

26 UNION STREET, SUITE 1D

NORTH ADAMS, MA 01247

T (413) 398-3211

T (802) 694-1919

August 3, 2023

Randy DiStefano
P.O. Box 1085
West Townshend, VT 05359

Dear Mr. DiStefano:

Please accept our analysis of the post-development stormwater runoff at the site located at 393 Wheeler Road, as required by the Windham ZBA. This analysis was completed in accordance with the conditions issued by the ZBA for dimensional waiver pursuant to the meeting on August 24, 2022. This site does not require a VTDEC Operational Stormwater permit since it does not create more than 0.5 acres of impervious surface, nor does it require a Construction Permit since it does not disturb more than 1.0 acres of earth. .

A pre and post-development hydrologic model was created using HydroCAD to evaluate the associated stormwater run-off rates. The analysis establishes the time of concentration for both pre and post-development conditions and evaluates the peak run off rates for the 1, 10, 25 and 100 year design storms. Design storms are based on the Type II rainfall distributions with precipitation amounts derived from NOAA Atlas 14. The analysis follows the SCS TR-20 and TR-55 runoff calculation methods.

The pre-development conditions, were assumed to be wooded across the entire subcatchment. The boundaries of the pre-development subcatchment were selected to fully encompass the proposed development, including all clearing and cover type changes. Refer to Sheet SW-1 for pre-development conditions. The post-development conditions show the proposed feature and the changes in cover type. The runoff pathways reflect the changes in grade and as such the post-development subcatchment is divided into two subcatchments. Refer to Sheet SW-2 for post development conditions.

Calculations for pre-development and post-development peak runoff rates were completed and can be found in the table below.

Storm	Pre-Development	Post-Development
1-year	0.80 cfs	0.79 cfs
10-year	2.91 cfs	2.87 cfs
25-year	4.05 cfs	4.00 cfs
100-year	5.92 cfs	5.85 cfs

The post-development peak runoff rates calculated for each of the design storms were found to be less than the pre-development peak run off rates. Post-development peak flows can be lower than pre-

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development when the flows of the two post-development subcatchments peak at different times as is the case on this site. Refer to the hydrograph comparisons of Subcatchments 3 and 4R in the attached HydroCAD report along with detailed summary calculations to support these findings.

The stormwater plan created for this site includes erosion prevention and sedimentation controls, including the installation of rip rap at the outlet of the foundation drain, building the driveway according to the suggested location and dimensions, and no further clearing or increase in impervious area beyond that shown on Sheet SW-2.

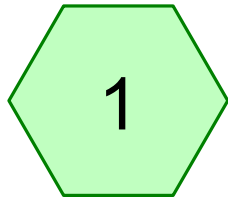
In summary, we find that the proposed development will have no adverse impact on the site hydrology. I trust that the information provided herein is sufficient for the Windham ZBA criteria for the dimensional waiver. Please feel free to reach out should you have any questions or concerns.

Very Truly Yours,

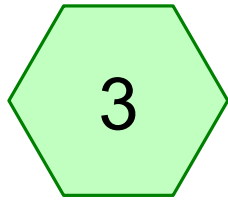


John E. Dupras, P.E.
Trinity Engineering & Technical Services, LLC

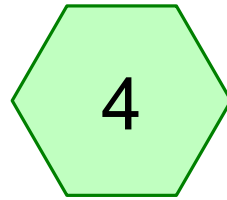




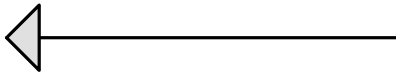
Pre 1



Post 3

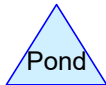
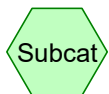


Post 4



Post 1 (sub-catchments 3 & 4)

Stream between sub-catchments 3 & 4



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Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1YR	Type II 24-hr		Default	24.00	1	2.51	2
2	10YR	Type II 24-hr		Default	24.00	1	4.34	2
3	25YR	Type II 24-hr		Default	24.00	1	5.19	2
4	100YR	Type II 24-hr		Default	24.00	1	6.50	2

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Type II 24-hr 1YR Rainfall=2.51"

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Summary for Subcatchment 1: Pre 1

Runoff = 0.80 cfs @ 12.10 hrs, Volume= 1,621 cf, Depth> 0.31"

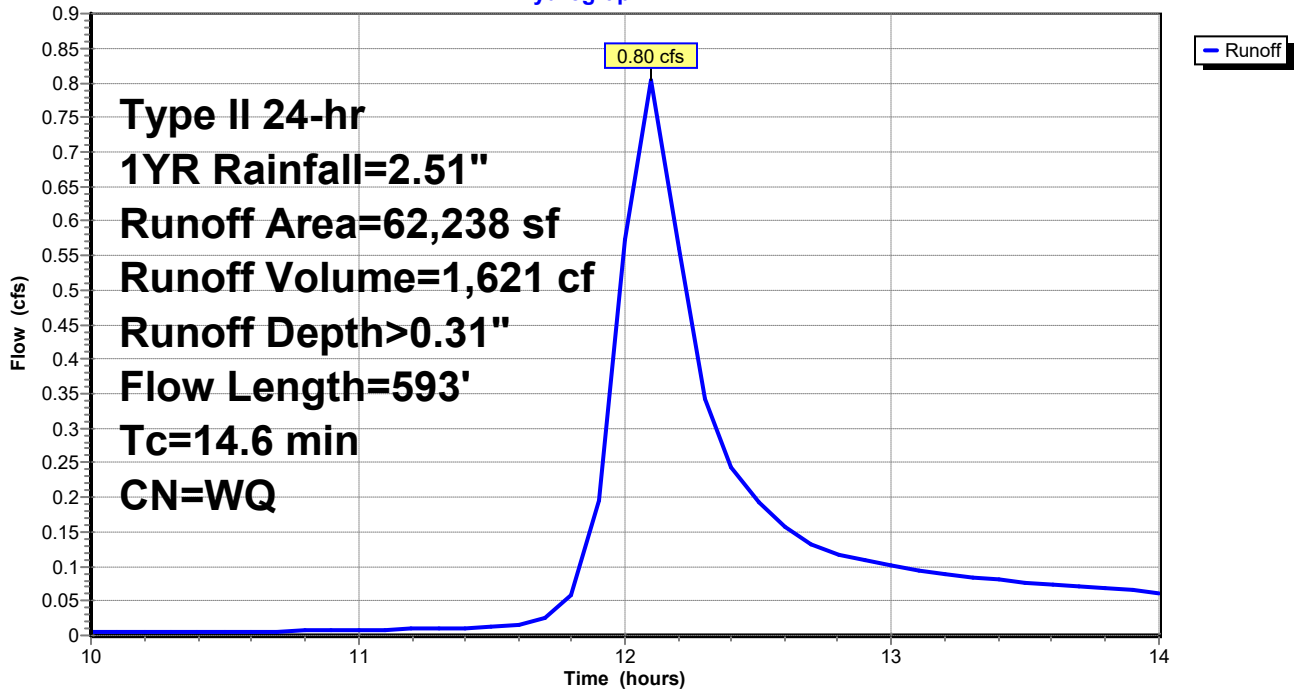
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 10.00-14.00 hrs, dt= 0.10 hrs
 Type II 24-hr 1YR Rainfall=2.51"

Area (sf)	CN	Description
4,484	74	>75% Grass cover, Good, HSG C
2,297	98	Unconnected pavement, HSG C
55,457	70	Woods, Good, HSG C
62,238		Weighted Average
59,941		96.31% Pervious Area
2,297		3.69% Impervious Area
2,297		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	79	0.0914	0.29		Sheet Flow, Grassy Sheet Grass: Short n= 0.150 P2= 2.97"
7.0	71	0.1823	0.17		Sheet Flow, Wooded Sheet Woods: Light underbrush n= 0.400 P2= 2.97"
2.2	300	0.2138	2.31		Shallow Concentrated Flow, Shallow Concentrated Woodland Kv= 5.0 fps
0.8	143	0.0280	3.09	20.72	Channel Flow, Chennel Area= 6.7 sf Perim= 16.0' r= 0.42' n= 0.045 Winding stream, pools & shoals
14.6	593	Total			

Subcatchment 1: Pre 1

Hydrograph



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Type II 24-hr 1YR Rainfall=2.51"

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Summary for Subcatchment 3: Post 3

Runoff = 0.47 cfs @ 12.03 hrs, Volume= 861 cf, Depth> 0.43"

Routed to Link 2L : Post 1 (sub-catchments 3 & 4)

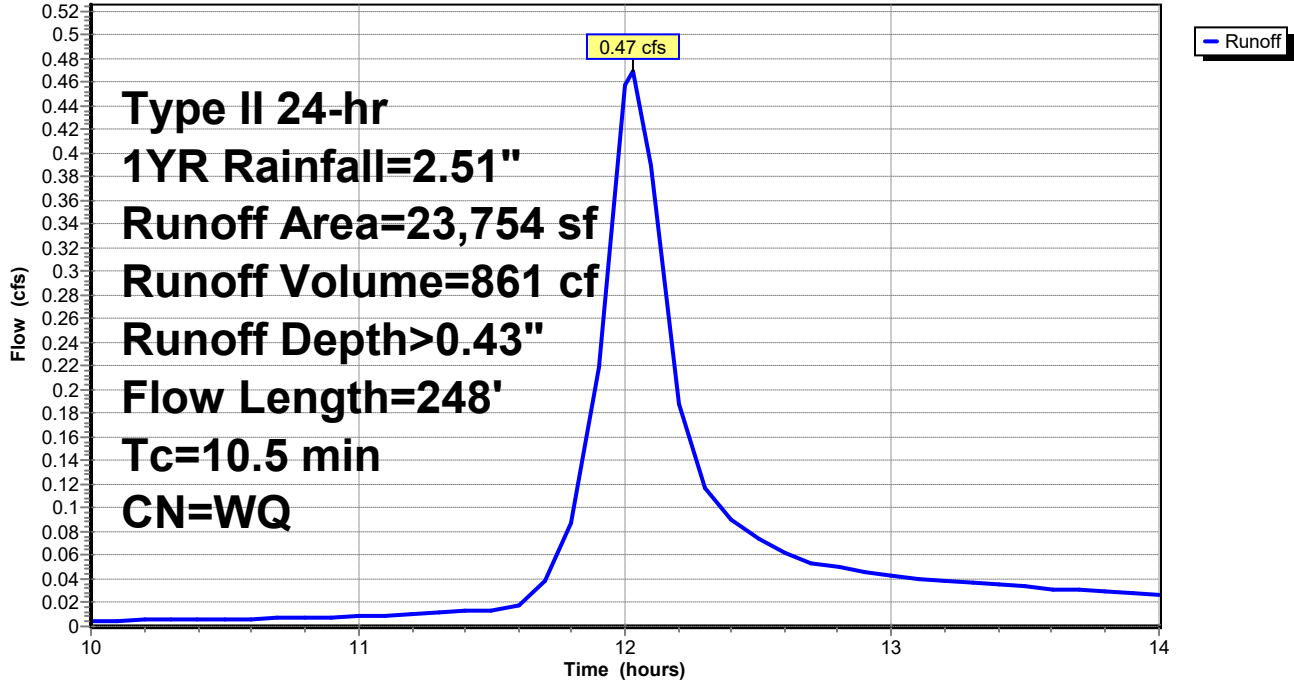
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 10.00-14.00 hrs, dt= 0.10 hrs
Type II 24-hr 1YR Rainfall=2.51"

Area (sf)	CN	Description
8,658	74	>75% Grass cover, Good, HSG C
701	98	Paved parking, HSG C
835	98	Roofs, HSG C
921	98	Unconnected pavement, HSG C
12,639	70	Woods, Good, HSG C
23,754		Weighted Average
21,297		89.66% Pervious Area
2,457		10.34% Impervious Area
921		37.48% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	47	0.1050	0.27		Sheet Flow, Grass Sheet 1 Grass: Short n= 0.150 P2= 2.97"
0.1	10	0.3000	2.47		Sheet Flow, Driveway Sheet Smooth surfaces n= 0.011 P2= 2.97"
2.3	43	0.1580	0.32		Sheet Flow, Grassy Sheet 2 Grass: Short n= 0.150 P2= 2.97"
3.1	30	0.2558	0.16		Sheet Flow, Wooded Sheet 1 Woods: Light underbrush n= 0.400 P2= 2.97"
1.2	20	0.1580	0.27		Sheet Flow, Grassy Sheet 3 Grass: Short n= 0.150 P2= 2.97"
0.9	98	0.1468	1.92		Shallow Concentrated Flow, Wooded Shallow Woodland Kv= 5.0 fps
10.5	248	Total			

Subcatchment 3: Post 3

Hydrograph



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Type II 24-hr 1YR Rainfall=2.51"

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Summary for Subcatchment 4: Post 4

Runoff = 0.51 cfs @ 12.09 hrs, Volume= 1,004 cf, Depth> 0.31"

Routed to Reach 4R : Stream between sub-catchments 3 & 4

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 10.00-14.00 hrs, dt= 0.10 hrs

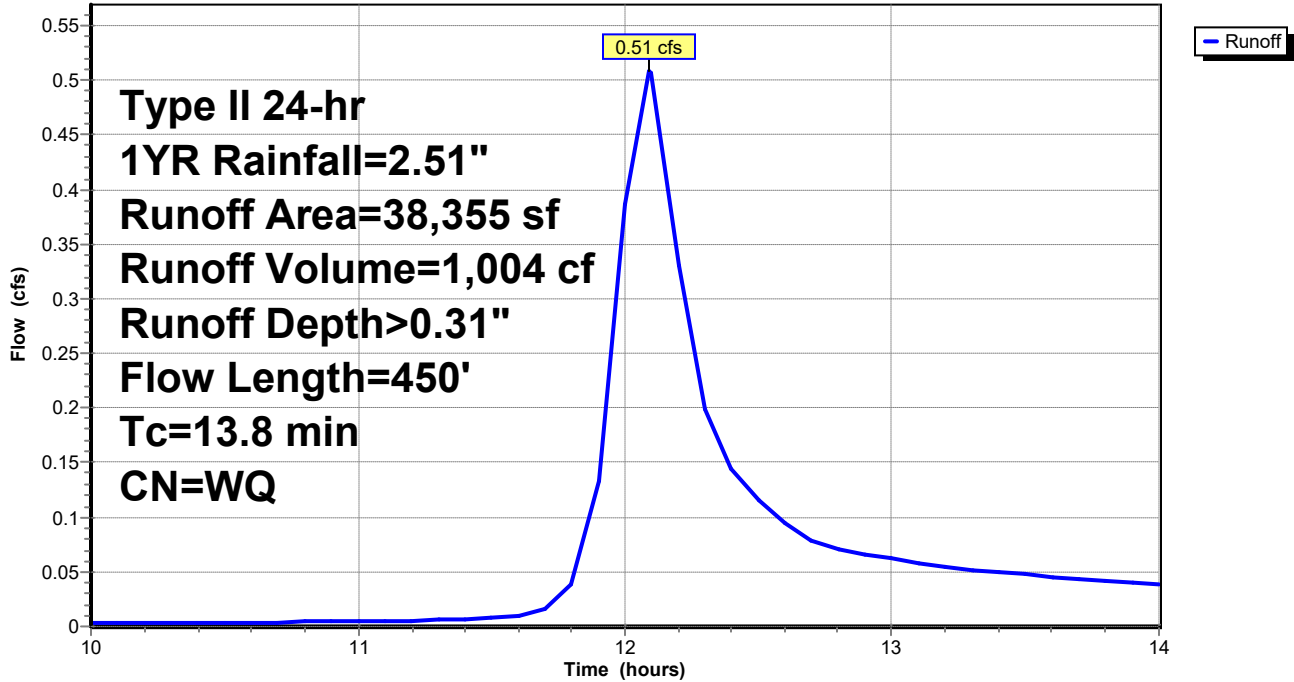
Type II 24-hr 1YR Rainfall=2.51"

Area (sf)	CN	Description
3,639	74	>75% Grass cover, Good, HSG C
0	98	Paved parking, HSG C
1,376	98	Unconnected pavement, HSG C
33,340	70	Woods, Good, HSG C
38,355		Weighted Average
36,979		96.41% Pervious Area
1,376		3.59% Impervious Area
1,376		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	79	0.0914	0.29		Sheet Flow, Grassy Sheet Grass: Short n= 0.150 P2= 2.97"
7.0	71	0.1823	0.17		Sheet Flow, Wooded Sheet Woods: Light underbrush n= 0.400 P2= 2.97"
2.2	300	0.2138	2.31		Shallow Concentrated Flow, Wooded Concentrated Woodland Kv= 5.0 fps
13.8	450	Total			

Subcatchment 4: Post 4

Hydrograph



Summary for Reach 4R: Stream between sub-catchments 3 & 4

Inflow Area = 38,355 sf, 3.59% Impervious, Inflow Depth > 0.31" for 1YR event
 Inflow = 0.51 cfs @ 12.09 hrs, Volume= 1,004 cf
 Outflow = 0.44 cfs @ 12.17 hrs, Volume= 986 cf, Atten= 13%, Lag= 4.5 min
 Routed to Link 2L : Post 1 (sub-catchments 3 & 4)

Routing by Stor-Ind+Trans method, Time Span= 10.00-14.00 hrs, dt= 0.10 hrs
 Max. Velocity= 1.01 fps, Min. Travel Time= 2.4 min
 Avg. Velocity = 0.44 fps, Avg. Travel Time= 5.4 min

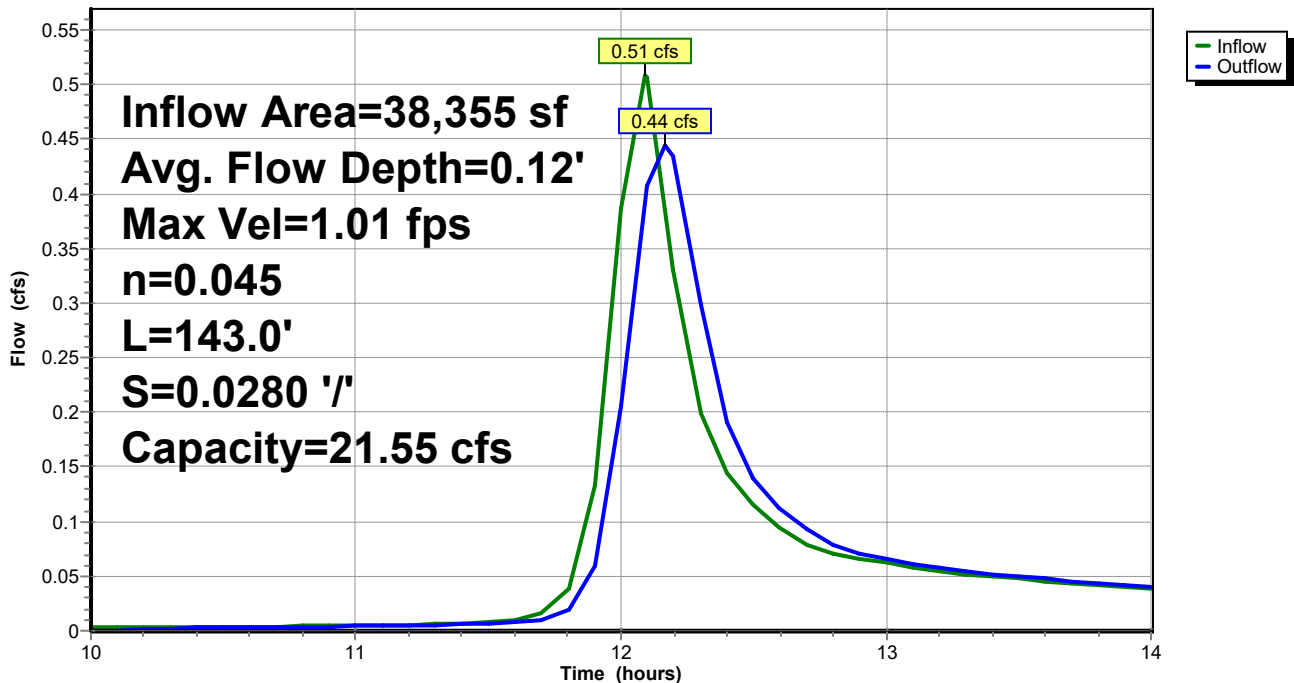
Peak Storage= 70 cf @ 12.12 hrs
 Average Depth at Peak Storage= 0.12' , Surface Width= 6.28'
 Bank-Full Depth= 0.67' Flow Area= 6.7 sf, Capacity= 21.55 cfs

15.00' x 0.67' deep Parabolic Channel, n= 0.045 Winding stream, pools & shoals
 Length= 143.0' Slope= 0.0280 '/'
 Inlet Invert= 1,502.00', Outlet Invert= 1,498.00'



Reach 4R: Stream between sub-catchments 3 & 4

Hydrograph



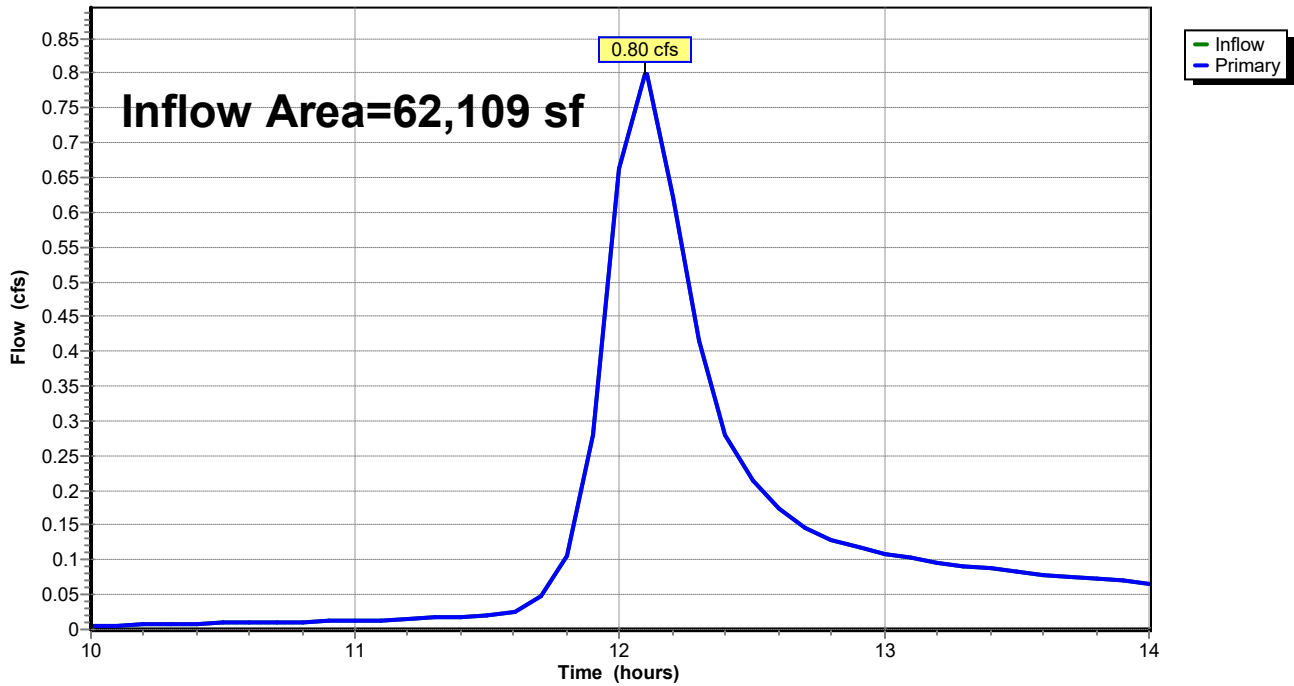
Summary for Link 2L: Post 1 (sub-catchments 3 & 4)

Inflow Area = 62,109 sf, 6.17% Impervious, Inflow Depth > 0.36" for 1YR event
Inflow = 0.80 cfs @ 12.09 hrs, Volume= 1,847 cf
Primary = 0.80 cfs @ 12.09 hrs, Volume= 1,847 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 10.00-14.00 hrs, dt= 0.10 hrs

Link 2L: Post 1 (sub-catchments 3 & 4)

Hydrograph



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Type II 24-hr 10YR Rainfall=4.34"

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Summary for Subcatchment 1: Pre 1

Runoff = 2.91 cfs @ 12.08 hrs, Volume= 5,739 cf, Depth> 1.11"

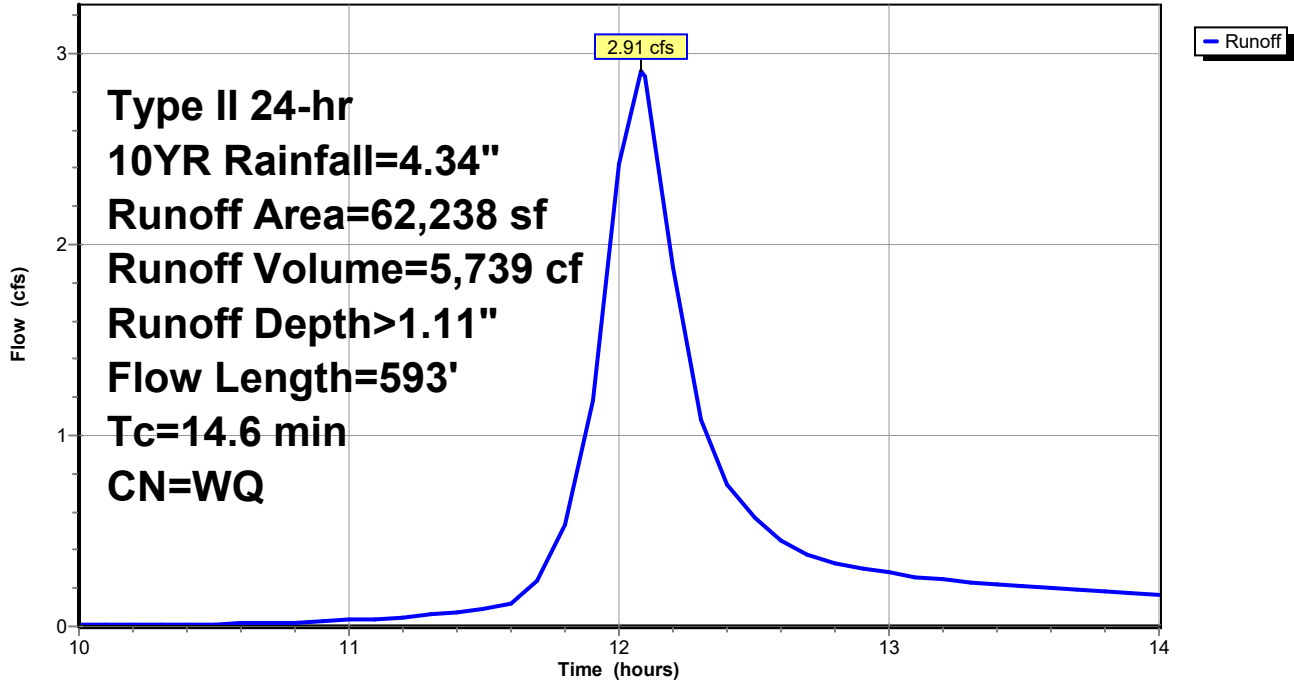
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 10.00-14.00 hrs, dt= 0.10 hrs
 Type II 24-hr 10YR Rainfall=4.34"

Area (sf)	CN	Description
4,484	74	>75% Grass cover, Good, HSG C
2,297	98	Unconnected pavement, HSG C
55,457	70	Woods, Good, HSG C
62,238		Weighted Average
59,941		96.31% Pervious Area
2,297		3.69% Impervious Area
2,297		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	79	0.0914	0.29		Sheet Flow, Grassy Sheet Grass: Short n= 0.150 P2= 2.97"
7.0	71	0.1823	0.17		Sheet Flow, Wooded Sheet Woods: Light underbrush n= 0.400 P2= 2.97"
2.2	300	0.2138	2.31		Shallow Concentrated Flow, Shallow Concentrated Woodland Kv= 5.0 fps
0.8	143	0.0280	3.09	20.72	Channel Flow, Channel Area= 6.7 sf Perim= 16.0' r= 0.42' n= 0.045 Winding stream, pools & shoals
14.6	593	Total			

Subcatchment 1: Pre 1

Hydrograph



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Type II 24-hr 10YR Rainfall=4.34"

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Printed 8/4/2023

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Summary for Subcatchment 3: Post 3

Runoff = 1.43 cfs @ 12.02 hrs, Volume= 2,566 cf, Depth> 1.30"

Routed to Link 2L : Post 1 (sub-catchments 3 & 4)

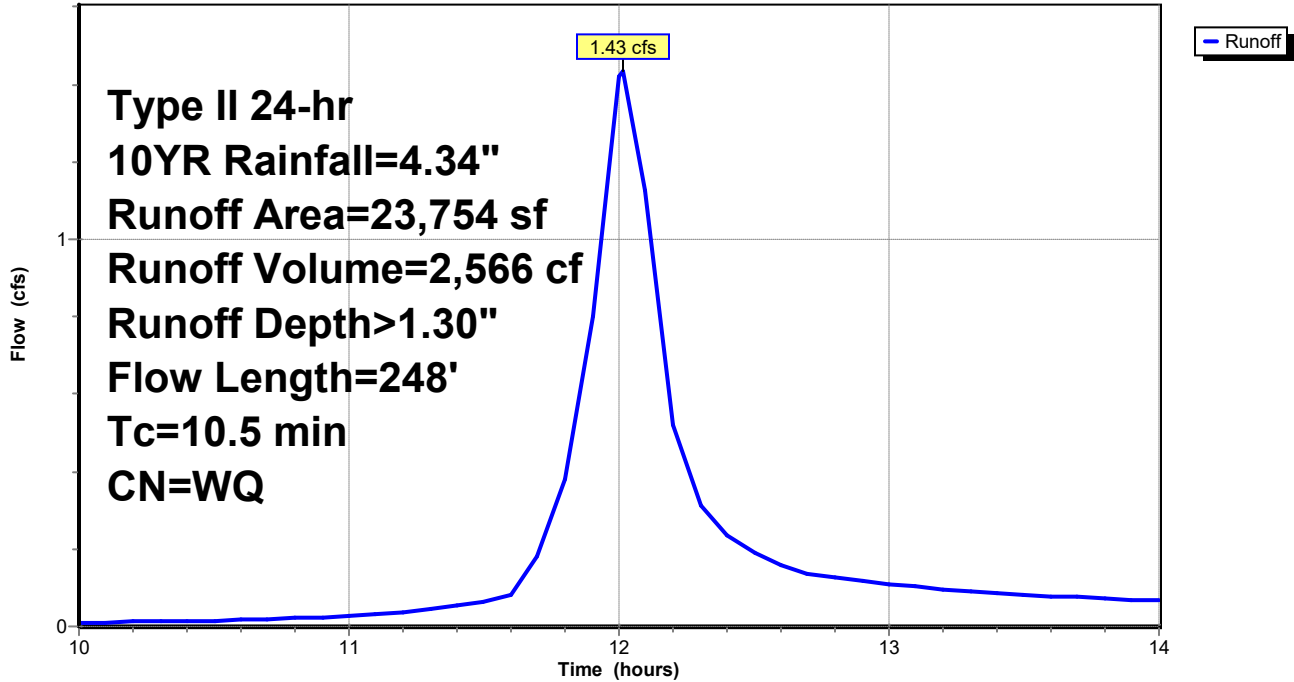
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 10.00-14.00 hrs, dt= 0.10 hrs
Type II 24-hr 10YR Rainfall=4.34"

Area (sf)	CN	Description
8,658	74	>75% Grass cover, Good, HSG C
701	98	Paved parking, HSG C
835	98	Roofs, HSG C
921	98	Unconnected pavement, HSG C
12,639	70	Woods, Good, HSG C
23,754		Weighted Average
21,297		89.66% Pervious Area
2,457		10.34% Impervious Area
921		37.48% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	47	0.1050	0.27		Sheet Flow, Grass Sheet 1 Grass: Short n= 0.150 P2= 2.97"
0.1	10	0.3000	2.47		Sheet Flow, Driveway Sheet Smooth surfaces n= 0.011 P2= 2.97"
2.3	43	0.1580	0.32		Sheet Flow, Grassy Sheet 2 Grass: Short n= 0.150 P2= 2.97"
3.1	30	0.2558	0.16		Sheet Flow, Wooded Sheet 1 Woods: Light underbrush n= 0.400 P2= 2.97"
1.2	20	0.1580	0.27		Sheet Flow, Grassy Sheet 3 Grass: Short n= 0.150 P2= 2.97"
0.9	98	0.1468	1.92		Shallow Concentrated Flow, Wooded Shallow Woodland Kv= 5.0 fps
10.5	248	Total			

Subcatchment 3: Post 3

Hydrograph



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Type II 24-hr 10YR Rainfall=4.34"

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Summary for Subcatchment 4: Post 4

Runoff = 1.82 cfs @ 12.07 hrs, Volume= 3,552 cf, Depth> 1.11"

Routed to Reach 4R : Stream between sub-catchments 3 & 4

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 10.00-14.00 hrs, dt= 0.10 hrs

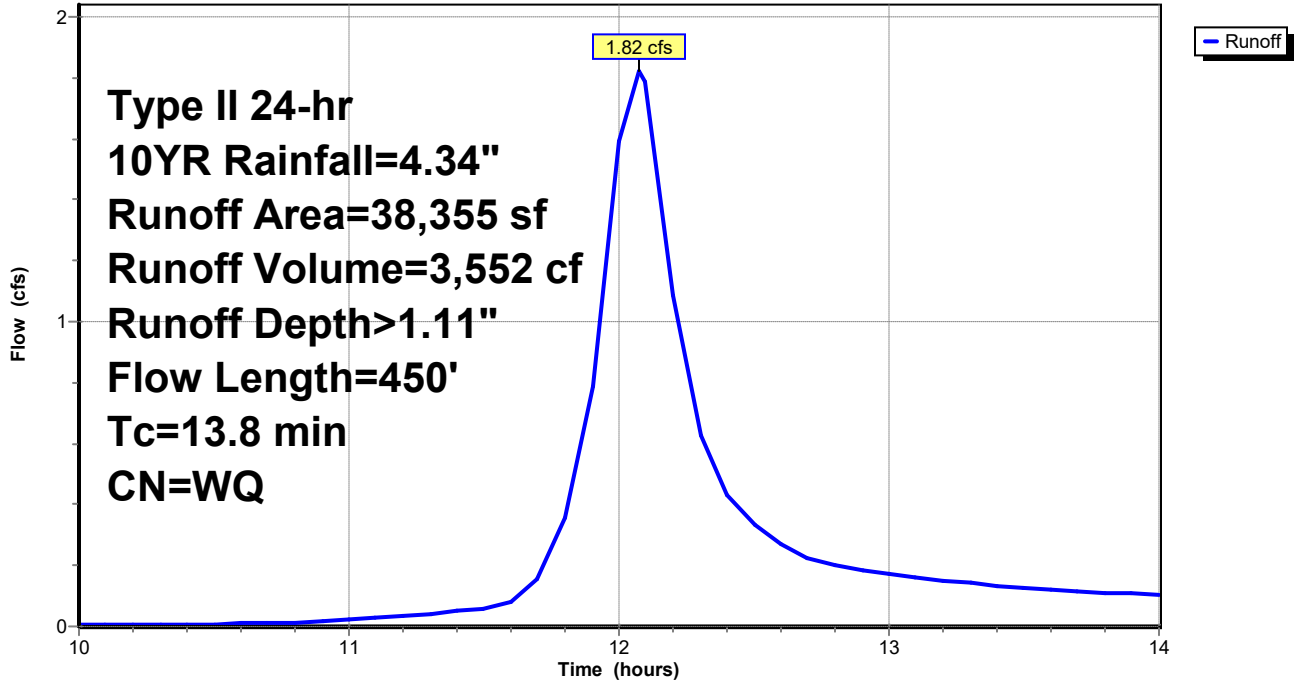
Type II 24-hr 10YR Rainfall=4.34"

Area (sf)	CN	Description
3,639	74	>75% Grass cover, Good, HSG C
0	98	Paved parking, HSG C
1,376	98	Unconnected pavement, HSG C
33,340	70	Woods, Good, HSG C
38,355		Weighted Average
36,979		96.41% Pervious Area
1,376		3.59% Impervious Area
1,376		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	79	0.0914	0.29		Sheet Flow, Grassy Sheet Grass: Short n= 0.150 P2= 2.97"
7.0	71	0.1823	0.17		Sheet Flow, Wooded Sheet Woods: Light underbrush n= 0.400 P2= 2.97"
2.2	300	0.2138	2.31		Shallow Concentrated Flow, Wooded Concentrated Woodland Kv= 5.0 fps
13.8	450	Total			

Subcatchment 4: Post 4

Hydrograph



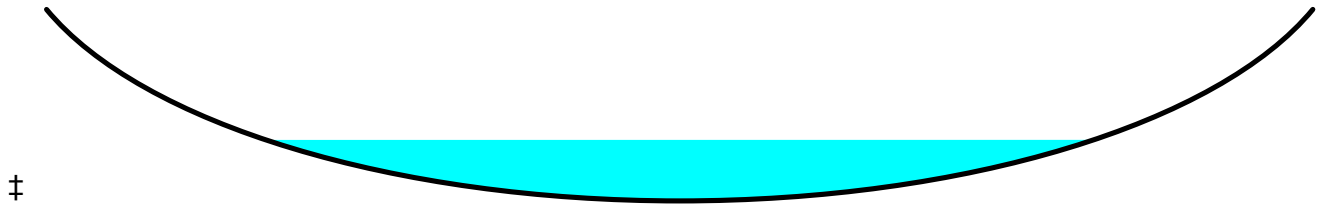
Summary for Reach 4R: Stream between sub-catchments 3 & 4

Inflow Area = 38,355 sf, 3.59% Impervious, Inflow Depth > 1.11" for 10YR event
 Inflow = 1.82 cfs @ 12.07 hrs, Volume= 3,552 cf
 Outflow = 1.72 cfs @ 12.11 hrs, Volume= 3,518 cf, Atten= 6%, Lag= 2.5 min
 Routed to Link 2L : Post 1 (sub-catchments 3 & 4)

Routing by Stor-Ind+Trans method, Time Span= 10.00-14.00 hrs, dt= 0.10 hrs
 Max. Velocity= 1.51 fps, Min. Travel Time= 1.6 min
 Avg. Velocity = 0.65 fps, Avg. Travel Time= 3.6 min

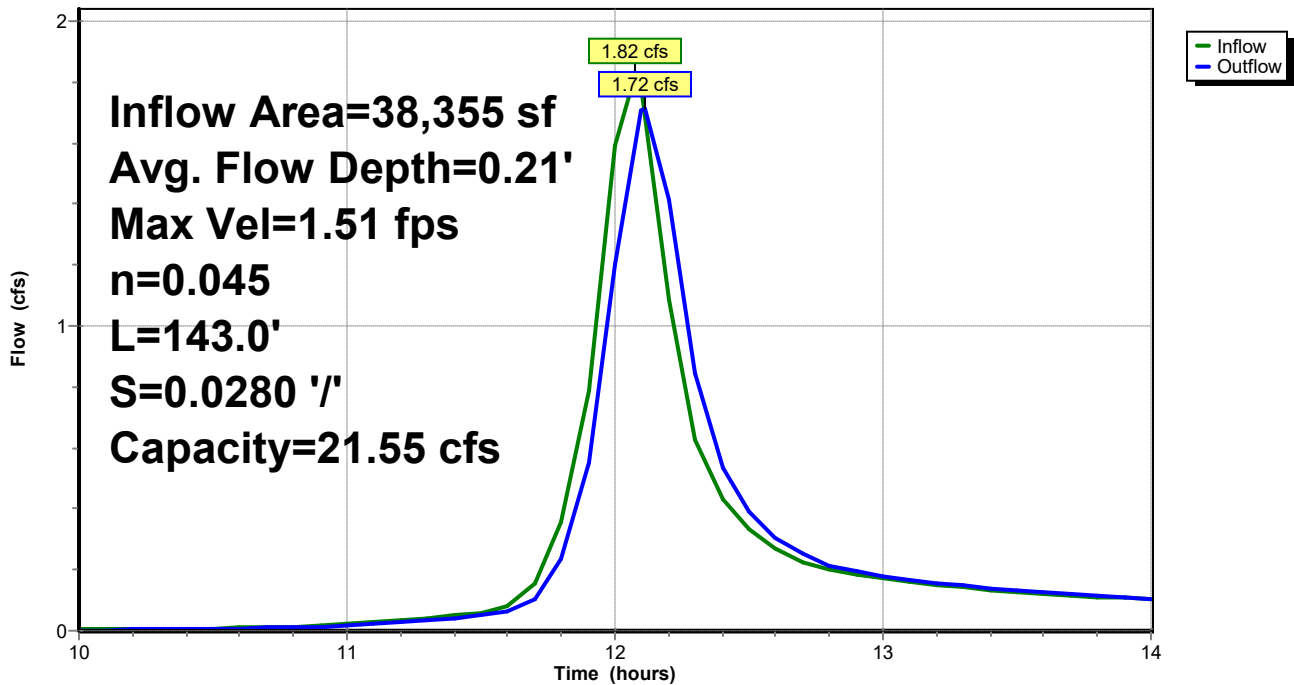
Peak Storage= 173 cf @ 12.09 hrs
 Average Depth at Peak Storage= 0.21' , Surface Width= 8.48'
 Bank-Full Depth= 0.67' Flow Area= 6.7 sf, Capacity= 21.55 cfs

15.00' x 0.67' deep Parabolic Channel, n= 0.045 Winding stream, pools & shoals
 Length= 143.0' Slope= 0.0280 '/'
 Inlet Invert= 1,502.00', Outlet Invert= 1,498.00'



Reach 4R: Stream between sub-catchments 3 & 4

Hydrograph

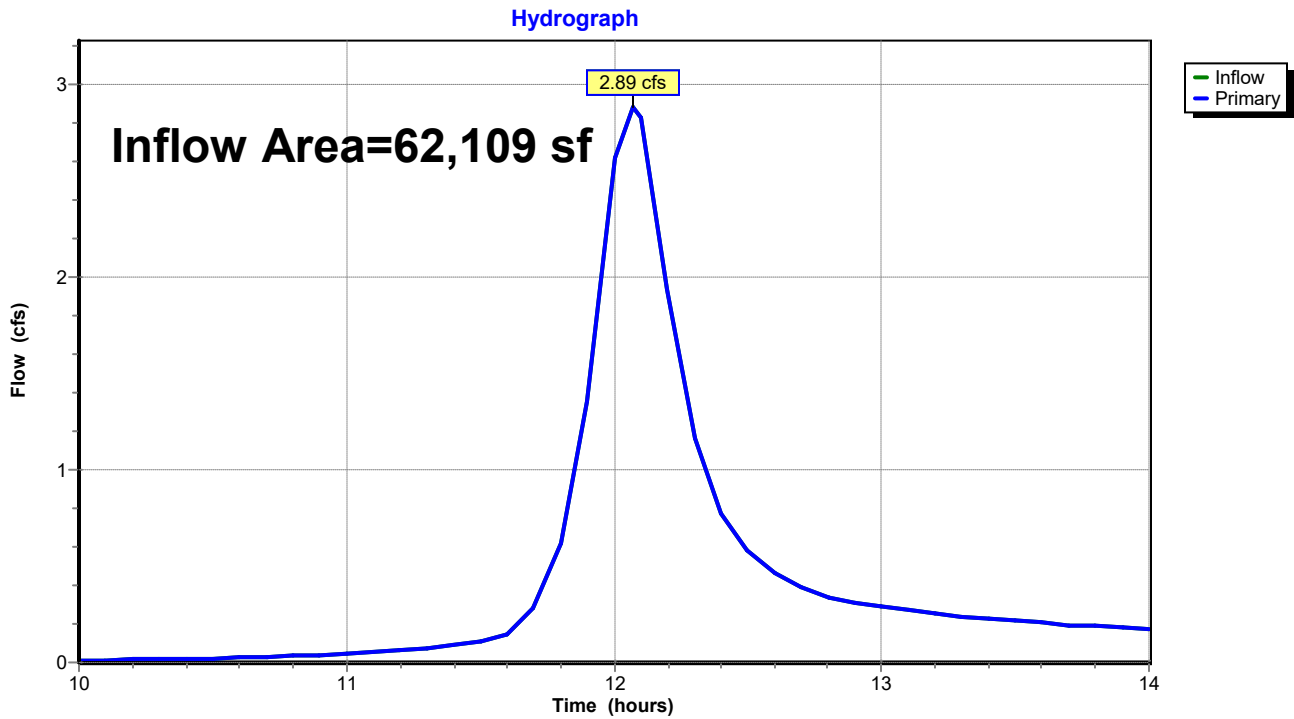


Summary for Link 2L: Post 1 (sub-catchments 3 & 4)

Inflow Area = 62,109 sf, 6.17% Impervious, Inflow Depth > 1.18" for 10YR event
Inflow = 2.89 cfs @ 12.07 hrs, Volume= 6,084 cf
Primary = 2.89 cfs @ 12.07 hrs, Volume= 6,084 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 10.00-14.00 hrs, dt= 0.10 hrs

Link 2L: Post 1 (sub-catchments 3 & 4)



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Type II 24-hr 25YR Rainfall=5.19"

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Summary for Subcatchment 1: Pre 1

Runoff = 4.05 cfs @ 12.08 hrs, Volume= 8,118 cf, Depth> 1.57"

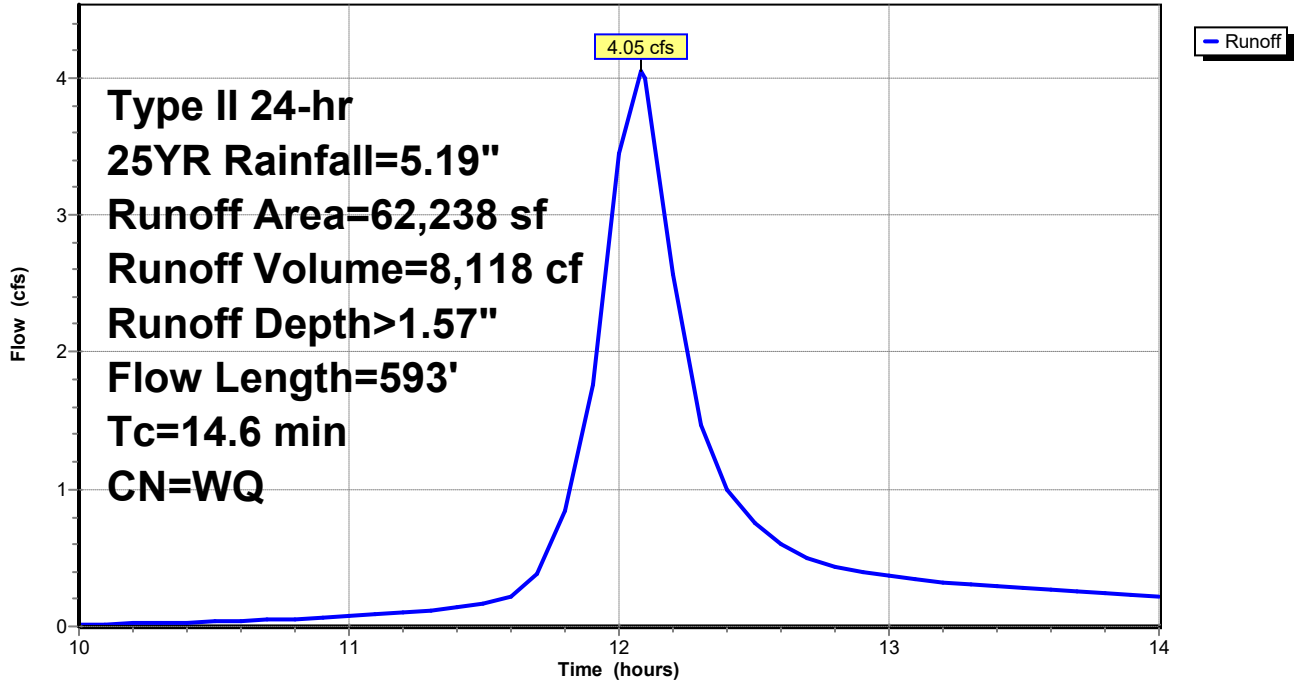
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 10.00-14.00 hrs, dt= 0.10 hrs
 Type II 24-hr 25YR Rainfall=5.19"

Area (sf)	CN	Description
4,484	74	>75% Grass cover, Good, HSG C
2,297	98	Unconnected pavement, HSG C
55,457	70	Woods, Good, HSG C
62,238		Weighted Average
59,941		96.31% Pervious Area
2,297		3.69% Impervious Area
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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	79	0.0914	0.29		Sheet Flow, Grassy Sheet Grass: Short n= 0.150 P2= 2.97"
7.0	71	0.1823	0.17		Sheet Flow, Wooded Sheet Woods: Light underbrush n= 0.400 P2= 2.97"
2.2	300	0.2138	2.31		Shallow Concentrated Flow, Shallow Concentrated Woodland Kv= 5.0 fps
0.8	143	0.0280	3.09	20.72	Channel Flow, Channel Area= 6.7 sf Perim= 16.0' r= 0.42' n= 0.045 Winding stream, pools & shoals
14.6	593	Total			

Subcatchment 1: Pre 1

Hydrograph



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Type II 24-hr 25YR Rainfall=5.19"

Prepared by Trinity Engineering

Printed 8/4/2023

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Summary for Subcatchment 3: Post 3

Runoff = 1.94 cfs @ 12.02 hrs, Volume= 3,513 cf, Depth> 1.77"

Routed to Link 2L : Post 1 (sub-catchments 3 & 4)

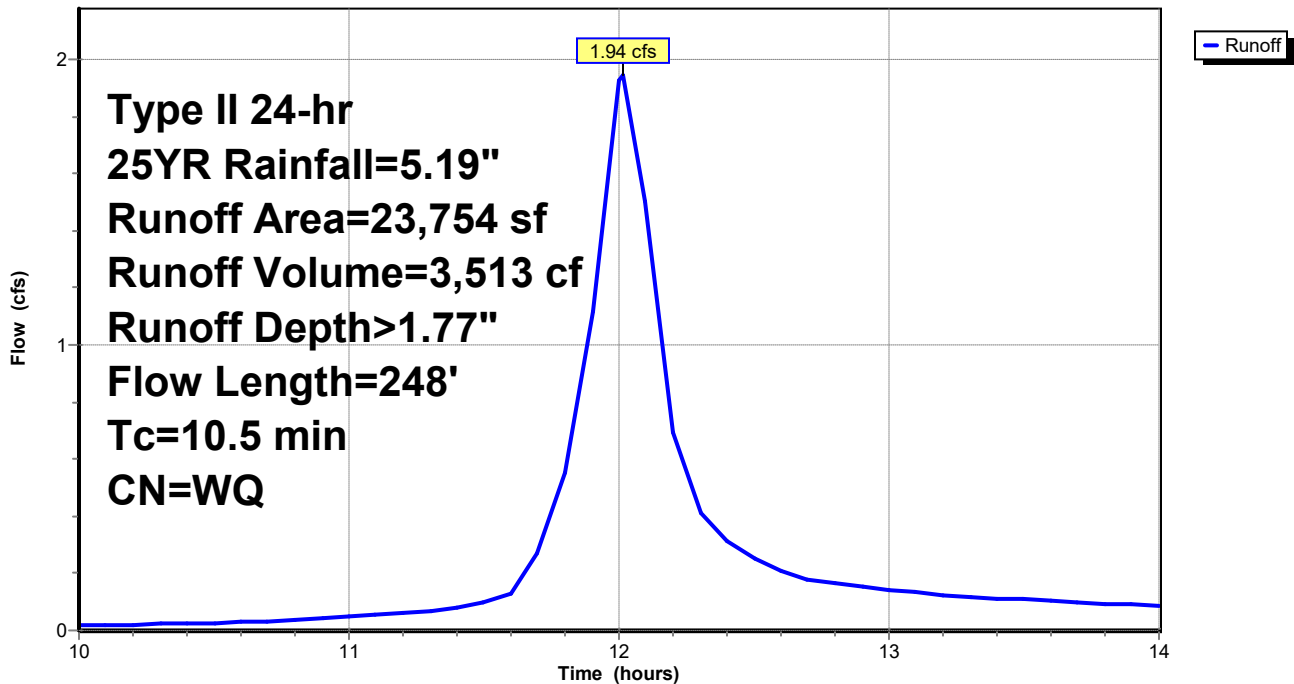
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 10.00-14.00 hrs, dt= 0.10 hrs
Type II 24-hr 25YR Rainfall=5.19"

Area (sf)	CN	Description
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701	98	Paved parking, HSG C
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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
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0.1	10	0.3000	2.47		Sheet Flow, Driveway Sheet Smooth surfaces n= 0.011 P2= 2.97"
2.3	43	0.1580	0.32		Sheet Flow, Grassy Sheet 2 Grass: Short n= 0.150 P2= 2.97"
3.1	30	0.2558	0.16		Sheet Flow, Wooded Sheet 1 Woods: Light underbrush n= 0.400 P2= 2.97"
1.2	20	0.1580	0.27		Sheet Flow, Grassy Sheet 3 Grass: Short n= 0.150 P2= 2.97"
0.9	98	0.1468	1.92		Shallow Concentrated Flow, Wooded Shallow Woodland Kv= 5.0 fps
10.5	248	Total			

Subcatchment 3: Post 3

Hydrograph



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Type II 24-hr 25YR Rainfall=5.19"

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Summary for Subcatchment 4: Post 4

Runoff = 2.54 cfs @ 12.07 hrs, Volume= 5,022 cf, Depth> 1.57"

Routed to Reach 4R : Stream between sub-catchments 3 & 4

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 10.00-14.00 hrs, dt= 0.10 hrs

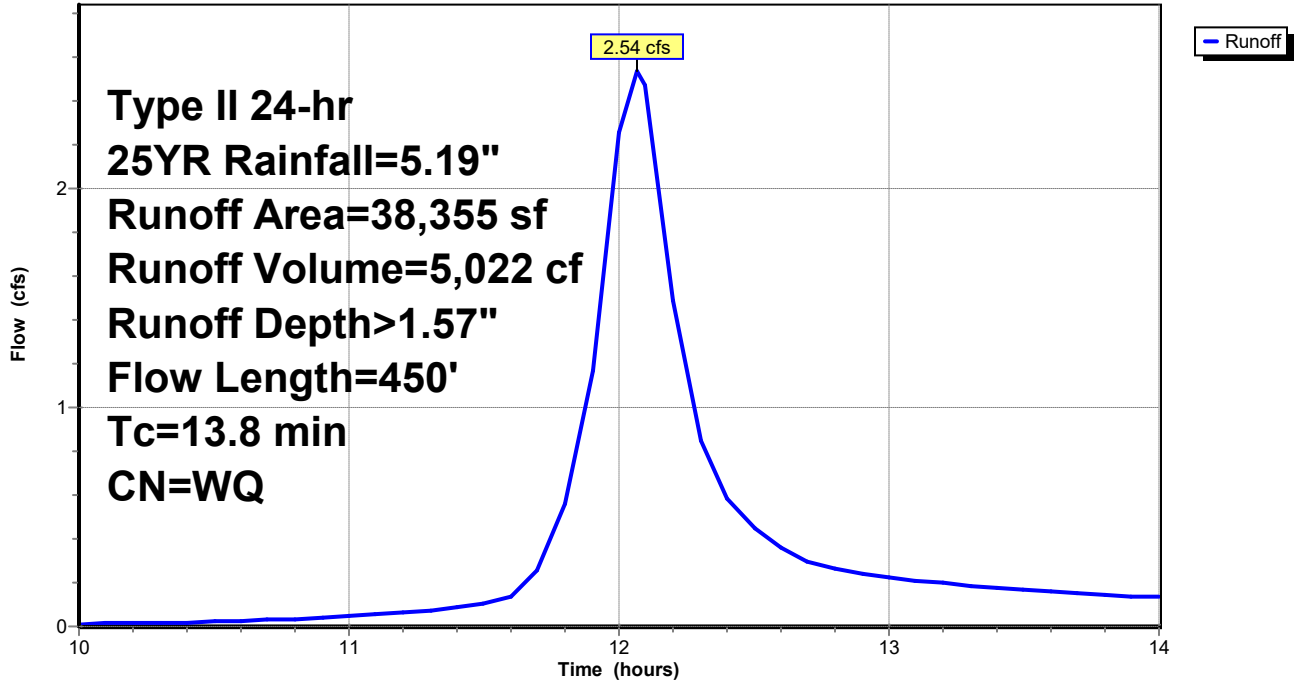
Type II 24-hr 25YR Rainfall=5.19"

Area (sf)	CN	Description
3,639	74	>75% Grass cover, Good, HSG C
0	98	Paved parking, HSG C
1,376	98	Unconnected pavement, HSG C
33,340	70	Woods, Good, HSG C
38,355		Weighted Average
36,979		96.41% Pervious Area
1,376		3.59% Impervious Area
1,376		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	79	0.0914	0.29		Sheet Flow, Grassy Sheet Grass: Short n= 0.150 P2= 2.97"
7.0	71	0.1823	0.17		Sheet Flow, Wooded Sheet Woods: Light underbrush n= 0.400 P2= 2.97"
2.2	300	0.2138	2.31		Shallow Concentrated Flow, Wooded Concentrated Woodland Kv= 5.0 fps
13.8	450	Total			

Subcatchment 4: Post 4

Hydrograph



Summary for Reach 4R: Stream between sub-catchments 3 & 4

Inflow Area = 38,355 sf, 3.59% Impervious, Inflow Depth > 1.57" for 25YR event
 Inflow = 2.54 cfs @ 12.07 hrs, Volume= 5,022 cf
 Outflow = 2.41 cfs @ 12.11 hrs, Volume= 4,981 cf, Atten= 5%, Lag= 2.3 min
 Routed to Link 2L : Post 1 (sub-catchments 3 & 4)

Routing by Stor-Ind+Trans method, Time Span= 10.00-14.00 hrs, dt= 0.10 hrs
 Max. Velocity= 1.67 fps, Min. Travel Time= 1.4 min
 Avg. Velocity = 0.75 fps, Avg. Travel Time= 3.2 min

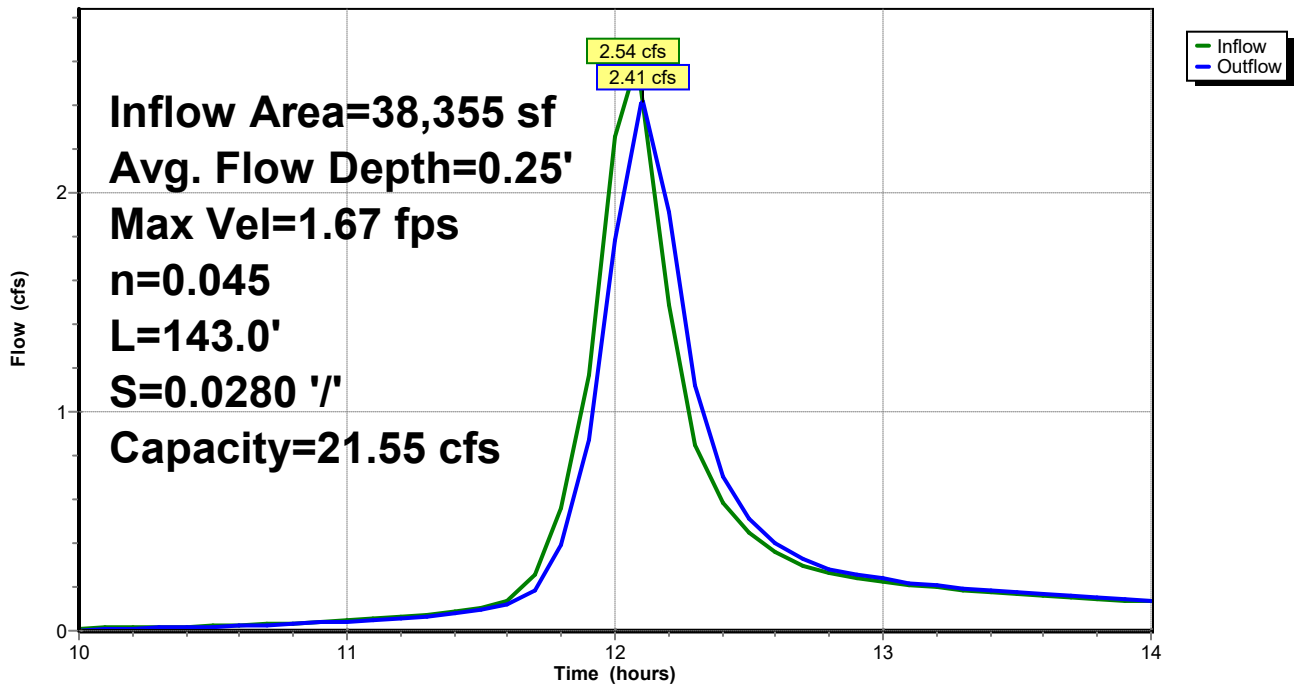
Peak Storage= 218 cf @ 12.09 hrs
 Average Depth at Peak Storage= 0.25' , Surface Width= 9.16'
 Bank-Full Depth= 0.67' Flow Area= 6.7 sf, Capacity= 21.55 cfs

15.00' x 0.67' deep Parabolic Channel, n= 0.045 Winding stream, pools & shoals
 Length= 143.0' Slope= 0.0280 '/'
 Inlet Invert= 1,502.00', Outlet Invert= 1,498.00'



Reach 4R: Stream between sub-catchments 3 & 4

Hydrograph

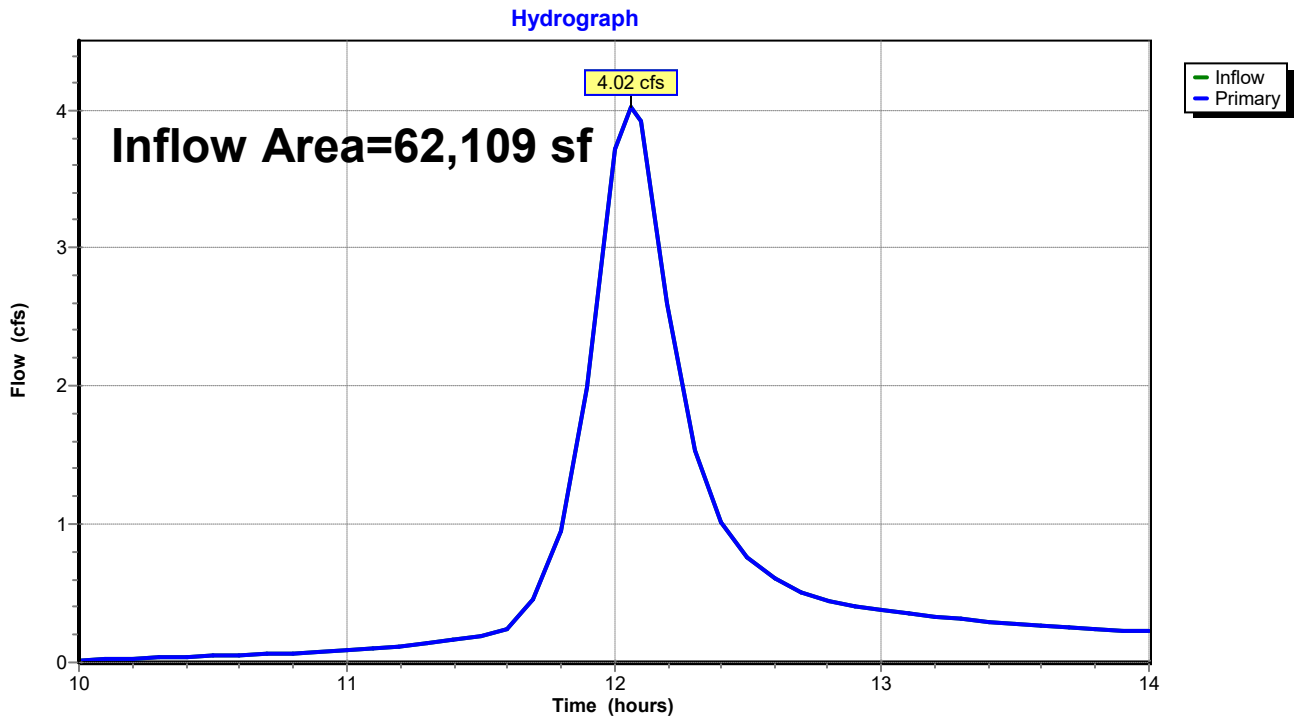


Summary for Link 2L: Post 1 (sub-catchments 3 & 4)

Inflow Area = 62,109 sf, 6.17% Impervious, Inflow Depth > 1.64" for 25YR event
Inflow = 4.02 cfs @ 12.06 hrs, Volume= 8,493 cf
Primary = 4.02 cfs @ 12.06 hrs, Volume= 8,493 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 10.00-14.00 hrs, dt= 0.10 hrs

Link 2L: Post 1 (sub-catchments 3 & 4)



22194 DiStefano SW - copy 2

Prepared by Trinity Engineering

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Type II 24-hr 100YR Rainfall=6.50"

Printed 8/4/2023

Summary for Subcatchment 1: Pre 1

Runoff = 5.92 cfs @ 12.07 hrs, Volume= 12,081 cf, Depth> 2.33"

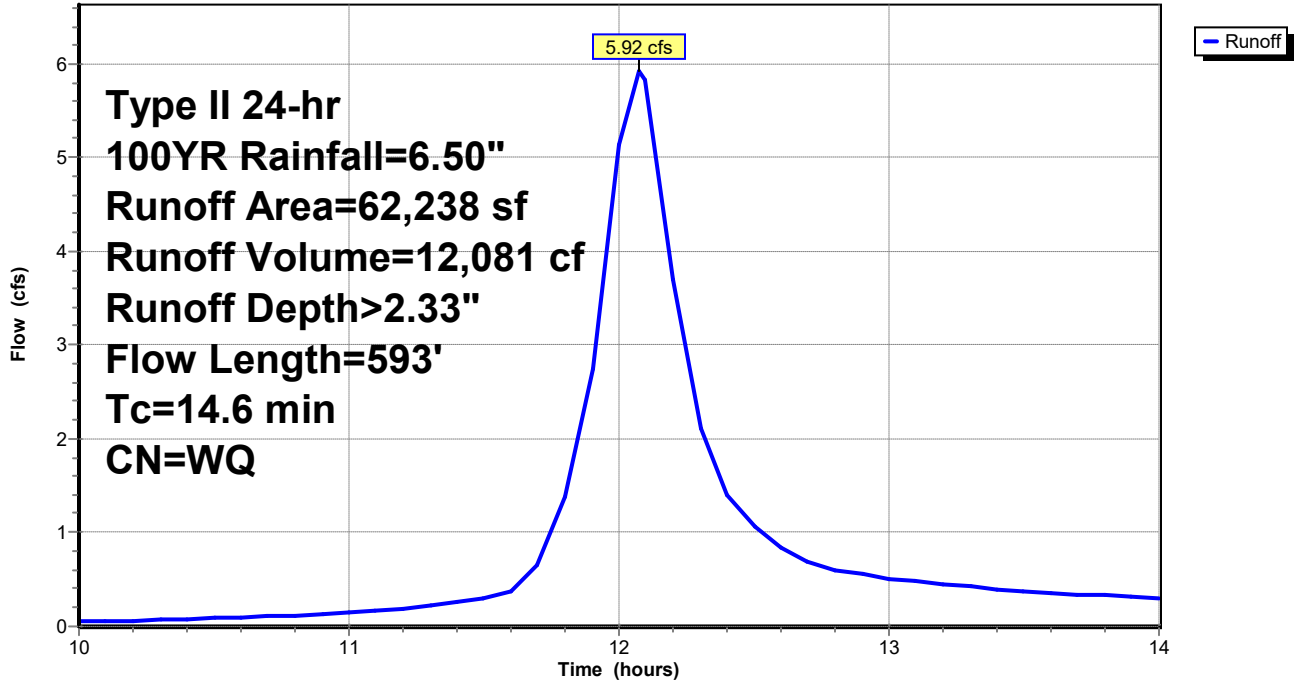
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 10.00-14.00 hrs, dt= 0.10 hrs
 Type II 24-hr 100YR Rainfall=6.50"

Area (sf)	CN	Description
4,484	74	>75% Grass cover, Good, HSG C
2,297	98	Unconnected pavement, HSG C
55,457	70	Woods, Good, HSG C
62,238		Weighted Average
59,941		96.31% Pervious Area
2,297		3.69% Impervious Area
2,297		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	79	0.0914	0.29		Sheet Flow, Grassy Sheet Grass: Short n= 0.150 P2= 2.97"
7.0	71	0.1823	0.17		Sheet Flow, Wooded Sheet Woods: Light underbrush n= 0.400 P2= 2.97"
2.2	300	0.2138	2.31		Shallow Concentrated Flow, Shallow Concentrated Woodland Kv= 5.0 fps
0.8	143	0.0280	3.09	20.72	Channel Flow, Chennel Area= 6.7 sf Perim= 16.0' r= 0.42' n= 0.045 Winding stream, pools & shoals
14.6	593	Total			

Subcatchment 1: Pre 1

Hydrograph



22194 DiStefano SW - copy 2

Prepared by Trinity Engineering

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Type II 24-hr 100YR Rainfall=6.50"

Printed 8/4/2023

Summary for Subcatchment 3: Post 3

Runoff = 2.77 cfs @ 12.01 hrs, Volume= 5,066 cf, Depth> 2.56"

Routed to Link 2L : Post 1 (sub-catchments 3 & 4)

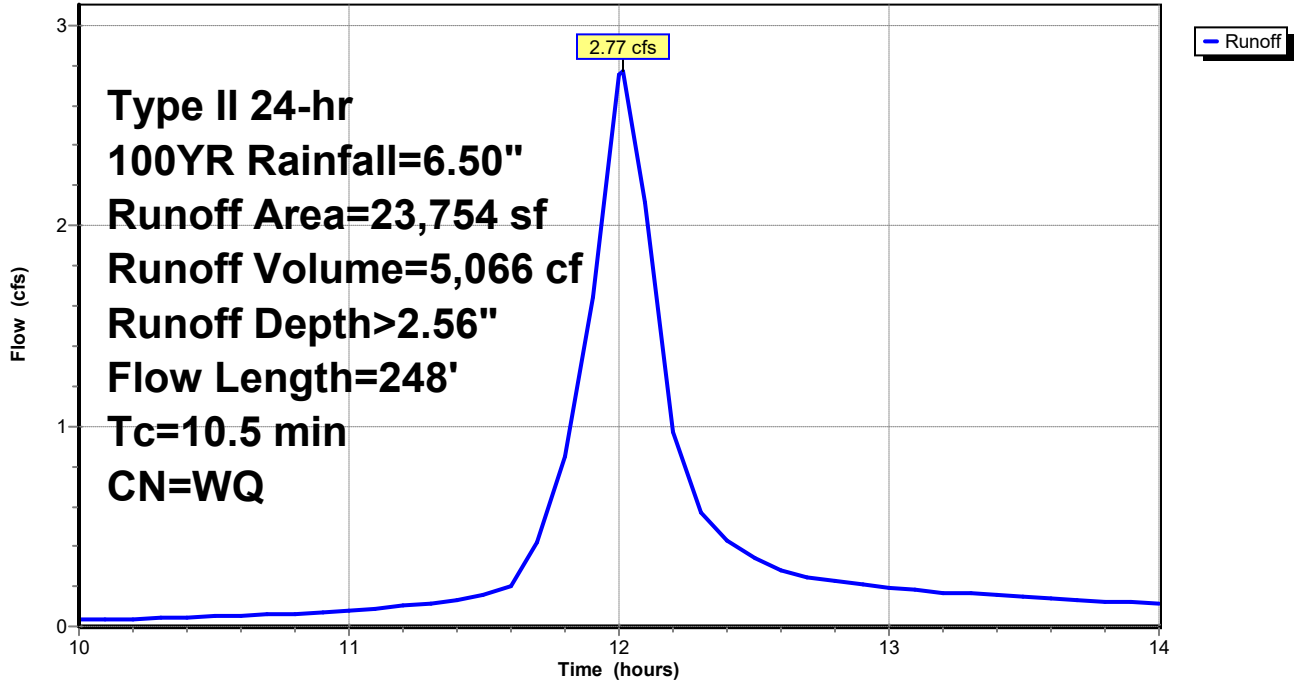
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 10.00-14.00 hrs, dt= 0.10 hrs
Type II 24-hr 100YR Rainfall=6.50"

Area (sf)	CN	Description
8,658	74	>75% Grass cover, Good, HSG C
701	98	Paved parking, HSG C
835	98	Roofs, HSG C
921	98	Unconnected pavement, HSG C
12,639	70	Woods, Good, HSG C
23,754		Weighted Average
21,297		89.66% Pervious Area
2,457		10.34% Impervious Area
921		37.48% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	47	0.1050	0.27		Sheet Flow, Grass Sheet 1 Grass: Short n= 0.150 P2= 2.97"
0.1	10	0.3000	2.47		Sheet Flow, Driveway Sheet Smooth surfaces n= 0.011 P2= 2.97"
2.3	43	0.1580	0.32		Sheet Flow, Grassy Sheet 2 Grass: Short n= 0.150 P2= 2.97"
3.1	30	0.2558	0.16		Sheet Flow, Wooded Sheet 1 Woods: Light underbrush n= 0.400 P2= 2.97"
1.2	20	0.1580	0.27		Sheet Flow, Grassy Sheet 3 Grass: Short n= 0.150 P2= 2.97"
0.9	98	0.1468	1.92		Shallow Concentrated Flow, Wooded Shallow Woodland Kv= 5.0 fps
10.5	248	Total			

Subcatchment 3: Post 3

Hydrograph



22194 DiStefano SW - copy 2

Type II 24-hr 100YR Rainfall=6.50"

Prepared by Trinity Engineering

Printed 8/4/2023

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Summary for Subcatchment 4: Post 4

Runoff = 3.71 cfs @ 12.06 hrs, Volume= 7,469 cf, Depth> 2.34"

Routed to Reach 4R : Stream between sub-catchments 3 & 4

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 10.00-14.00 hrs, dt= 0.10 hrs

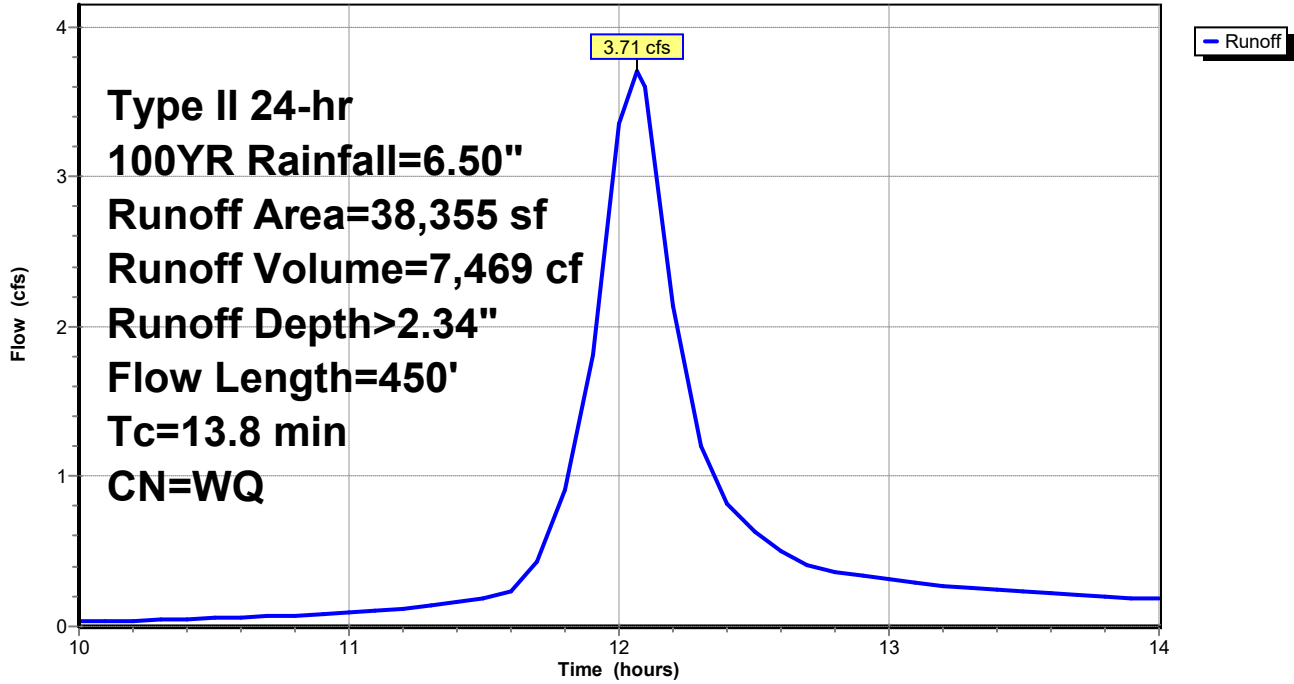
Type II 24-hr 100YR Rainfall=6.50"

Area (sf)	CN	Description
3,639	74	>75% Grass cover, Good, HSG C
0	98	Paved parking, HSG C
1,376	98	Unconnected pavement, HSG C
33,340	70	Woods, Good, HSG C
38,355		Weighted Average
36,979		96.41% Pervious Area
1,376		3.59% Impervious Area
1,376		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	79	0.0914	0.29		Sheet Flow, Grassy Sheet Grass: Short n= 0.150 P2= 2.97"
7.0	71	0.1823	0.17		Sheet Flow, Wooded Sheet Woods: Light underbrush n= 0.400 P2= 2.97"
2.2	300	0.2138	2.31		Shallow Concentrated Flow, Wooded Concentrated Woodland Kv= 5.0 fps
13.8	450	Total			

Subcatchment 4: Post 4

Hydrograph



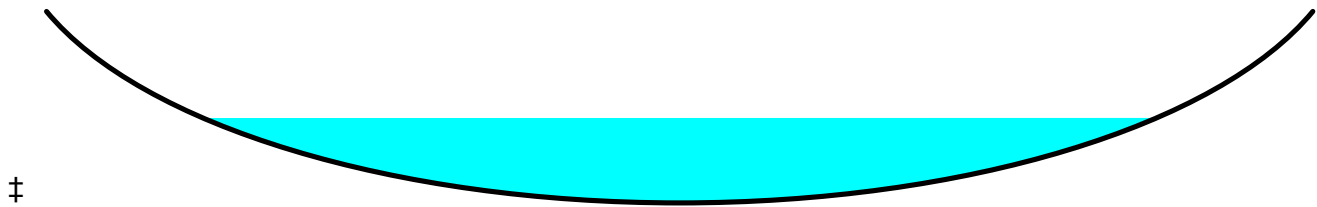
Summary for Reach 4R: Stream between sub-catchments 3 & 4

Inflow Area = 38,355 sf, 3.59% Impervious, Inflow Depth > 2.34" for 100YR event
 Inflow = 3.71 cfs @ 12.06 hrs, Volume= 7,469 cf
 Outflow = 3.56 cfs @ 12.10 hrs, Volume= 7,414 cf, Atten= 4%, Lag= 2.0 min
 Routed to Link 2L : Post 1 (sub-catchments 3 & 4)

Routing by Stor-Ind+Trans method, Time Span= 10.00-14.00 hrs, dt= 0.10 hrs
 Max. Velocity= 1.87 fps, Min. Travel Time= 1.3 min
 Avg. Velocity = 0.86 fps, Avg. Travel Time= 2.8 min

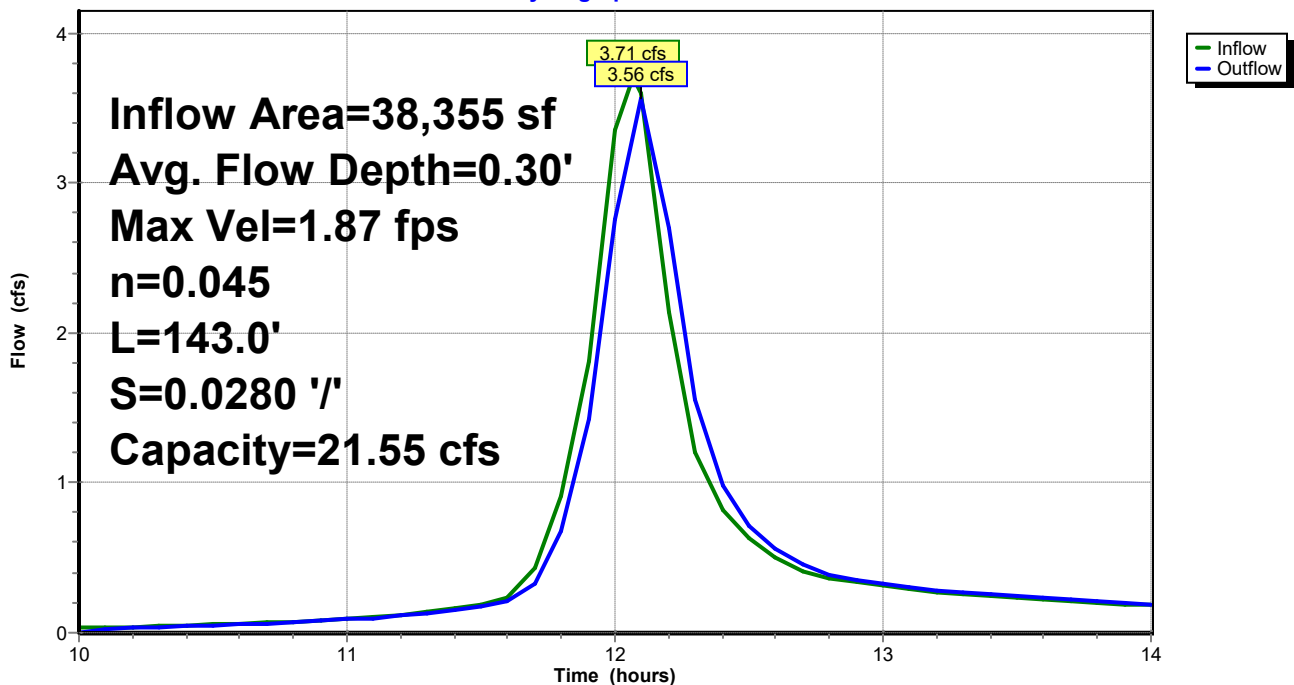
Peak Storage= 284 cf @ 12.08 hrs
 Average Depth at Peak Storage= 0.30' , Surface Width= 10.00'
 Bank-Full Depth= 0.67' Flow Area= 6.7 sf, Capacity= 21.55 cfs

15.00' x 0.67' deep Parabolic Channel, n= 0.045 Winding stream, pools & shoals
 Length= 143.0' Slope= 0.0280 '/'
 Inlet Invert= 1,502.00', Outlet Invert= 1,498.00'



Reach 4R: Stream between sub-catchments 3 & 4

Hydrograph



Summary for Link 2L: Post 1 (sub-catchments 3 & 4)

Inflow Area = 62,109 sf, 6.17% Impervious, Inflow Depth > 2.41" for 100YR event
Inflow = 5.88 cfs @ 12.06 hrs, Volume= 12,479 cf
Primary = 5.88 cfs @ 12.06 hrs, Volume= 12,479 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 10.00-14.00 hrs, dt= 0.10 hrs

Link 2L: Post 1 (sub-catchments 3 & 4)

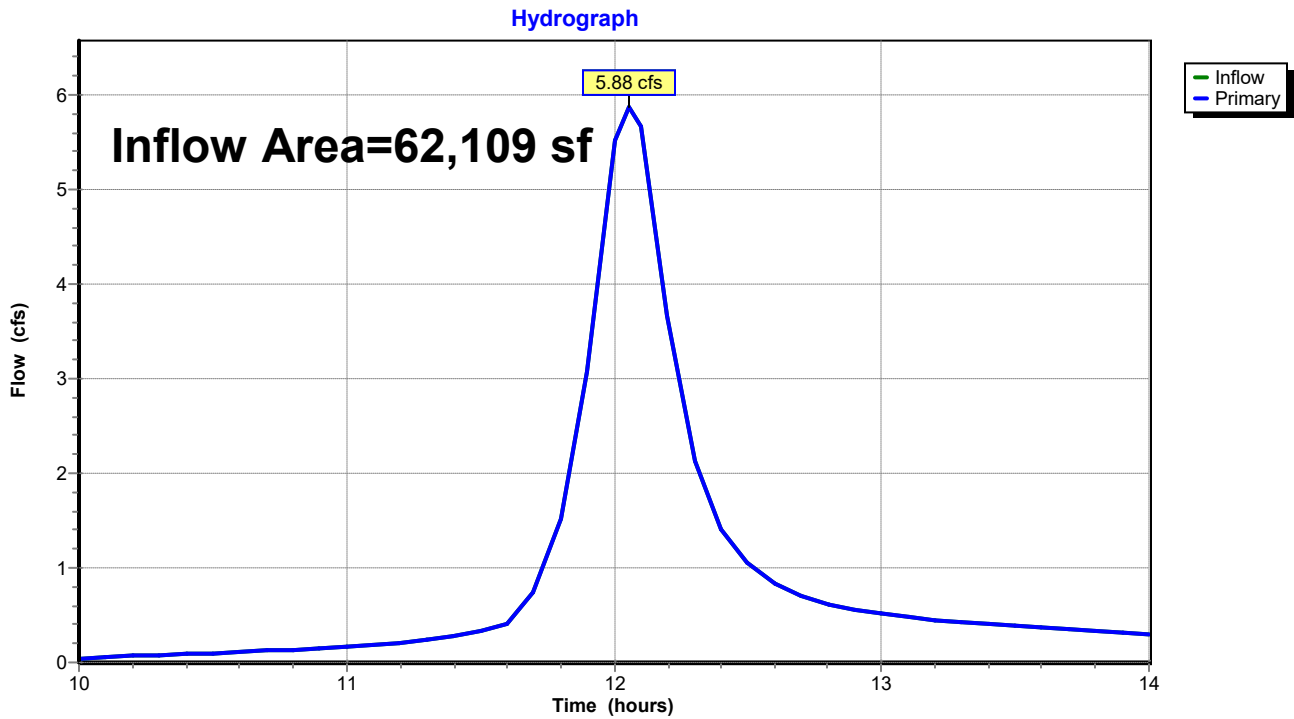


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Project Reports

- 0 Routing Diagram
- 1 Rainfall Events Listing (selected events)

1YR Event

- 1 Subcat 1: Pre 1
- 1 Subcat 3: Post 3
- 1 Subcat 4: Post 4
- 1 Reach 4R: Stream between sub-catchments 3 & 4
- 1 Link 2L: Post 1 (sub-catchments 3 & 4)

10YR Event

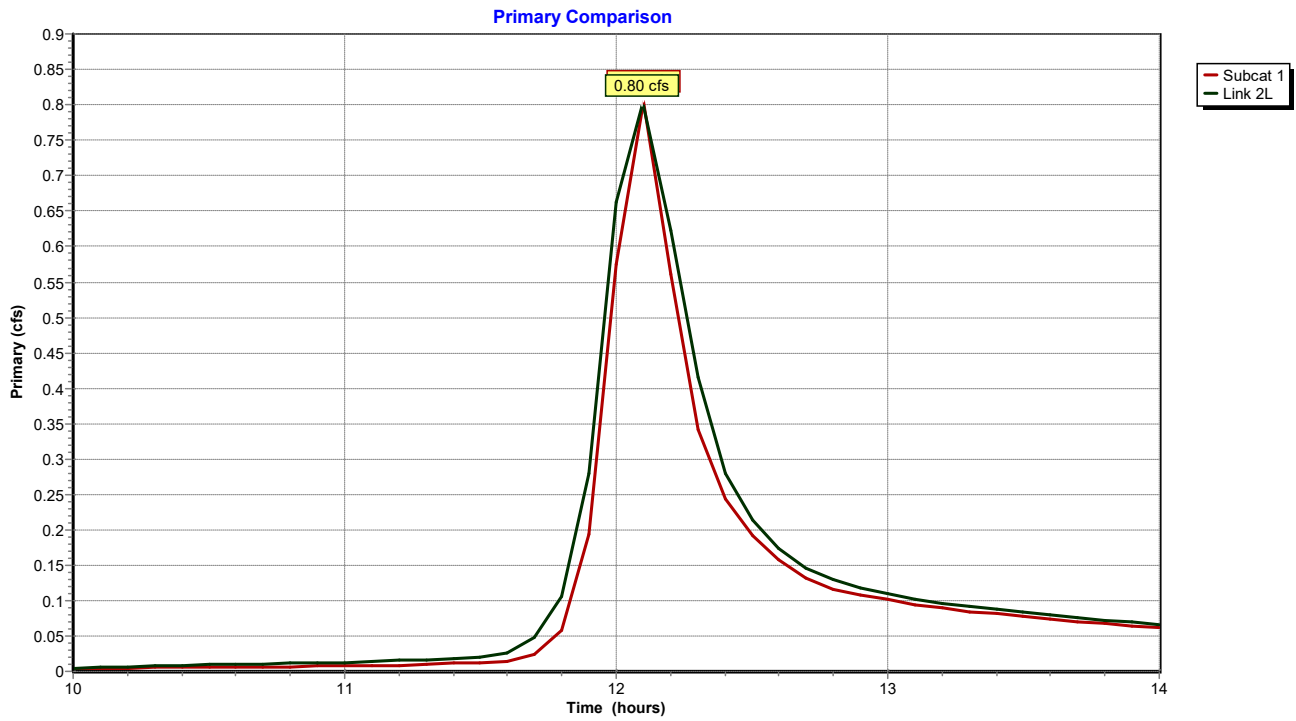
- 1 Subcat 1: Pre 1
- 1 Subcat 3: Post 3
- 1 Subcat 4: Post 4
- 1 Reach 4R: Stream between sub-catchments 3 & 4
- 1 Link 2L: Post 1 (sub-catchments 3 & 4)

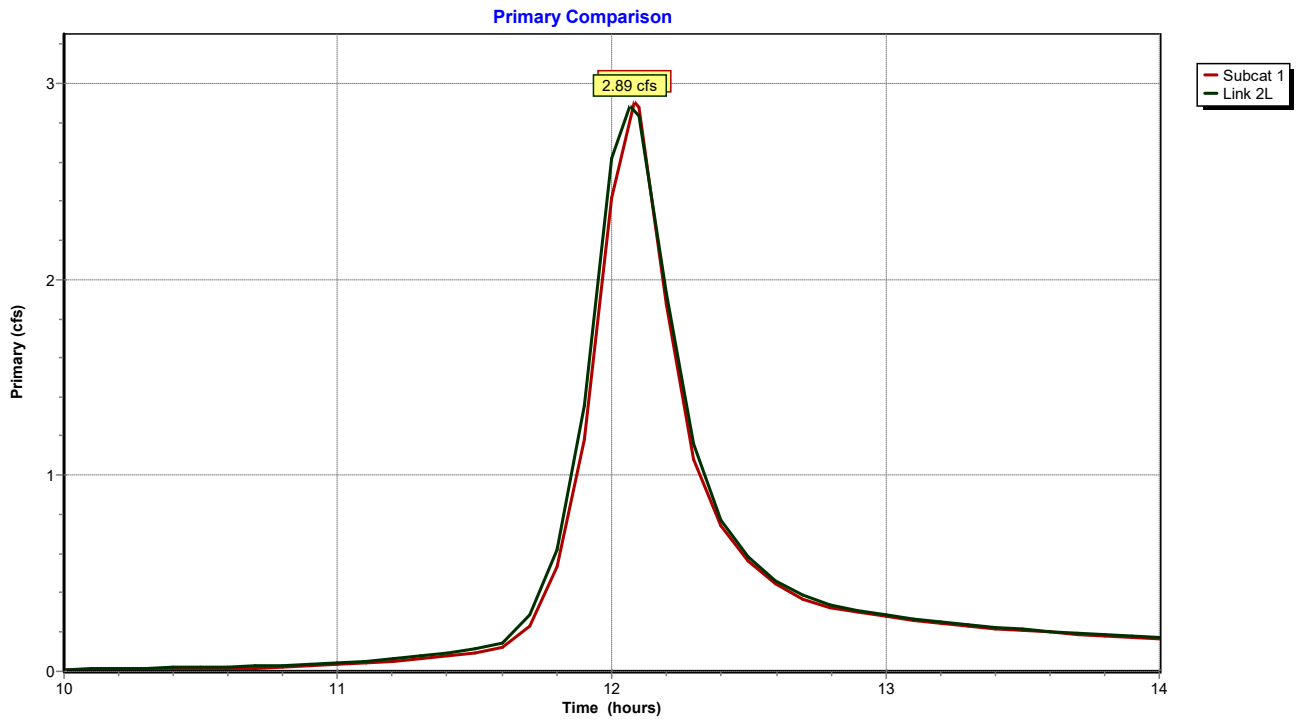
25YR Event

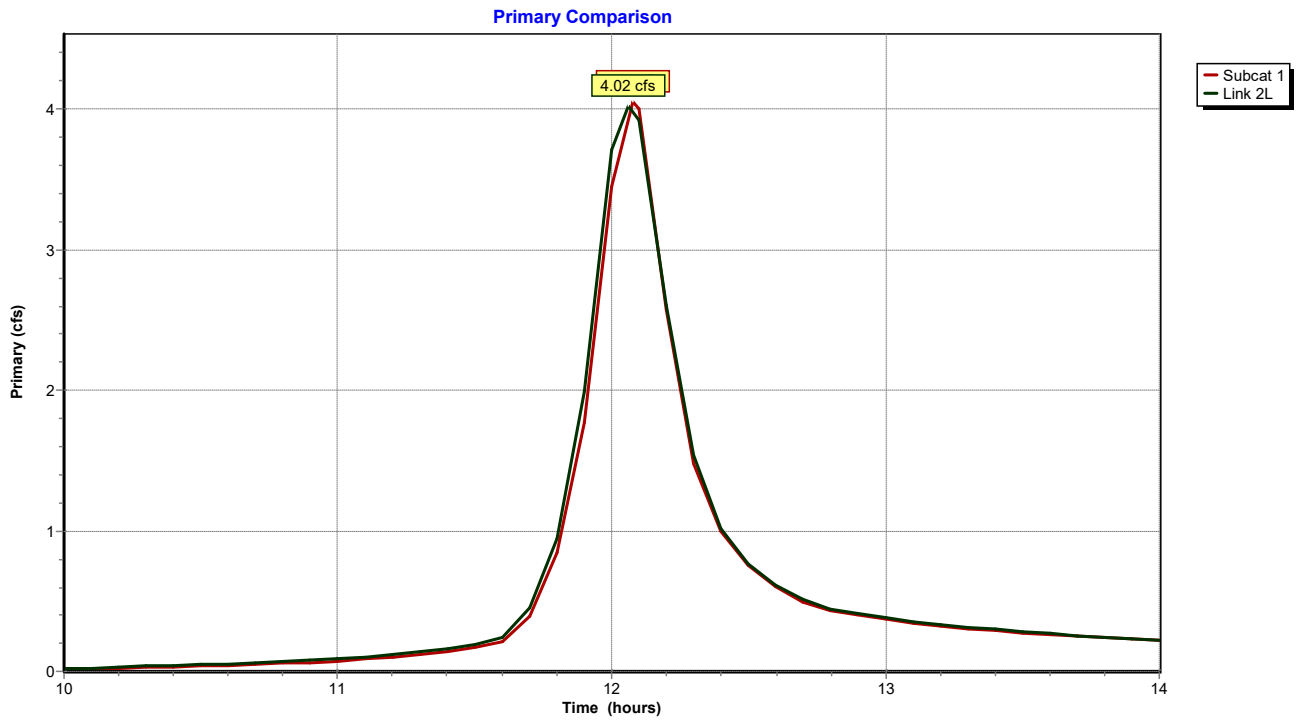
- 1 Subcat 1: Pre 1
- 1 Subcat 3: Post 3
- 1 Subcat 4: Post 4
- 1 Reach 4R: Stream between sub-catchments 3 & 4
- 1 Link 2L: Post 1 (sub-catchments 3 & 4)

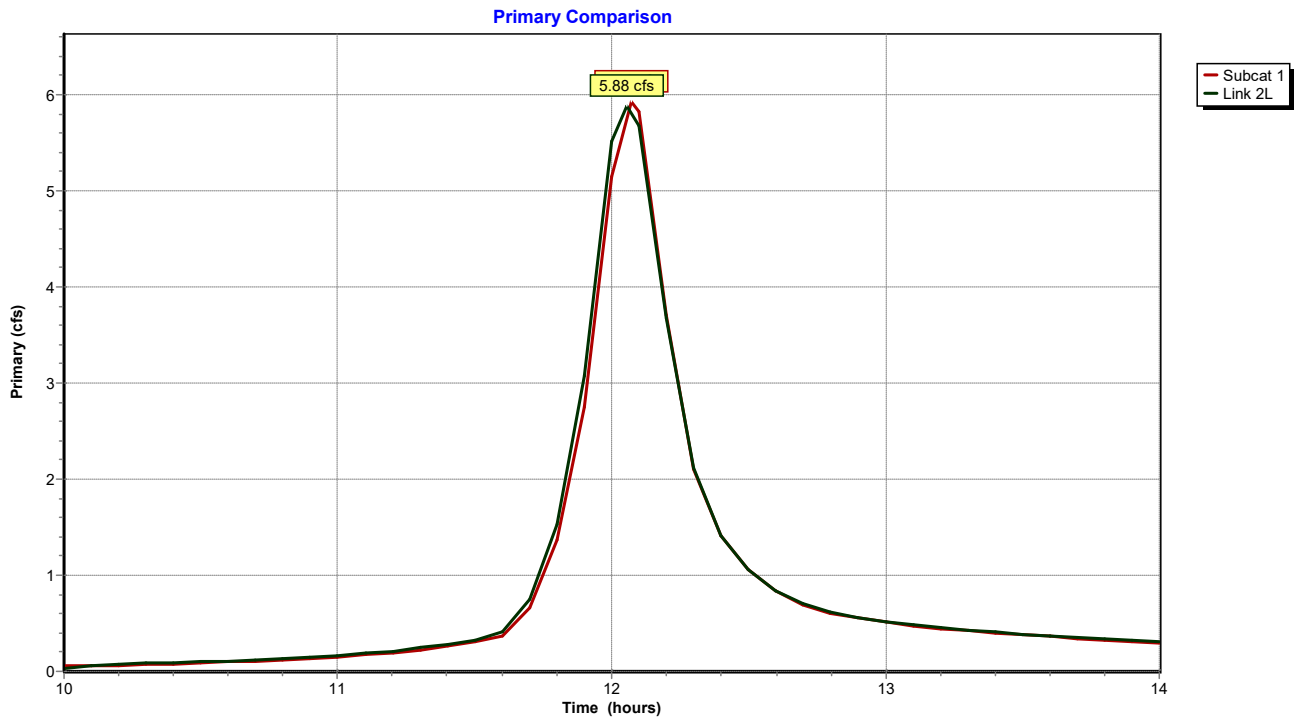
100YR Event

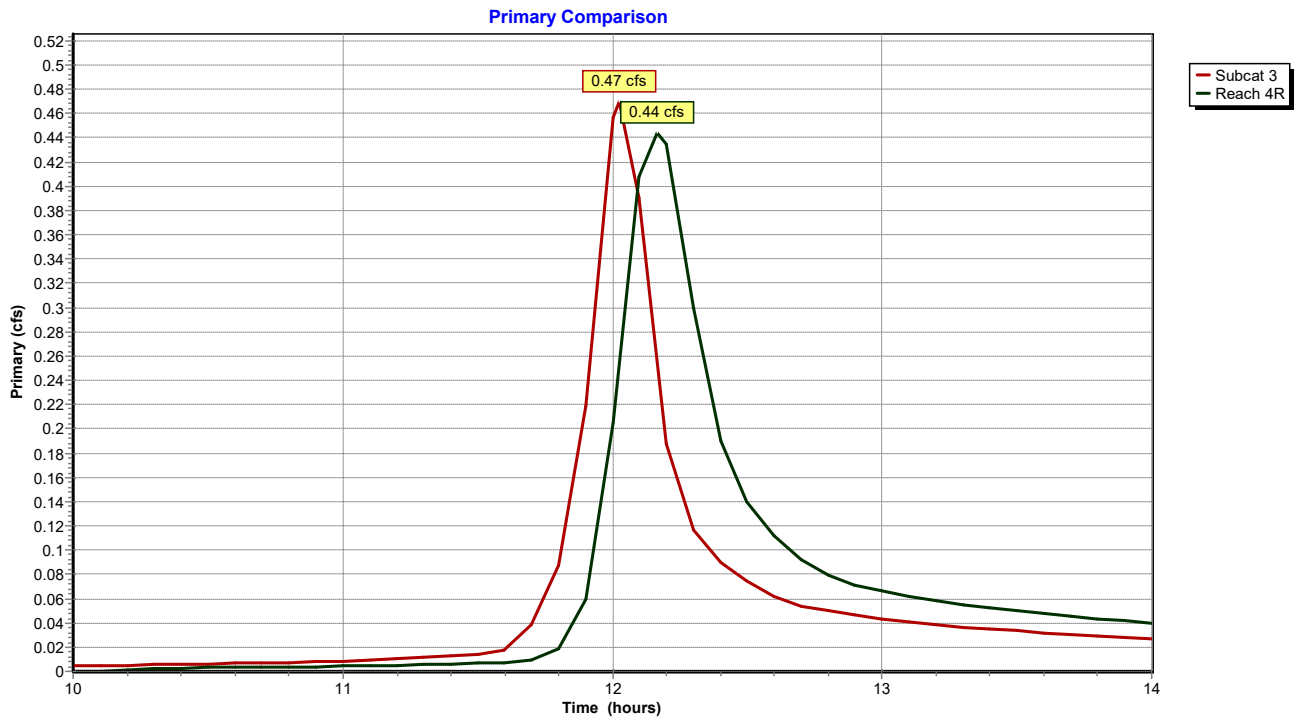
- 1 Subcat 1: Pre 1
- 1 Subcat 3: Post 3
- 1 Subcat 4: Post 4
- 1 Reach 4R: Stream between sub-catchments 3 & 4
- 1 Link 2L: Post 1 (sub-catchments 3 & 4)

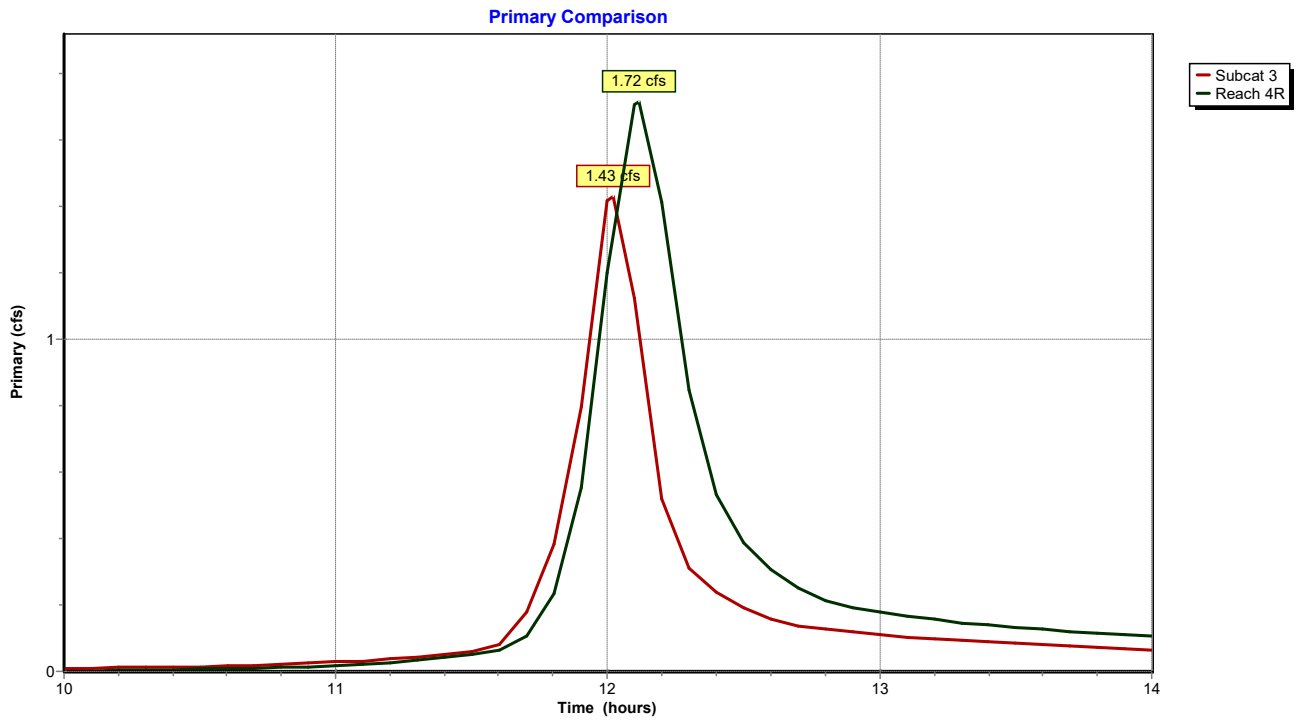


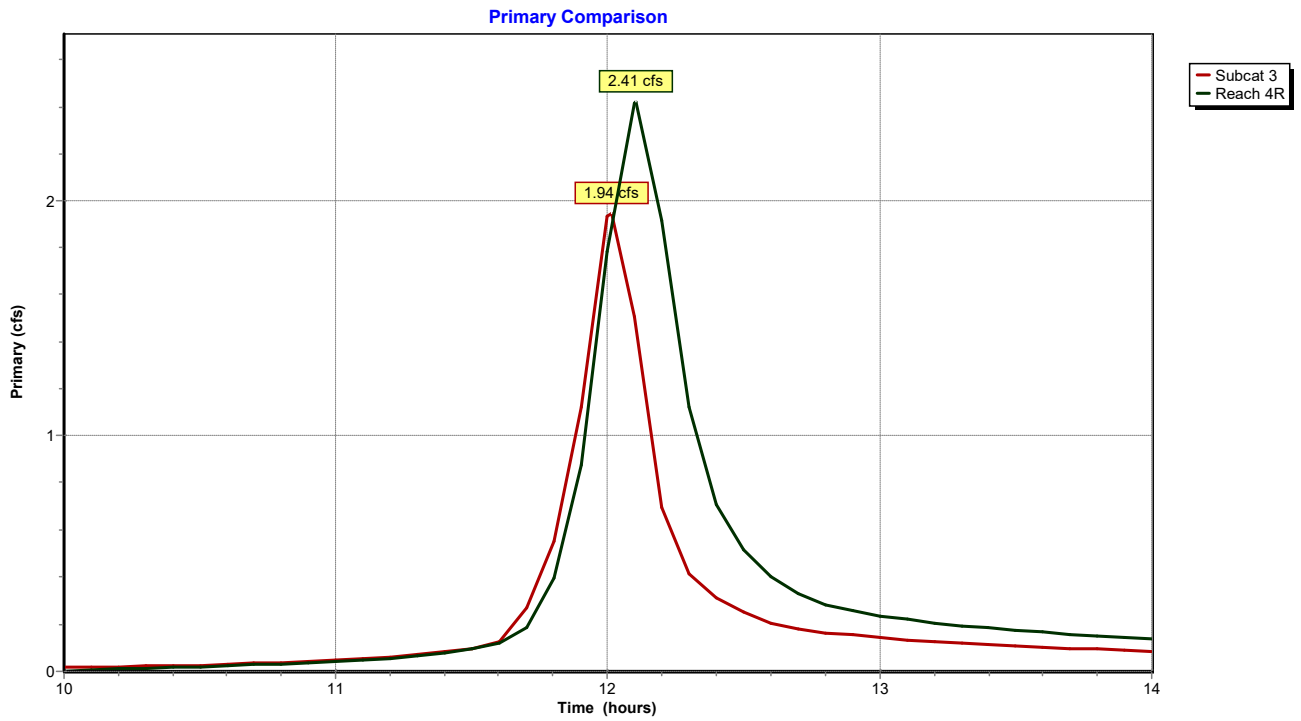


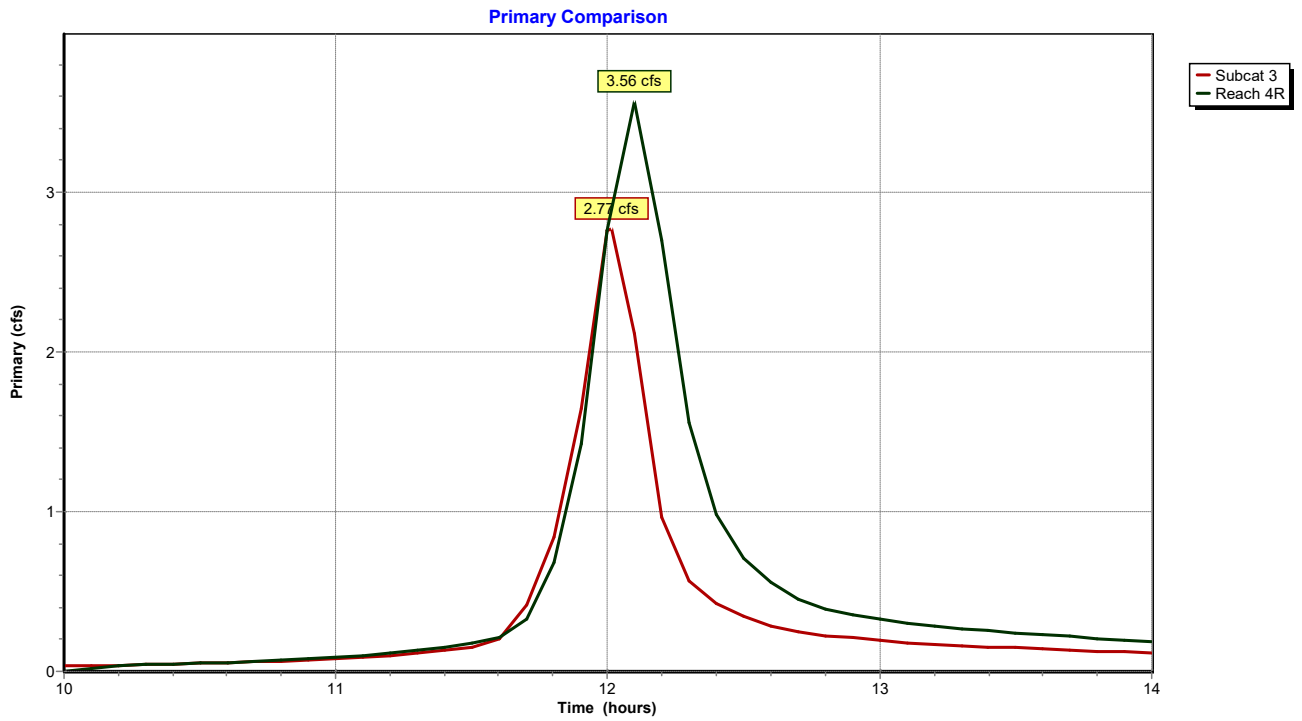


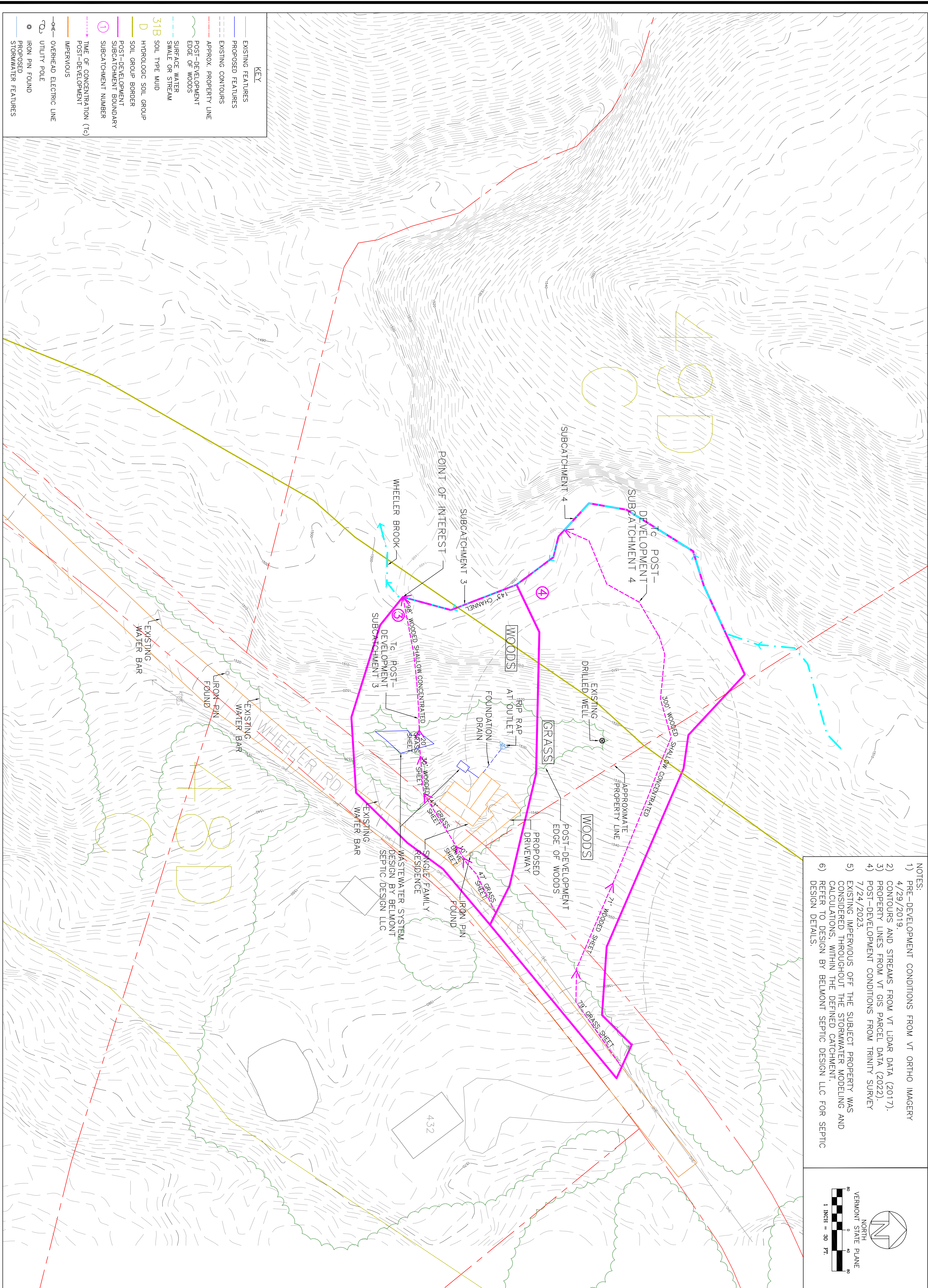




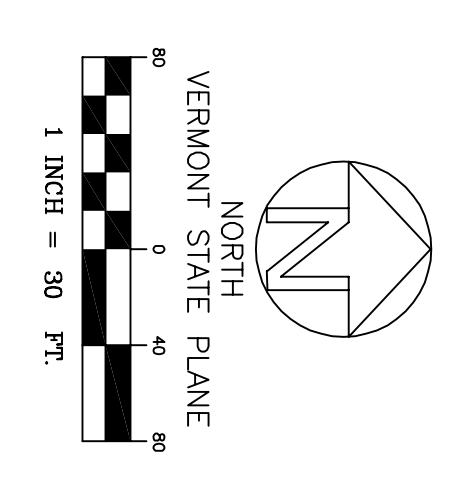








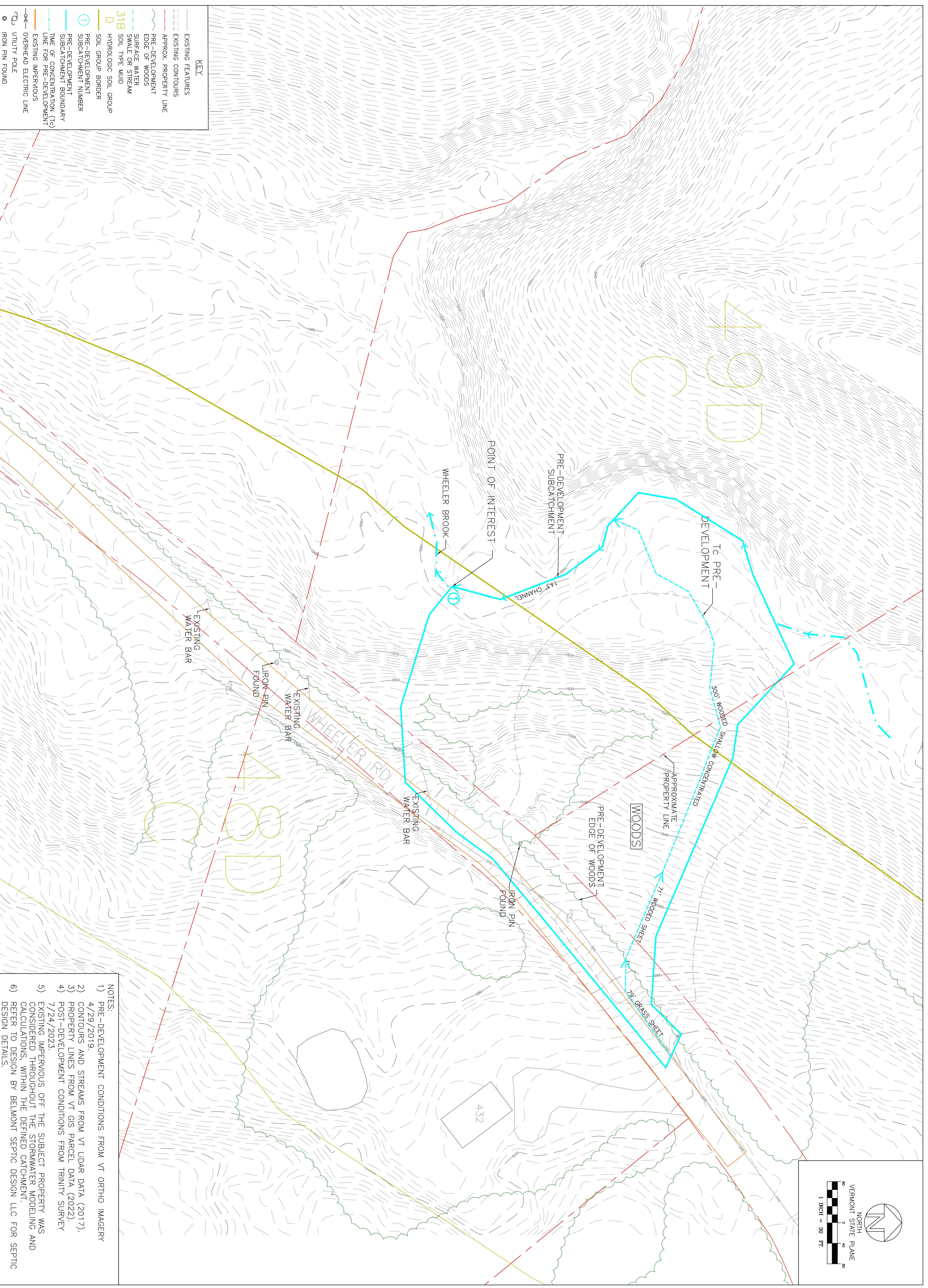
- NOTES:
- 1) PRE-DEVELOPMENT CONDITIONS FROM VT ORTHO IMAGERY 4/29/2019.
 - 2) CONTOURS AND STREAMS FROM VT LIDAR DATA (2017).
 - 3) PROPERTY LINES FROM VT GIS PARCEL DATA (2022).
 - 4) POST-DEVELOPMENT CONDITIONS FROM TRINITY SURVEY 7/24/2023.
 - 5) EXISTING IMPERVIOUS OFF THE SUBJECT PROPERTY WAS CONSIDERED THROUGHOUT THE STORMWATER MODELING AND CALCULATIONS, WITHIN THE DEFINED CATCHMENT.
 - 6) REFER TO DESIGN BY BELMONT SEPTIC DESIGN LLC FOR SEPTIC DESIGN DETAILS.



KEY

	EXISTING FEATURES
	PROPOSED FEATURES
	EXISTING CONTOURS
	APPROX. PROPERTY LINE
	POST-DEVELOPMENT EDGE OF WOODS
	SURFACE WATER
	SWALE OR STREAM
	SOIL TYPE MUD
	31B SOIL TYPE MUD
	HYDROLOGIC SOIL GROUP
	D SOIL GROUP BORDER
	POST-DEVELOPMENT SUBCATCHMENT BOUNDARY
	POST-DEVELOPMENT SUBCATCHMENT NUMBER
	TIME OF CONCENTRATION (Tc)
	POST-DEVELOPMENT IMPERVIOUS
	OVERHEAD ELECTRIC LINE
	UTILITY POLE
	IRON PIN FOUND
	PROPOSED
	STORMWATER FEATURES

PROJECT NUMBER: 22194	DATE: 8/3/2023	TITLE: POST-DEVELOPMENT STORMWATER PLAN	DESIGNED BY: J.E.D.		REV. NO. 1	DATE 8/3/23	DESCRIPTION SUBMITTAL TO WINDHAM ZBA	BY J.E.D.
			DRAWN BY: K.V.B.					
SHEET NUMBER: 2	OF 2	PROJECT: PREPARED FOR RANDY DISTEFANO 393 WHEELER ROAD TOWN OF WINDHAM, VERMONT						

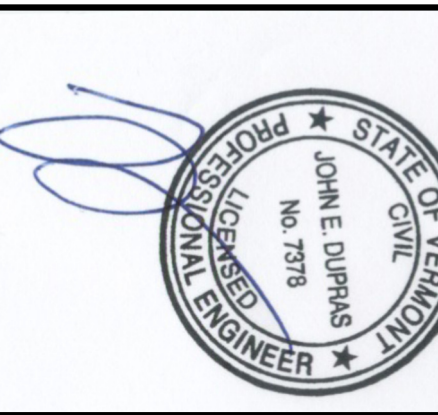


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REV. NO.	DATE	DESCRIPTION	BY
1	8/3/23	SUBMITTAL TO WINDHAM ZBA	J.E.D.



DESIGNED BY: J.E.D.
DRAWN BY: K.V.B.
CHECKED BY: J.E.D.
SCALE: AS SHOWN

PRE-DEVELOPMENT STORMWATER PLAN

PROJECT:
**PREPARED FOR RANDY DISTEFANO
393 WHEELER ROAD
TOWN OF WINDHAM, VERMONT**

DATE: 8/3/2023
PROJECT NUMBER: 22194
SHEET NUMBER: 1 OF 2
SHEET: SW-1