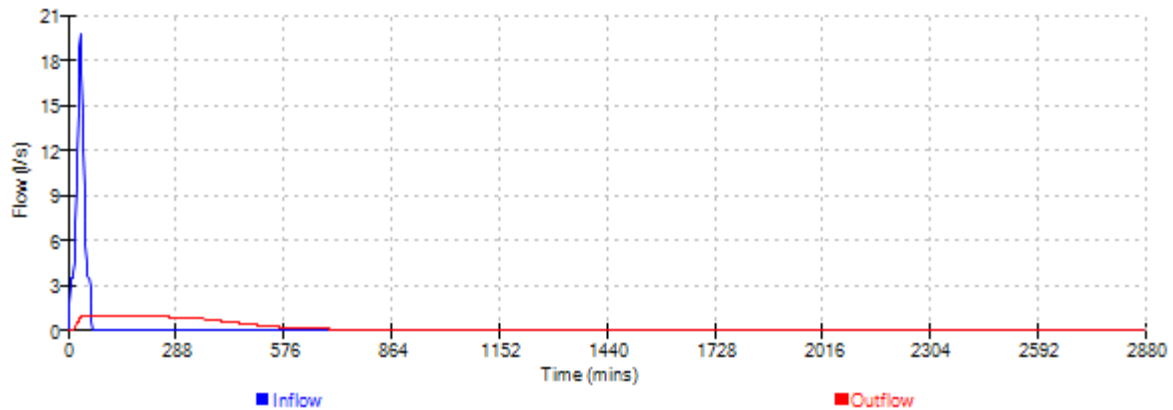
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55 Shepherds Lane Dartford DA1 2NL		
Date 24/01/2023 07:19 File Nutts Lane.SRCX	Designed by sheph Checked by	
Innovyze	Source Control 2020.1	

Event: 30 min Winter



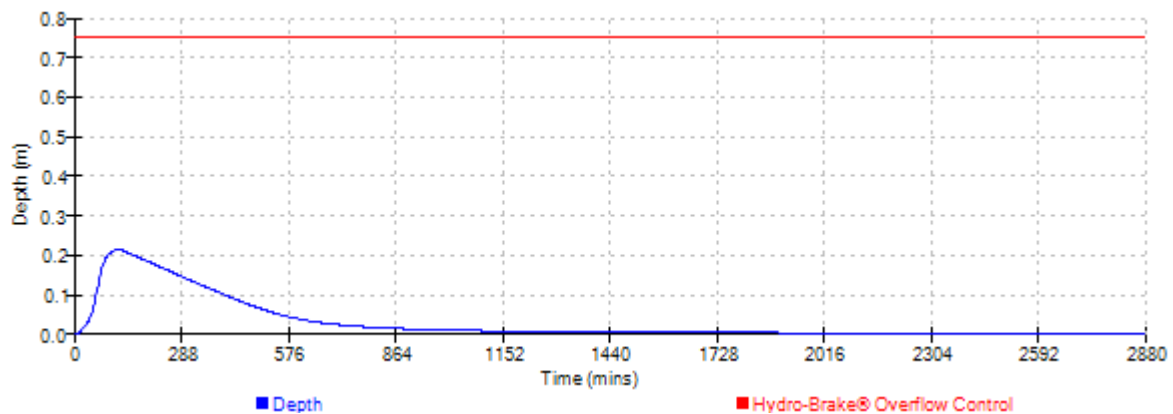
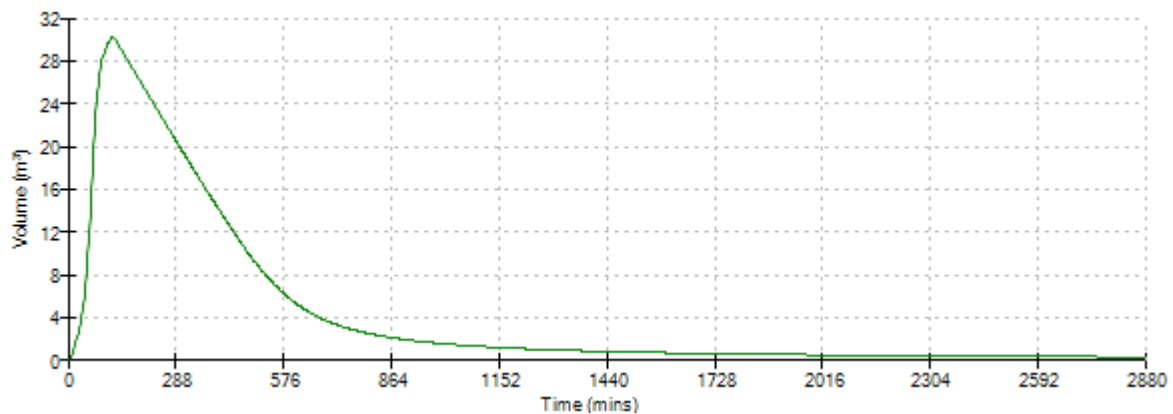
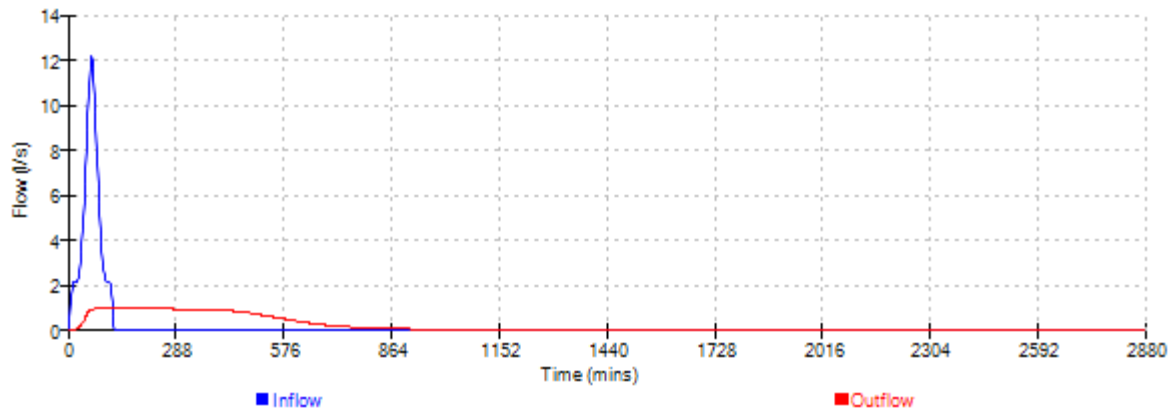
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55 Shepherds Lane Dartford DA1 2NL		
Date 24/01/2023 07:19 File Nutts Lane.SRCX	Designed by sheph Checked by	
Innovyze	Source Control 2020.1	

Event: 60 min Winter



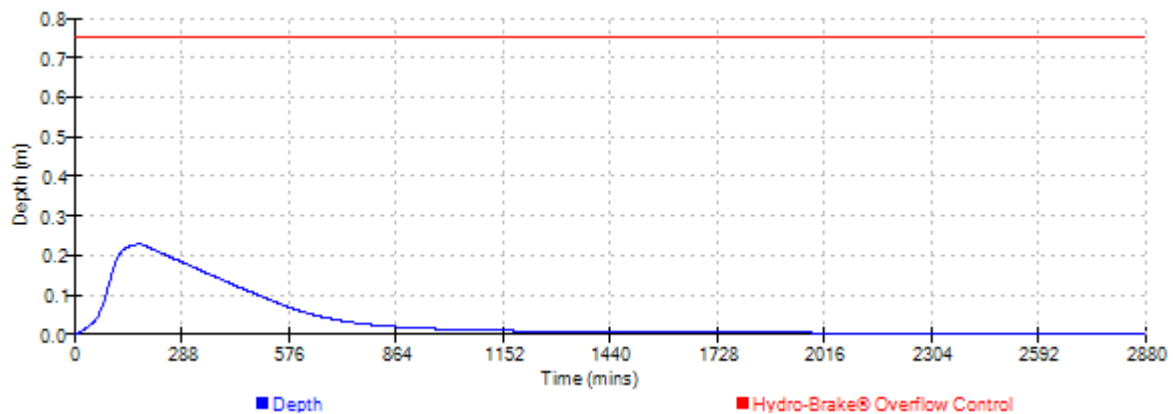
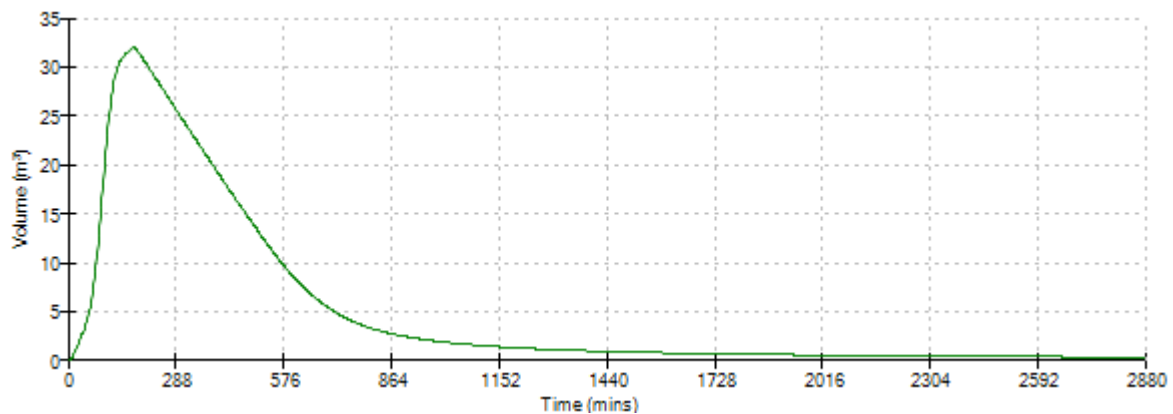
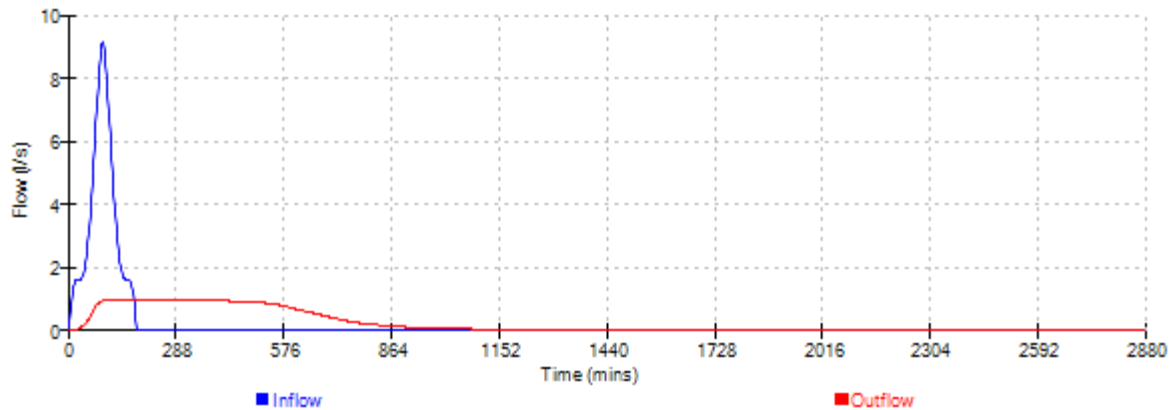
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55 Shepherds Lane Dartford DA1 2NL		
Date 24/01/2023 07:19 File Nutts Lane.SRCX	Designed by sheph Checked by	
Innovyze	Source Control 2020.1	

Event: 120 min Winter



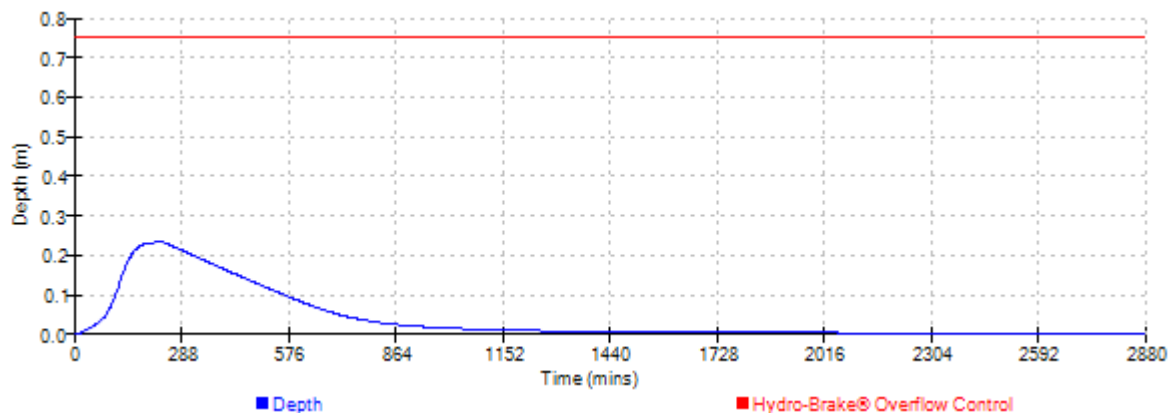
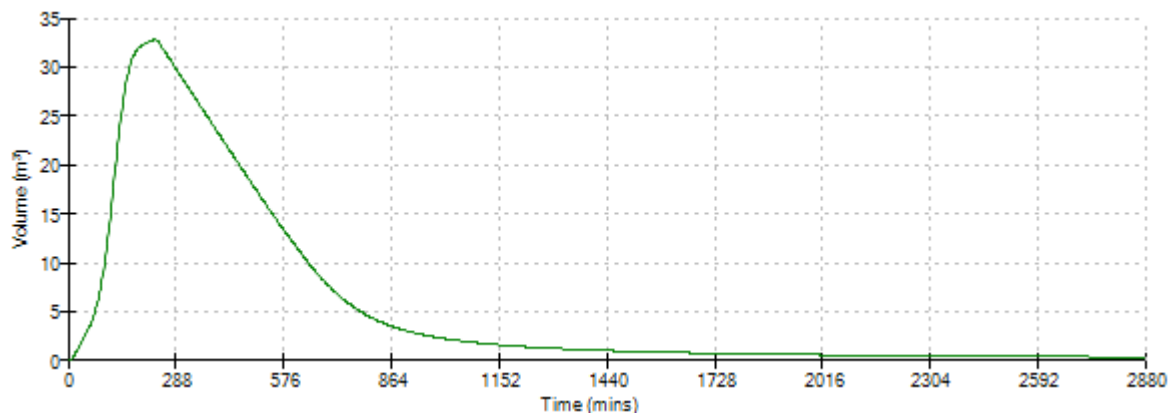
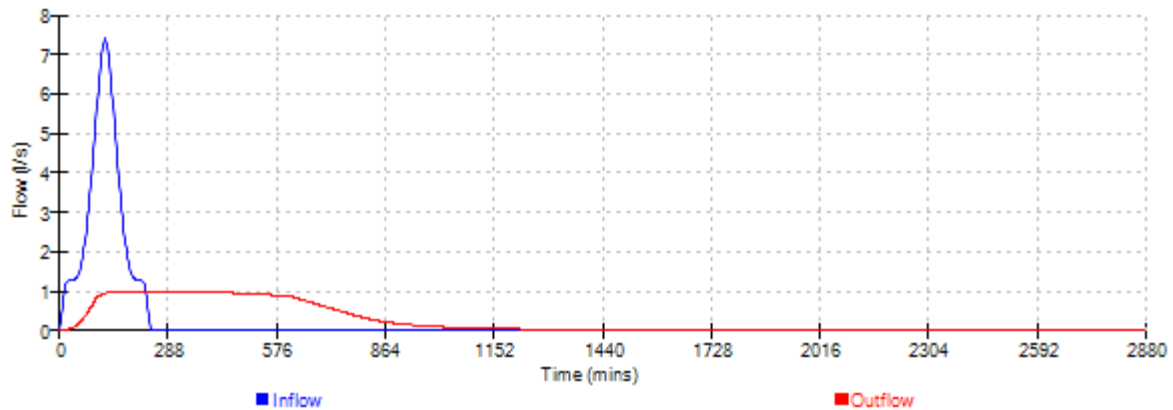
Easy Flood Risk		Page 29
55 Shepherds Lane Dartford DA1 2NL		
Date 24/01/2023 07:19 File Nutts Lane.SRCX	Designed by sheph Checked by	
Innovyze	Source Control 2020.1	

Event: 180 min Winter



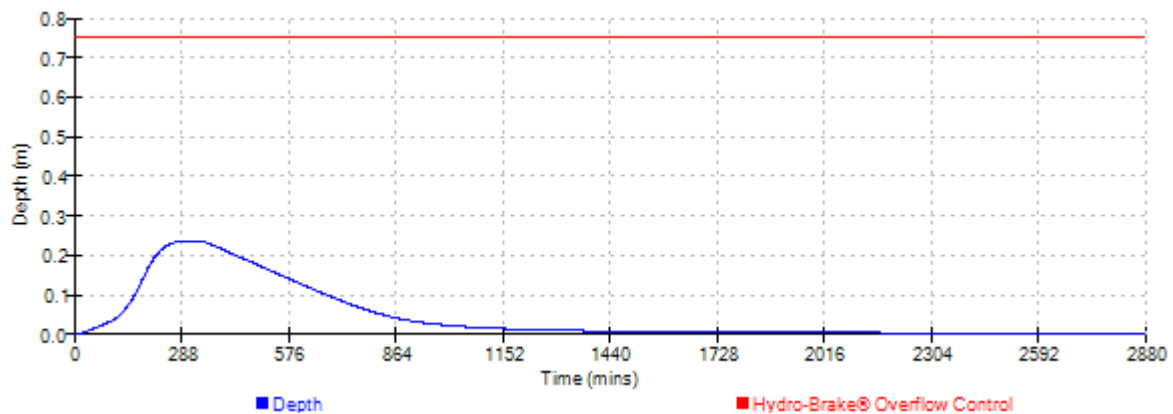
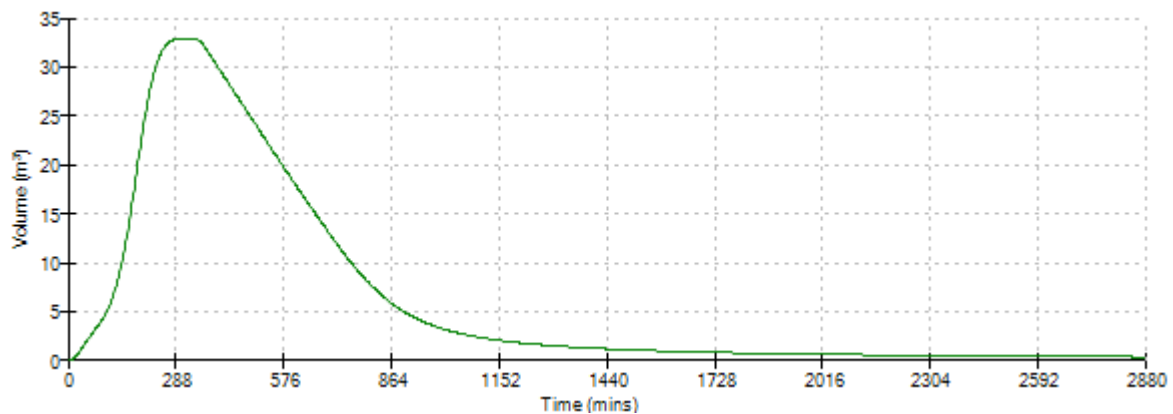
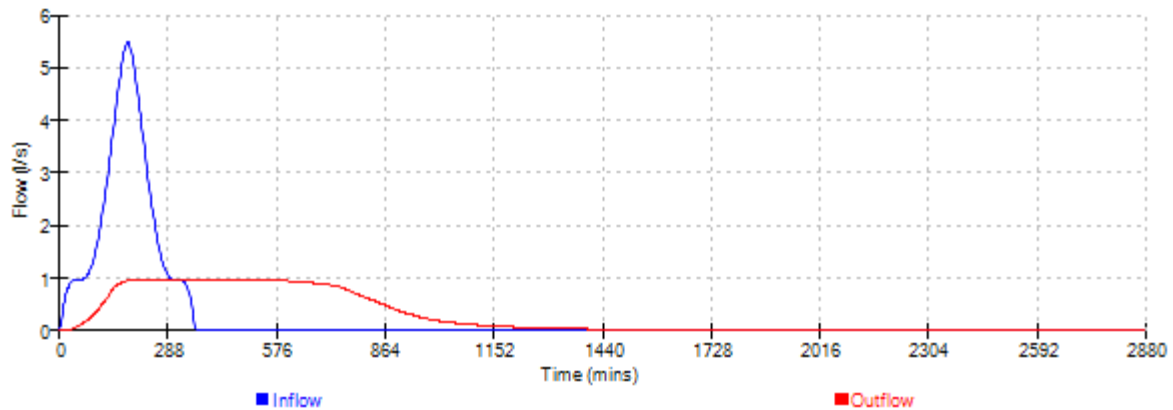
Easy Flood Risk		Page 30
55 Shepherds Lane Dartford DA1 2NL		
Date 24/01/2023 07:19 File Nutts Lane.SRCX	Designed by sheph Checked by	
Innovyze	Source Control 2020.1	

Event: 240 min Winter



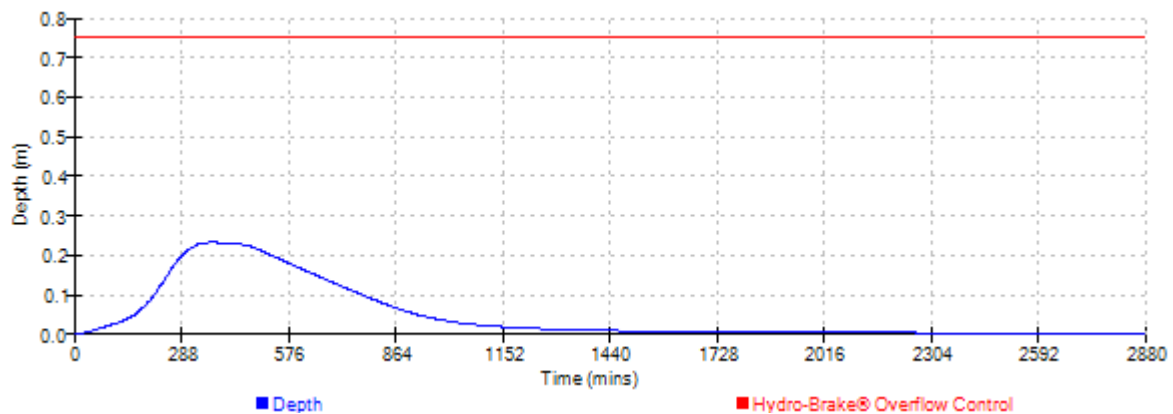
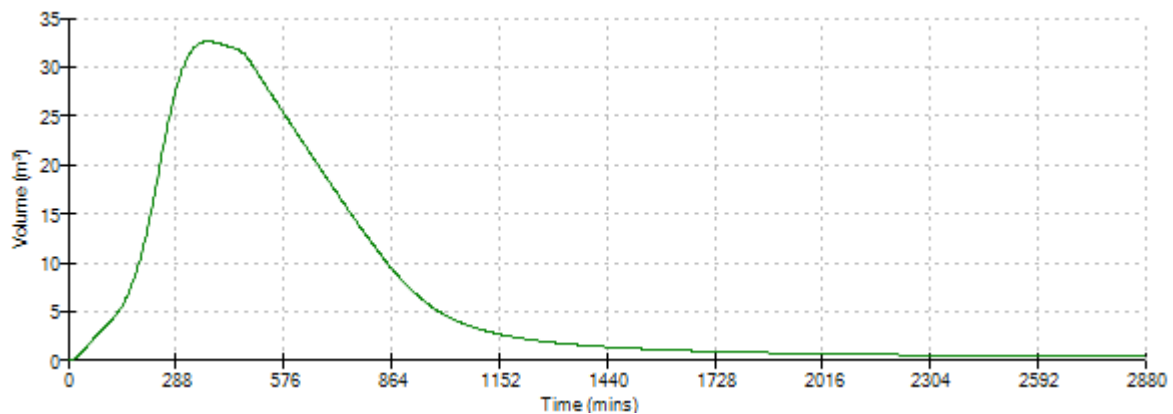
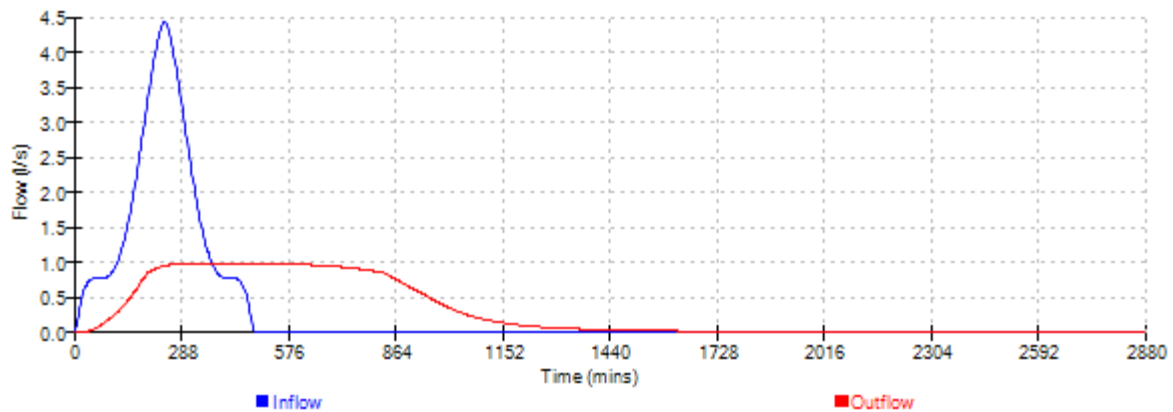
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55 Shepherds Lane Dartford DA1 2NL		
Date 24/01/2023 07:19 File Nutts Lane.SRCX	Designed by sheph Checked by	
Innovyze	Source Control 2020.1	

Event: 360 min Winter



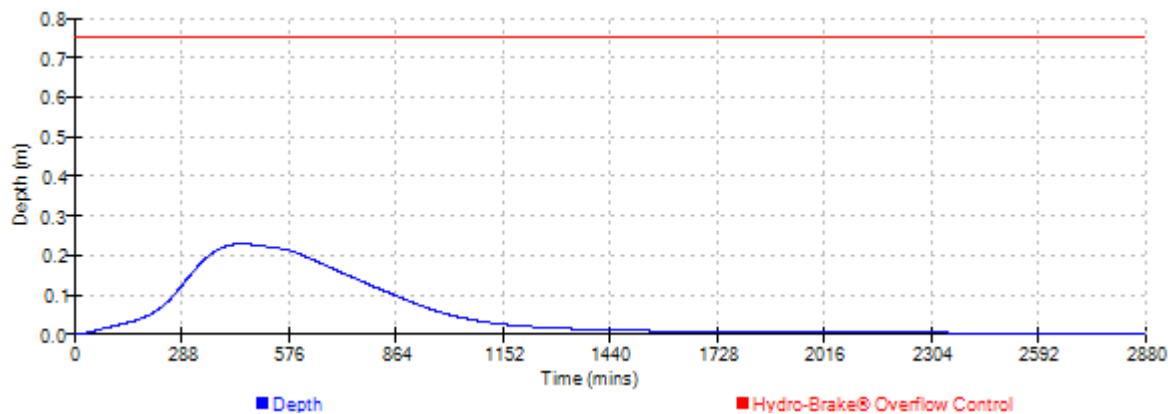
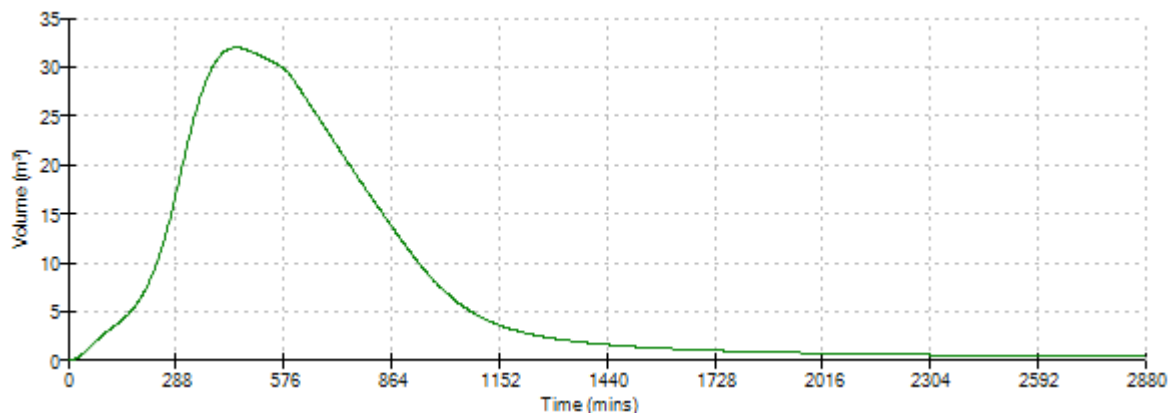
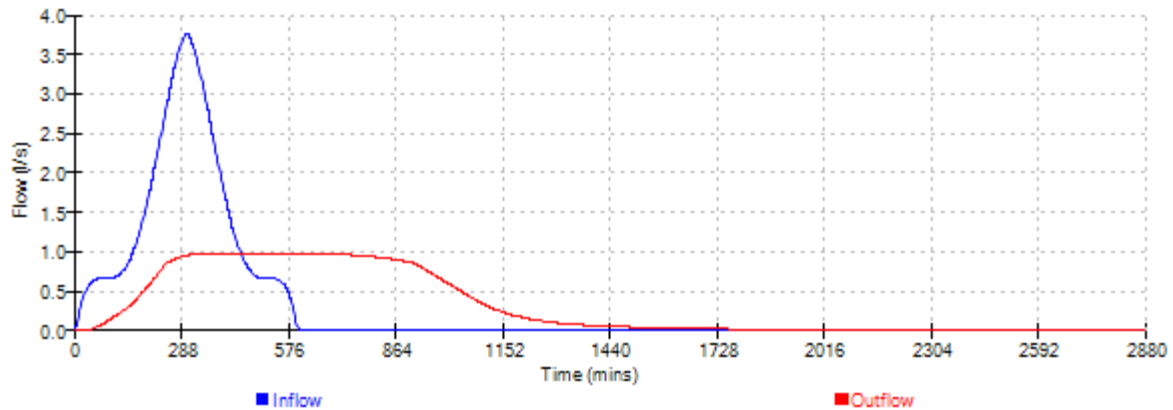
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55 Shepherds Lane Dartford DA1 2NL		
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Innovyze	Source Control 2020.1	

Event: 480 min Winter



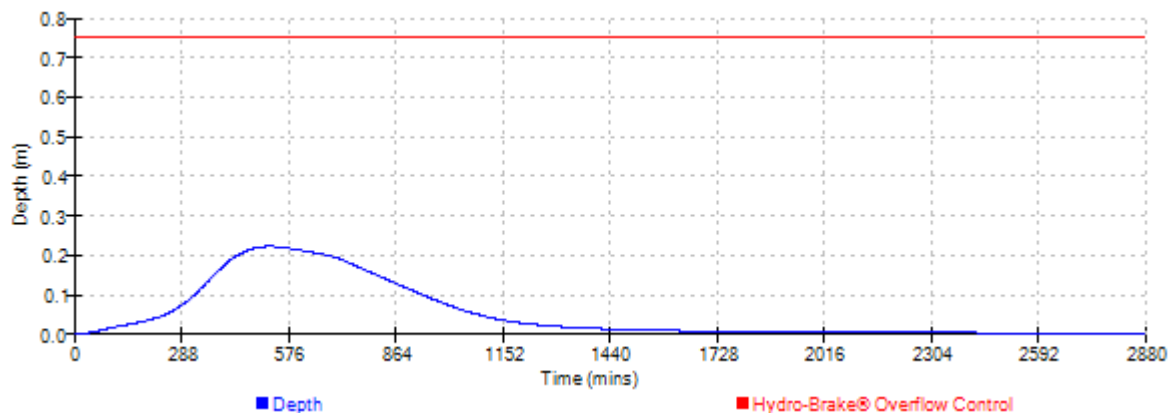
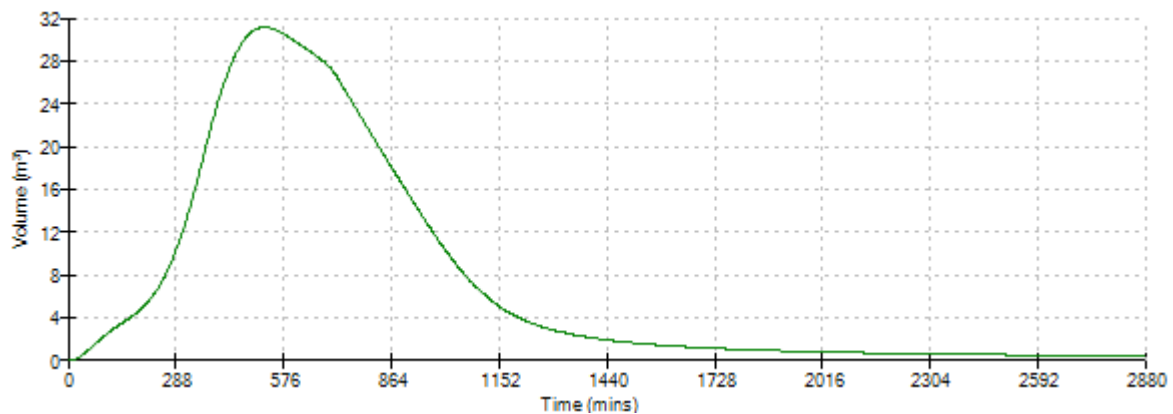
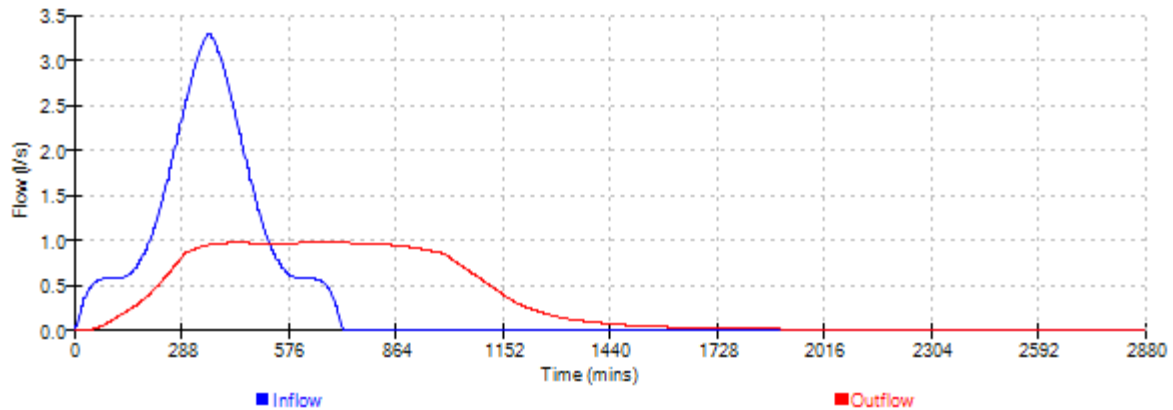
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55 Shepherds Lane Dartford DA1 2NL		
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Innovyze	Source Control 2020.1	

Event: 600 min Winter



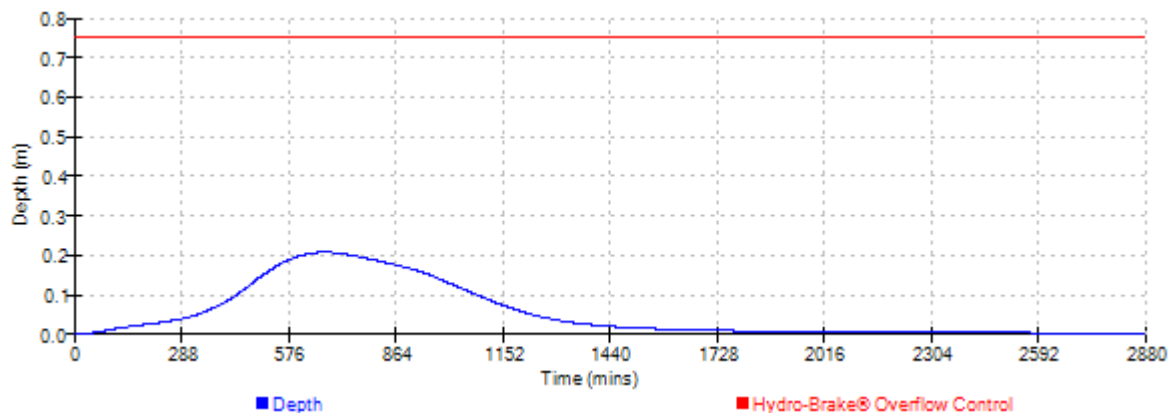
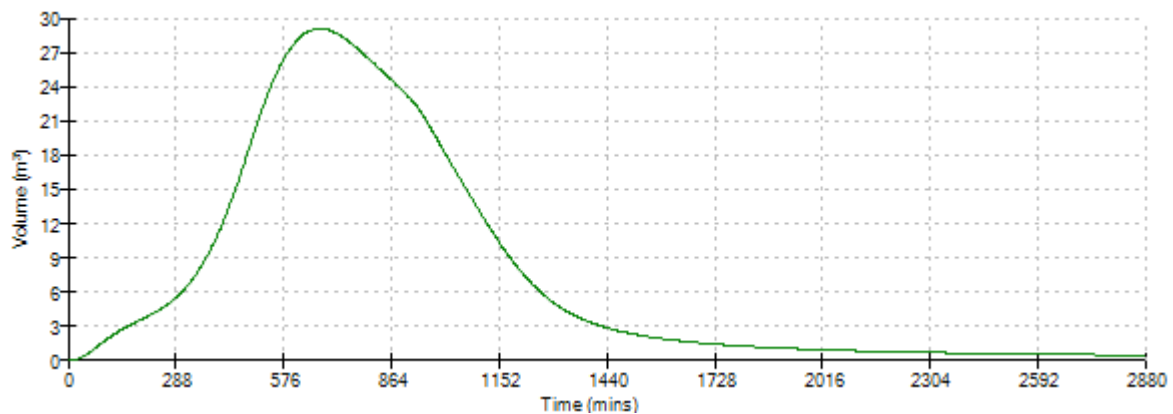
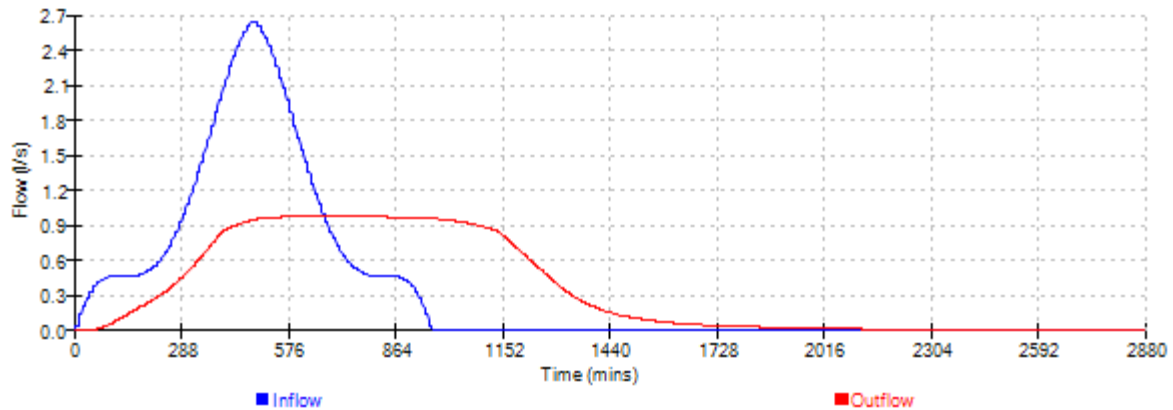
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55 Shepherds Lane Dartford DA1 2NL		
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Innovyze		Source Control 2020.1

Event: 720 min Winter



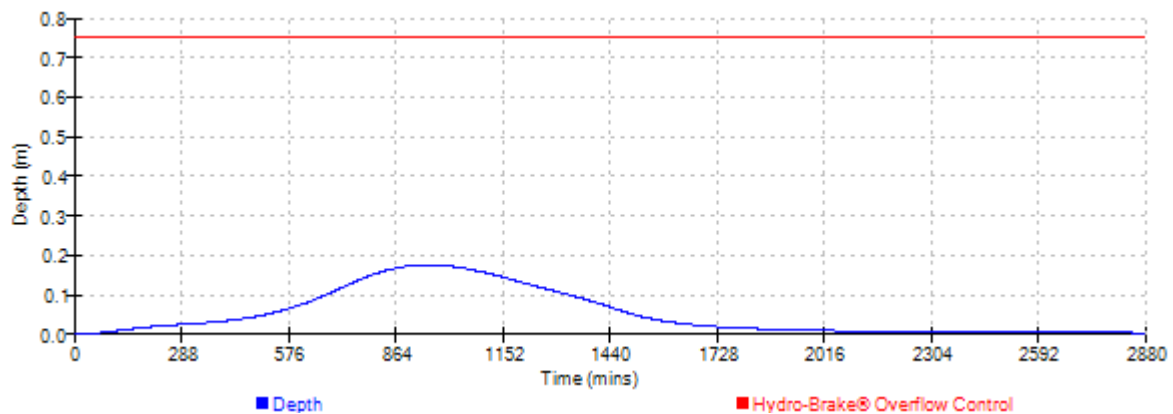
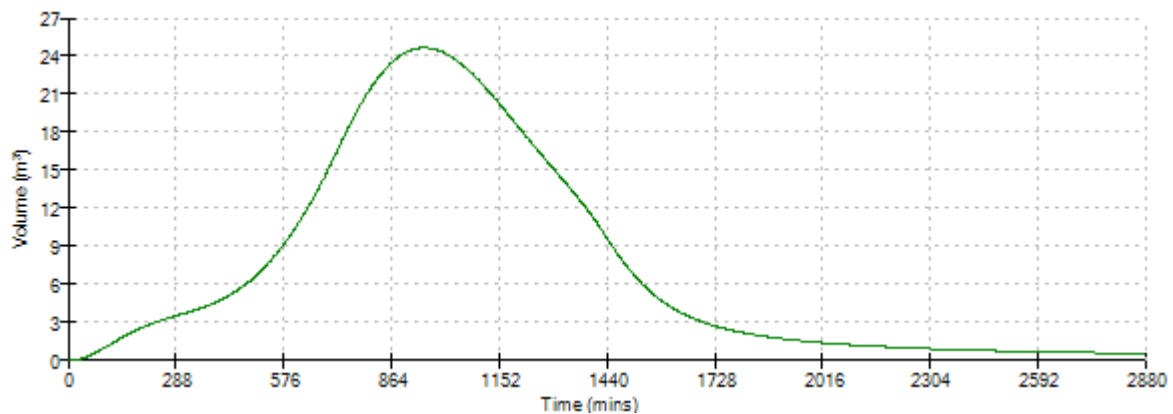
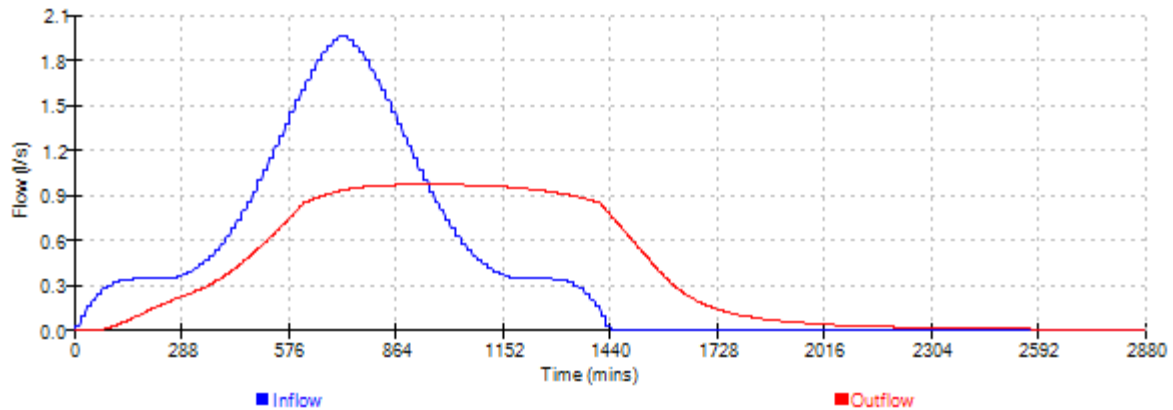
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55 Shepherds Lane Dartford DA1 2NL		
Date 24/01/2023 07:19 File Nutts Lane.SRCX	Designed by sheph Checked by	
Innovyze	Source Control 2020.1	

Event: 960 min Winter



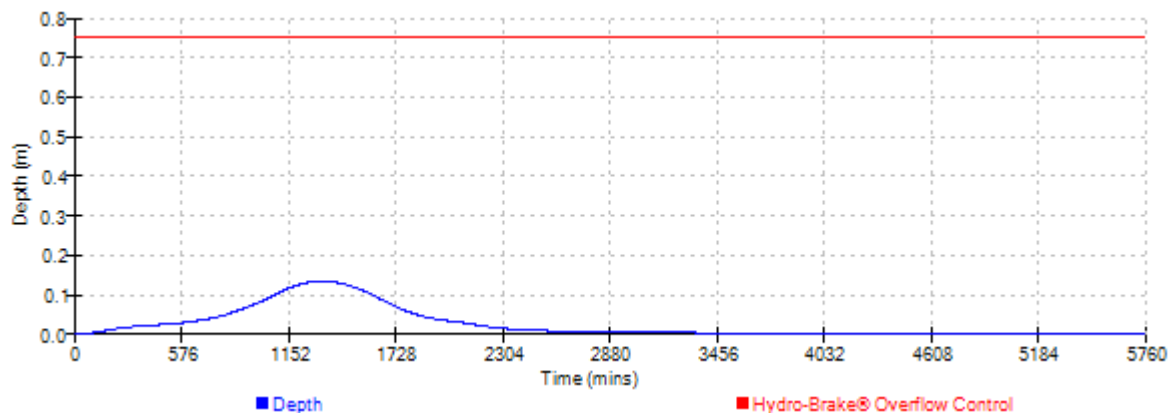
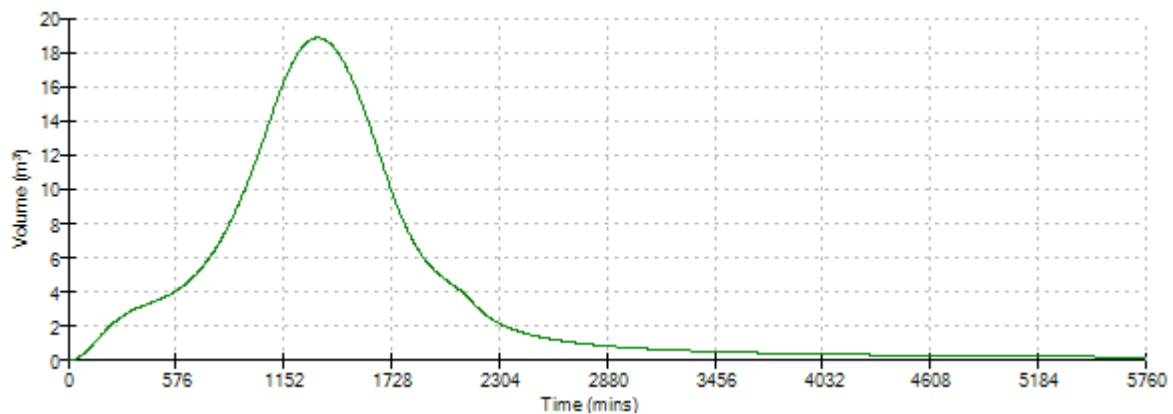
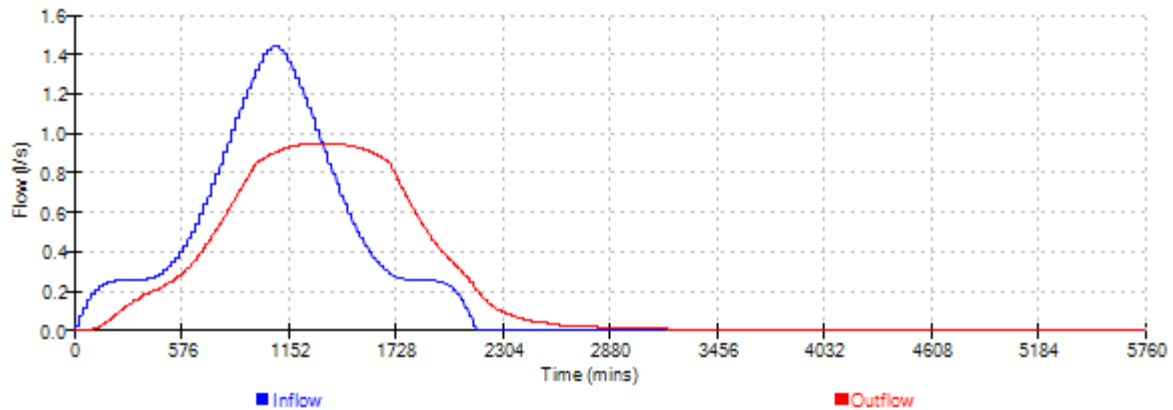
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55 Shepherds Lane Dartford DA1 2NL		
Date 24/01/2023 07:19 File Nutts Lane.SRCX	Designed by sheph Checked by	
Innovyze	Source Control 2020.1	

Event: 1440 min Winter



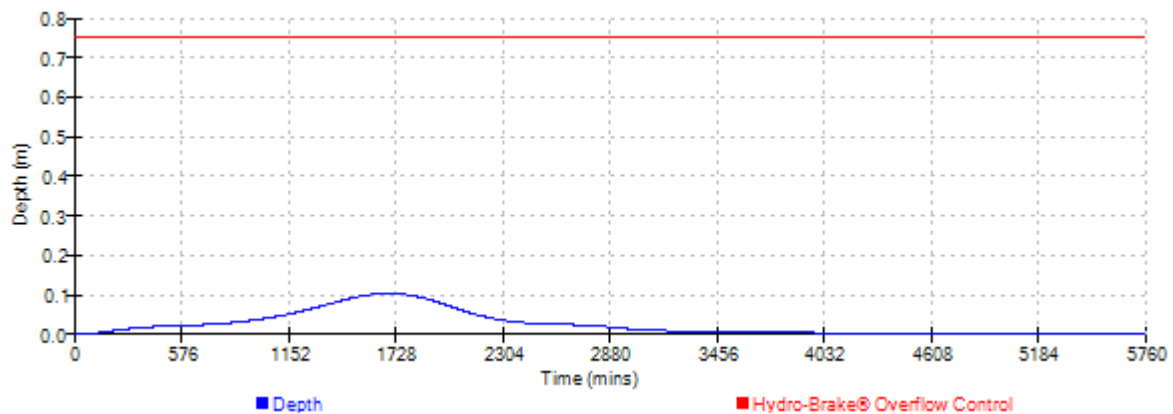
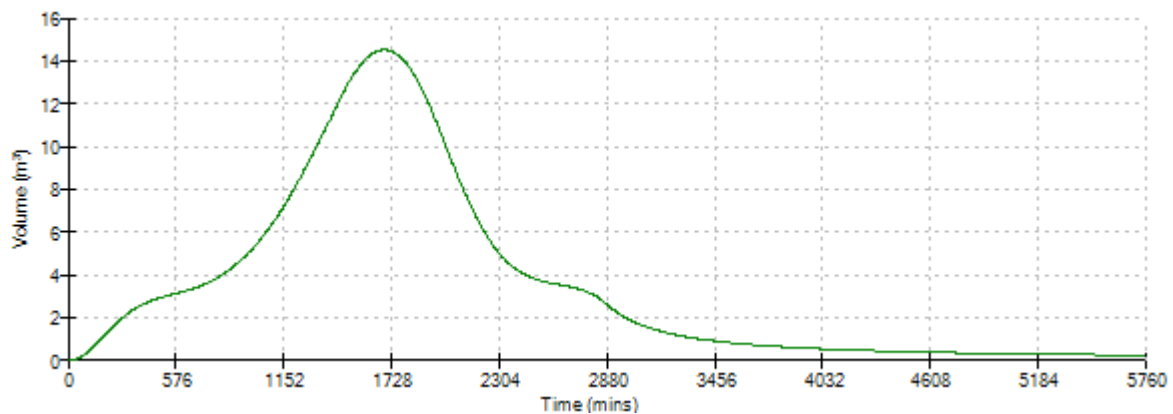
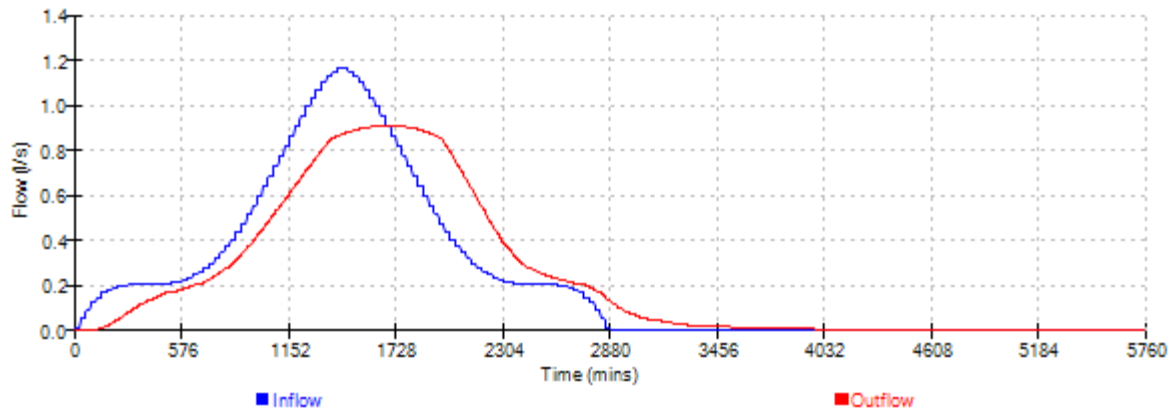
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55 Shepherds Lane Dartford DA1 2NL		
Date 24/01/2023 07:19 File Nutts Lane.SRCX	Designed by sheph Checked by	
Innovyze	Source Control 2020.1	

Event: 2160 min Winter



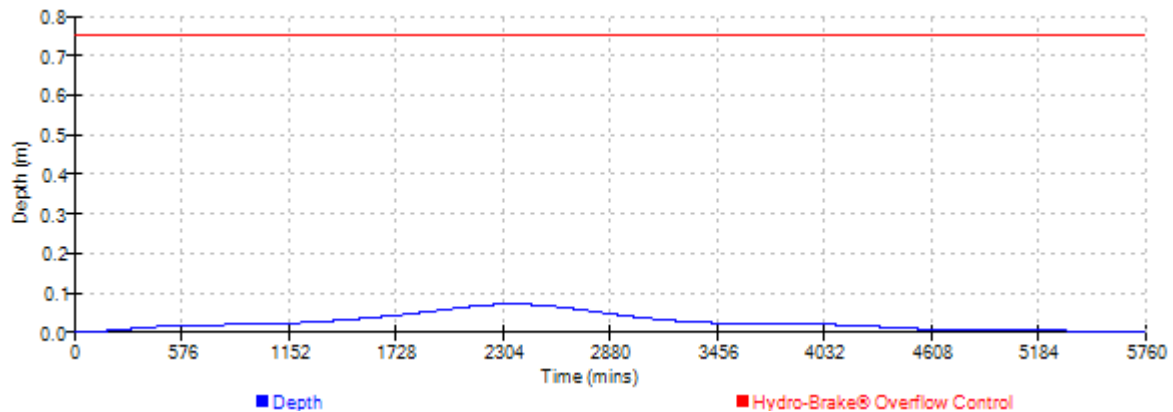
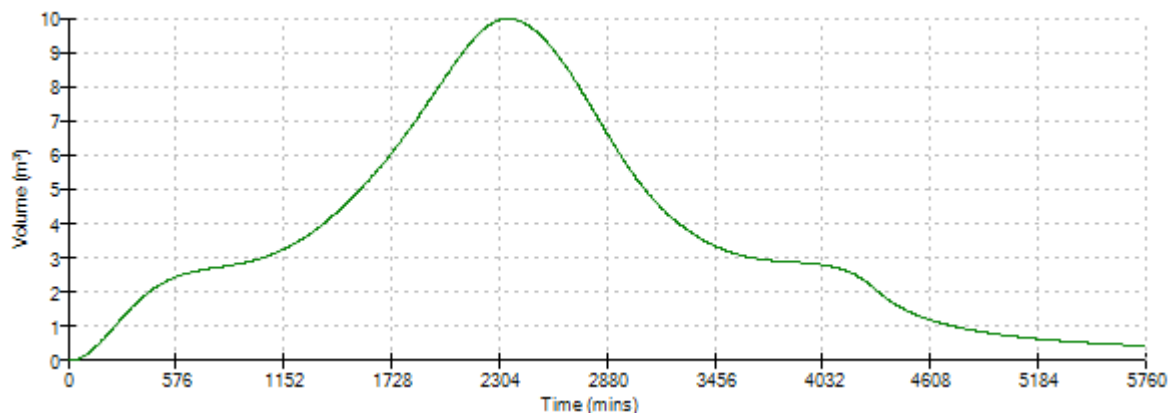
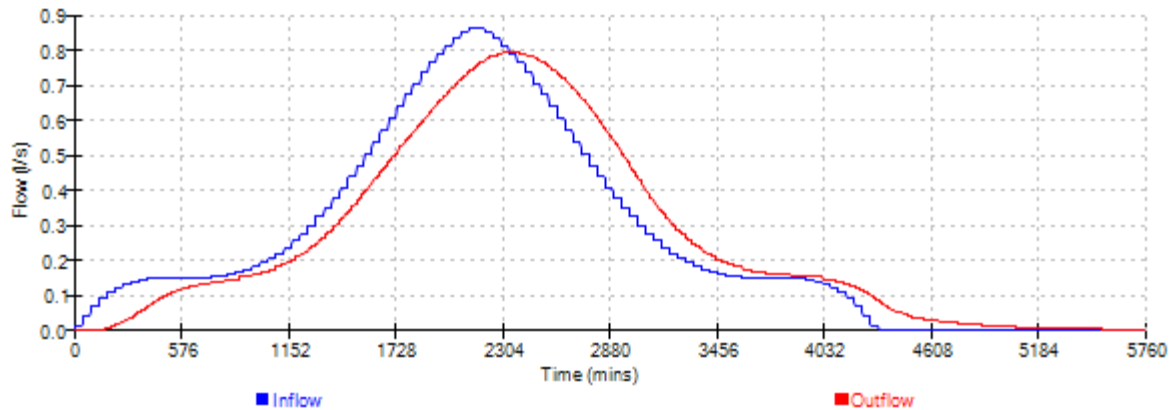
Easy Flood Risk		Page 38
55 Shepherds Lane Dartford DA1 2NL		
Date 24/01/2023 07:19 File Nutts Lane.SRCX	Designed by sheph Checked by	
Innovyze	Source Control 2020.1	

Event: 2880 min Winter



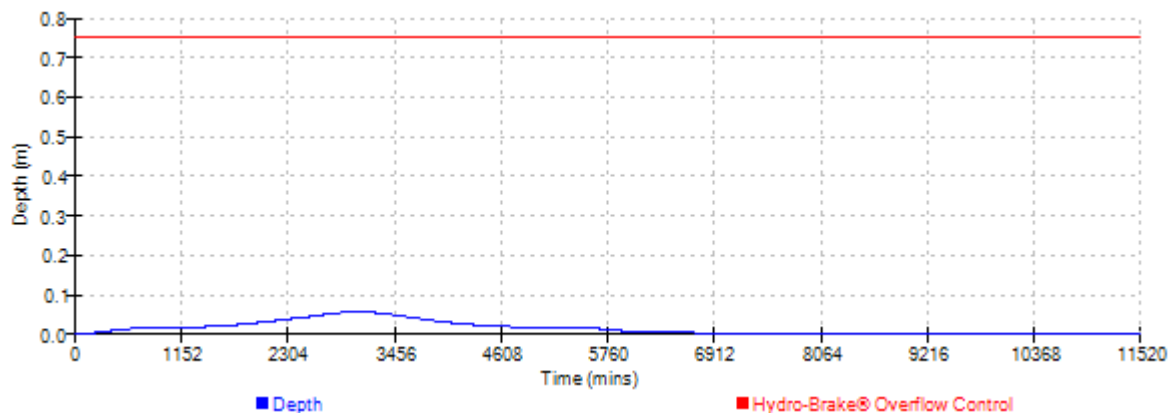
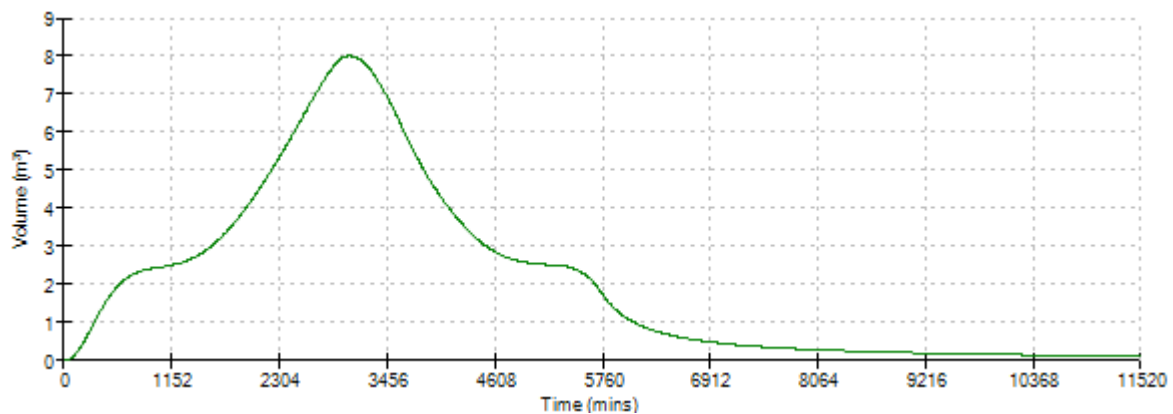
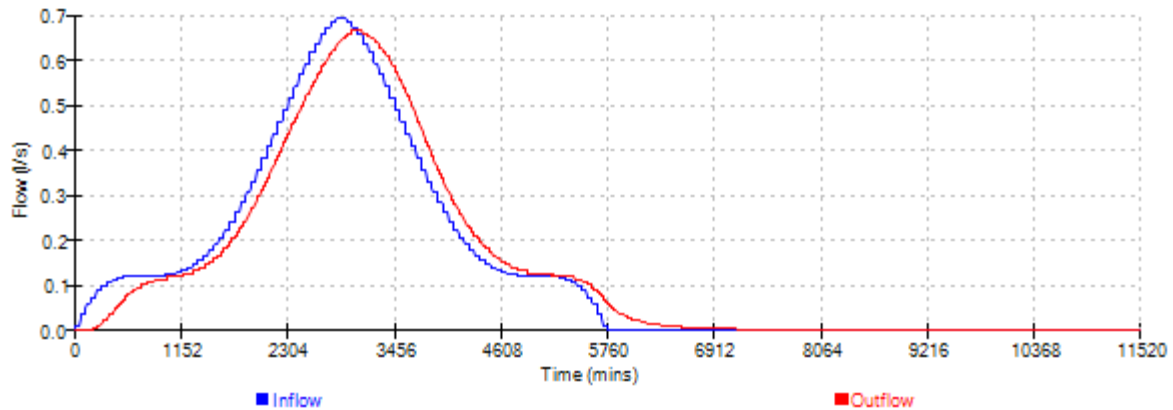
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55 Shepherds Lane Dartford DA1 2NL		
Date 24/01/2023 07:19 File Nutts Lane.SRCX	Designed by sheph Checked by	
Innovyze	Source Control 2020.1	

Event: 4320 min Winter



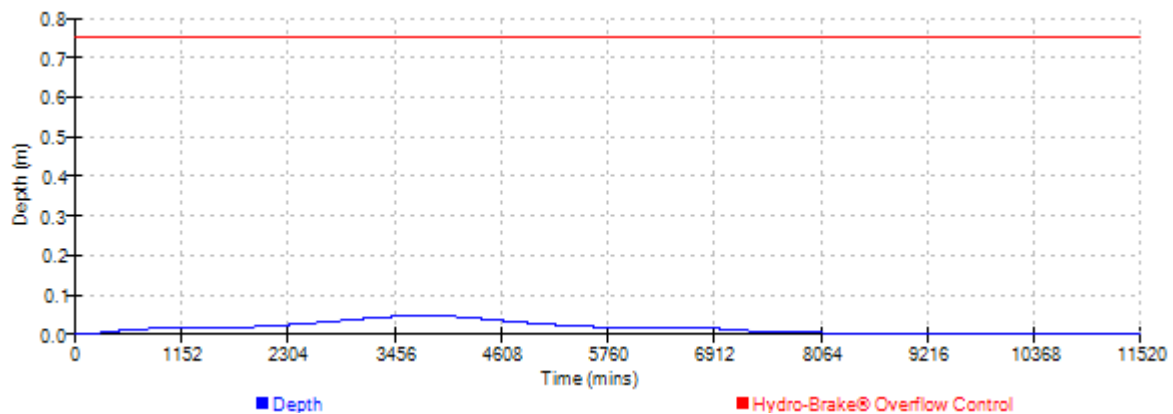
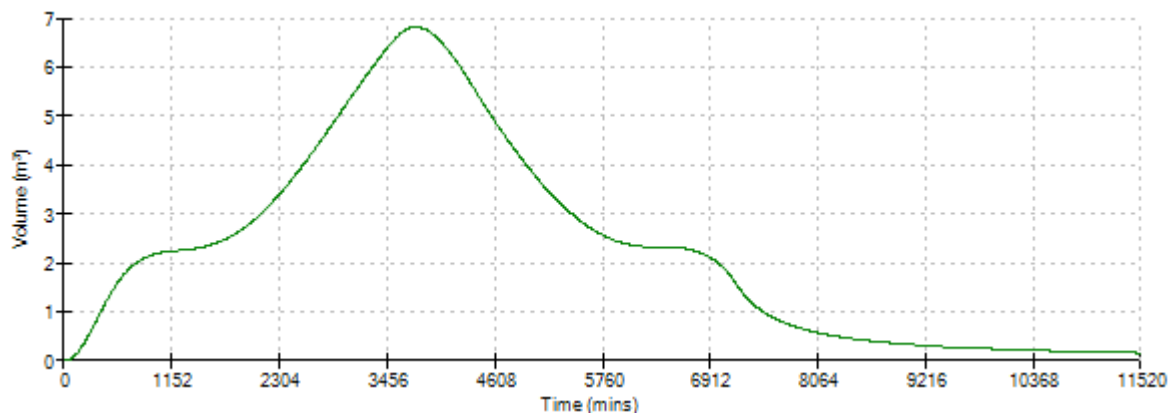
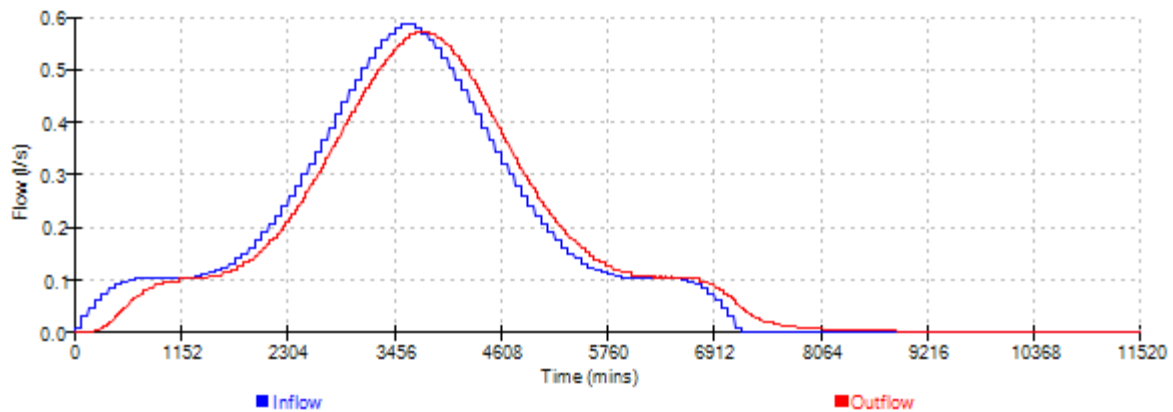
Easy Flood Risk		Page 40
55 Shepherds Lane Dartford DA1 2NL		
Date 24/01/2023 07:19 File Nutts Lane.SRCX	Designed by sheph Checked by	
Innovyze	Source Control 2020.1	

Event: 5760 min Winter



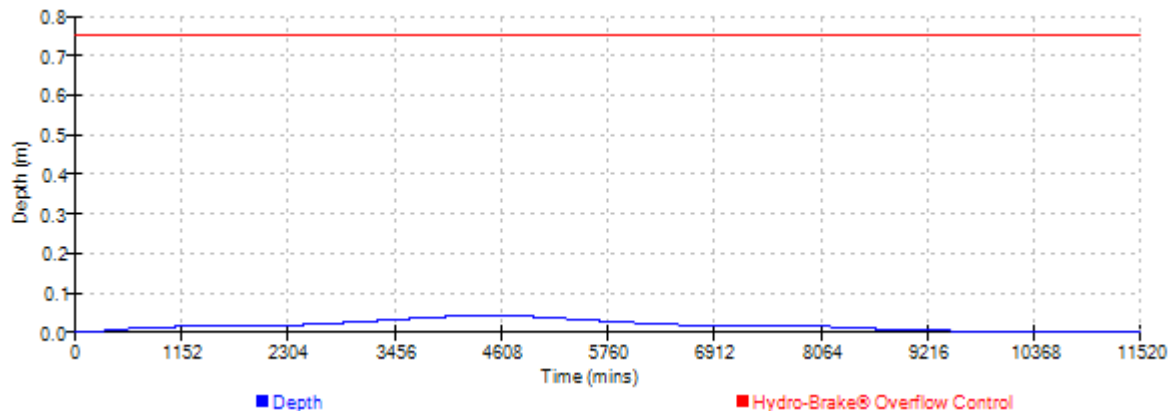
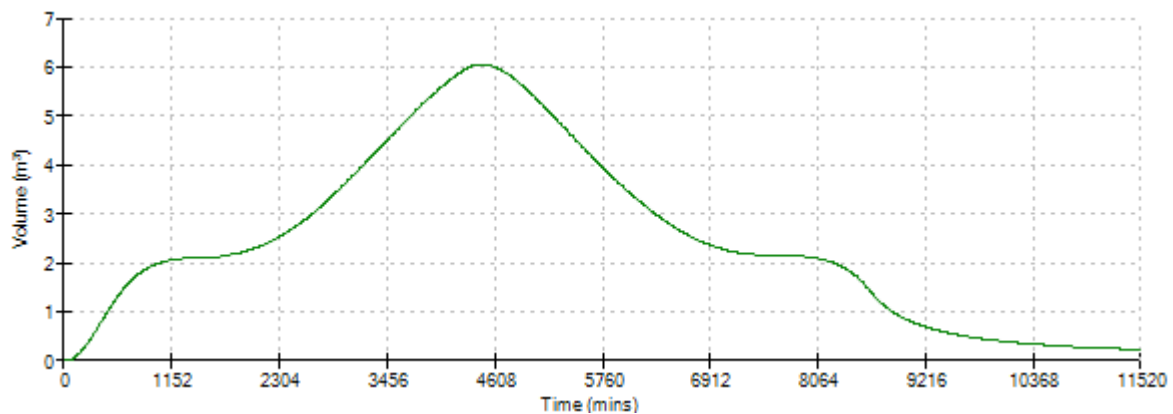
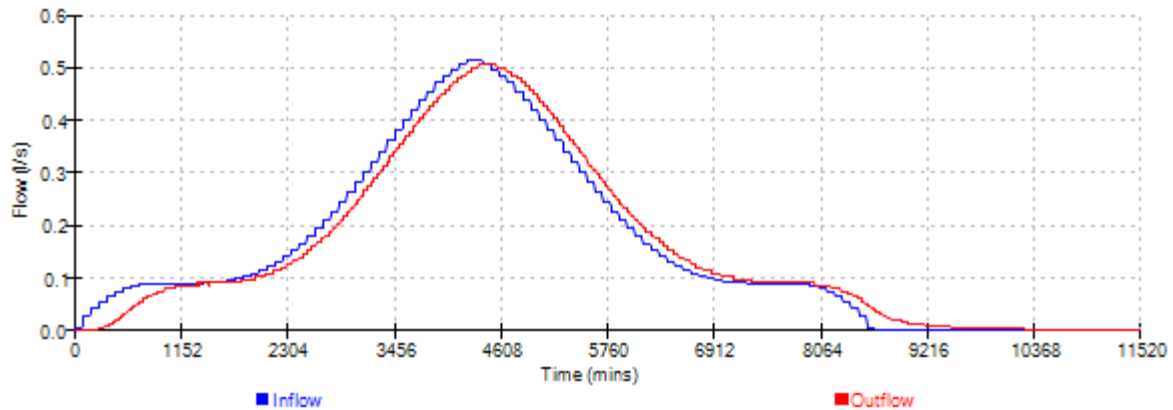
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Event: 7200 min Winter



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Innovyze	Source Control 2020.1	

Event: 8640 min Winter



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55 Shepherds Lane Dartford DA1 2NL		
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File Nutts Lane.SRCX	Checked by	
Innovyze		Source Control 2020.1

Event: 10080 min Winter

