

# **Medenbach, Eggers & Carr**

Civil Engineering and Land Surveying PC  
4305 US Highway 209, Stone Ridge, NY 12484  
845-687-0047  
[www.mecels.com](http://www.mecels.com)

## **Design Report**

**For Proposed Access Road Culvert at**

**Buttermilk Falls**

**Proposed Hotel and Resort Expansion**

**Situated**

**North Road, Town of Marlborough, Ulster County, NY**

**June 10, 2024**

## **General Description:**

Buttermilk Falls is an existing Bed and Breakfast facility with a restaurant known as Henry's, Spa, Banquet Hall, and accessory facilities situated on 50.7 acres overlooking the Hudson River on east side of North Road in Milton New York.

The proposal is to add a 65-room hotel, 35 individual cabins, 60 seat restaurant and 300 seat banquet hall among other accessory facilities. This will include adding 5.3 adjacent acres to the main parcel and 6 acres on the west side of North Road on corner of Mahoney Road for parking. Total Site area is 62.0 acres.

A Proposed new access road from North Road to the proposed Hotel site will require a culvert to cross a unclassified stream that flows south across the frontage of the site. The bridge will only be used by staff and small delivery trucks. The existing 12' x 6' stone arch bridge 300 ft south of the proposed bridge will remain and be used for access to the private lot SBL 103.1-2-12.100, 3.5 acres. The existing wooded bridge 50 ft north of the proposed bridge will be removed. The existing wood bridge 350 ft north identified as wood bridge consists of wood railings over two 48" HDPE culverts and will be used for pedestrian traffic.

## **Culvert Design**

The proposed culvert will consist of reinforced concrete abutments and reinforced concrete deck. The bridge is designed for a H20 loading and to pass the 100 year storm.

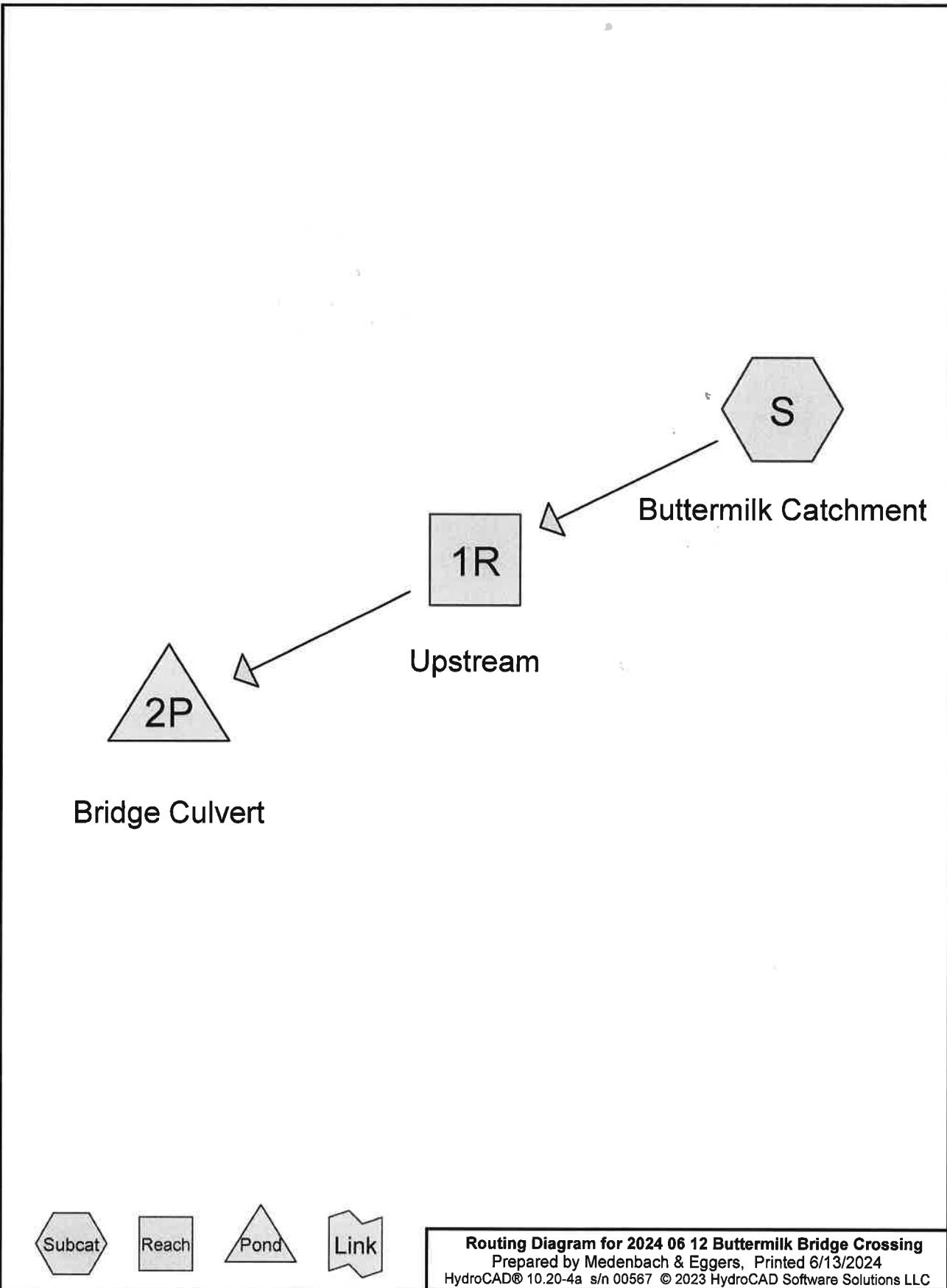
The 100 year storm design flow at 470 cfs and results in surface water elevation of 153.6 ft at discharge of culvert. Streambed is at elevation 145.5 ft, top of 12 thick culvert at 155.5. This will provide 12" of freeboard under culvert.

## **Attached:**

HydroCAD calculation 9 sheets

Photo of 5'x12' metal box culvert upstream under North Rd

Photo of 6' x12' Stone arch bridge downstream



**2024 06 12 Buttermilk Bridge Crossing**

Prepared by Medenbach &amp; Eggers

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**Rainfall Events Listing (selected events)**

of 9

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	100-year	Type II 24-hr		Default	24.00	1	8.60	2

**2024 06 12 Buttermilk Bridge Crossing**

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**Pipe Listing (all nodes)**

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)	Node Name
1	2P	146.00	145.68	32.0	0.0100	0.030	144.0	90.0	0.0	

Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment S: Buttermilk Catchment** Runoff Area=1,145.000 ac 0.00% Impervious Runoff Depth=2.06"  
Flow Length=12,150' Tc=174.1 min CN=45 Runoff=468.84 cfs 196.728 af

**Reach 1R: Upstream** Avg. Flow Depth=2.69' Max Vel=7.15 fps Inflow=488.84 cfs 276.083 af  
n=0.030 L=200.0' S=0.0100 '/' Capacity=1,144.29 cfs Outflow=488.80 cfs 276.029 af

**Pond 2P: Bridge Culvert** Peak Elev=153.63' Storage=305,814 cf Inflow=488.80 cfs 276.029 af  
144.0" x 90.0" Box Culvert n=0.030 L=32.0' S=0.0100 '/' Outflow=465.78 cfs 276.018 af

**Total Runoff Area = 1,145.000 ac Runoff Volume = 196.728 af Average Runoff Depth = 2.06"**  
**100.00% Pervious = 1,145.000 ac 0.00% Impervious = 0.000 ac**

### Summary for Subcatchment S: Buttermilk Catchment

Runoff = 468.84 cfs @ 14.31 hrs, Volume= 196.728 af, Depth= 2.06"  
 Routed to Reach 1R : Upstream

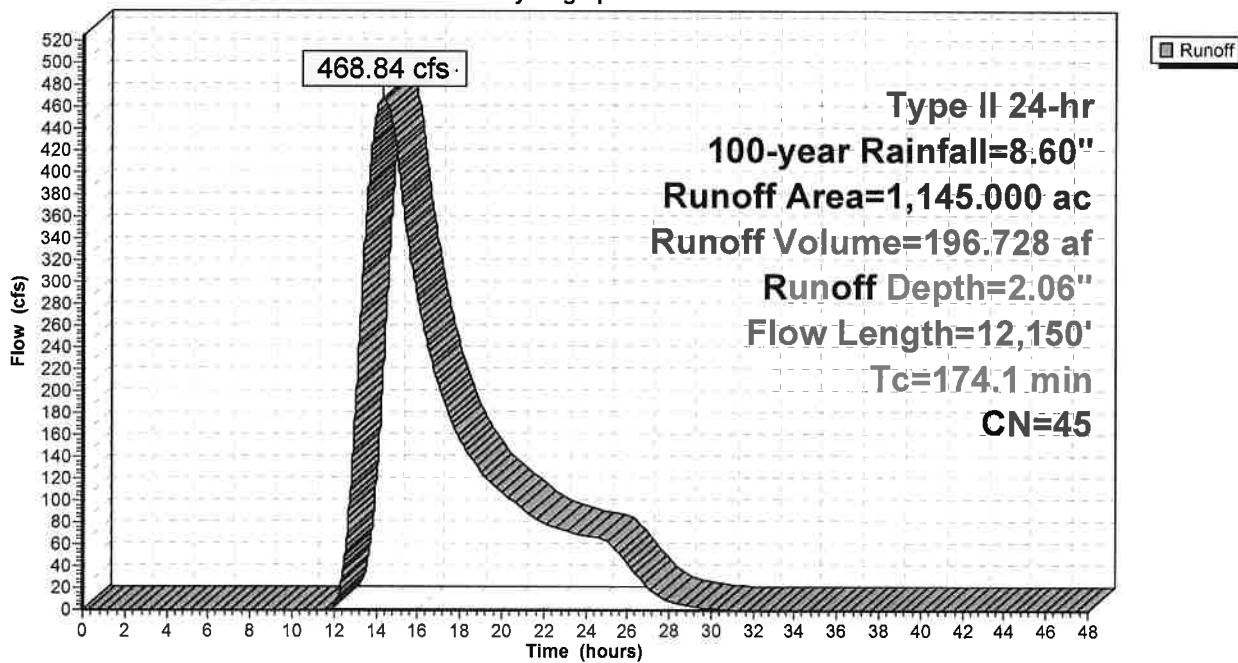
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 Type II 24-hr 100-year Rainfall=8.60"

Area (ac)	CN	Description
* 1,145.000	45	Woods/grass comb., Fair, HSG A
1,145.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.4	150	0.0200	0.09		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.75"
51.1	2,000	0.0170	0.65		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
95.6	10,000	0.0017	1.74	20.92	Channel Flow, Area= 12.0 sf Perim= 20.0' r= 0.60' n= 0.025 Earth, clean & winding
174.1	12,150				Total

### Subcatchment S: Buttermilk Catchment

Hydrograph



### Summary for Reach 1R: Upstream

Inflow Area = 1,145.000 ac, 0.00% Impervious, Inflow Depth > 2.89" for 100-year event  
 Inflow = 488.84 cfs @ 14.31 hrs, Volume= 276.083 af, Incl. 20.00 cfs Base Flow  
 Outflow = 488.80 cfs @ 14.33 hrs, Volume= 276.029 af, Atten= 0%, Lag= 0.8 min  
 Routed to Pond 2P : Bridge Culvert

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 7.15 fps, Min. Travel Time= 0.5 min

Avg. Velocity = 3.54 fps, Avg. Travel Time= 0.9 min

Peak Storage= 13,671 cf @ 14.32 hrs

Average Depth at Peak Storage= 2.69', Surface Width= 38.87'

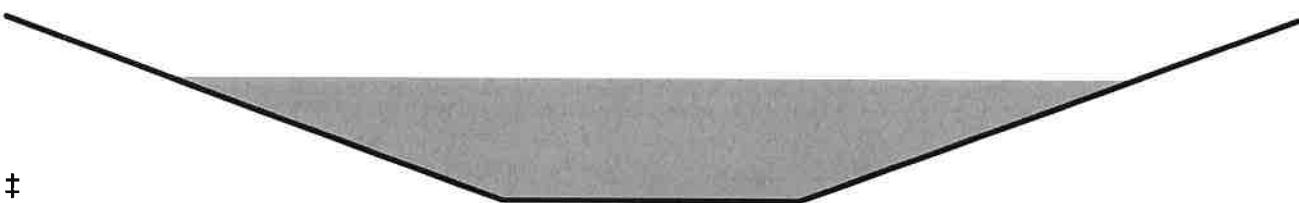
Bank-Full Depth= 4.00' Flow Area= 128.0 sf, Capacity= 1,144.29 cfs

12.00' x 4.00' deep channel, n= 0.030 Stream, clean & straight

Side Slope Z-value= 5.0 '/' Top Width= 52.00'

Length= 200.0' Slope= 0.0100 '/'

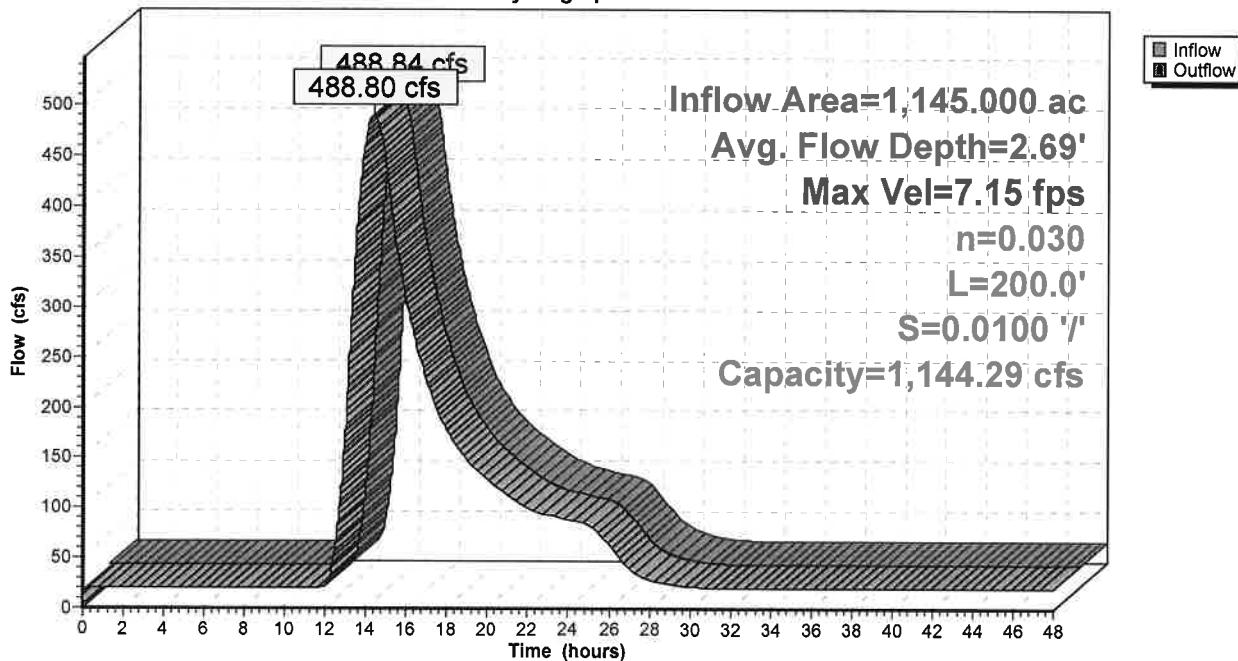
Inlet Invert= 151.00', Outlet Invert= 149.00'



‡

### Reach 1R: Upstream

Hydrograph



### Summary for Pond 2P: Bridge Culvert

Inflow Area = 1,145.000 ac, 0.00% Impervious, Inflow Depth > 2.89" for 100-year event  
 Inflow = 488.80 cfs @ 14.33 hrs, Volume= 276.029 af  
 Outflow = 465.78 cfs @ 14.78 hrs, Volume= 276.018 af, Atten= 5%, Lag= 27.0 min  
 Primary = 465.78 cfs @ 14.78 hrs, Volume= 276.018 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs  
 Peak Elev= 153.63' @ 14.78 hrs Surf.Area= 114,507 sf Storage= 305,814 cf

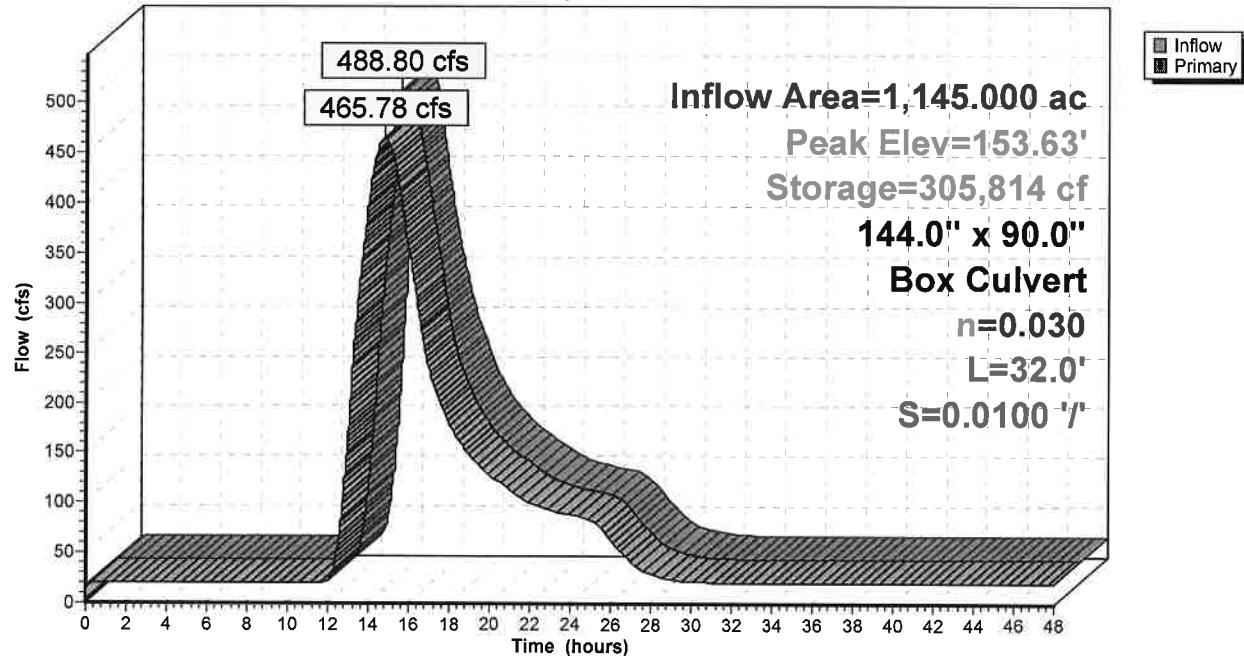
Plug-Flow detention time= 3.6 min calculated for 276.018 af (100% of inflow)  
 Center-of-Mass det. time= 3.6 min (1,153.8 - 1,150.2 )

Volume	Invert	Avail.Storage	Storage Description
#1	146.00'	618,750 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
146.00	500	0	0
147.00	1,000	750	750
148.00	5,000	3,000	3,750
150.00	20,000	25,000	28,750
152.00	90,000	110,000	138,750
154.00	120,000	210,000	348,750
156.00	150,000	270,000	618,750

Device	Routing	Invert	Outlet Devices
#1	Primary	146.00'	144.0" W x 90.0" H Box Culvert L= 32.0' Box, 30-75° wingwalls, rounded crown, Ke= 0.200 Inlet / Outlet Invert= 146.00' / 145.68' S= 0.0100 '/' Cc= 0.900 n= 0.030 Stream, clean & straight, Flow Area= 90.00 sf

Primary OutFlow Max=465.78 cfs @ 14.78 hrs HW=153.63' TW=152.63' (TW follows 1.00' below HW)  
 ↗1=Culvert (Outlet Controls 465.78 cfs @ 6.78 fps)

**Pond 2P: Bridge Culvert****Hydrograph**

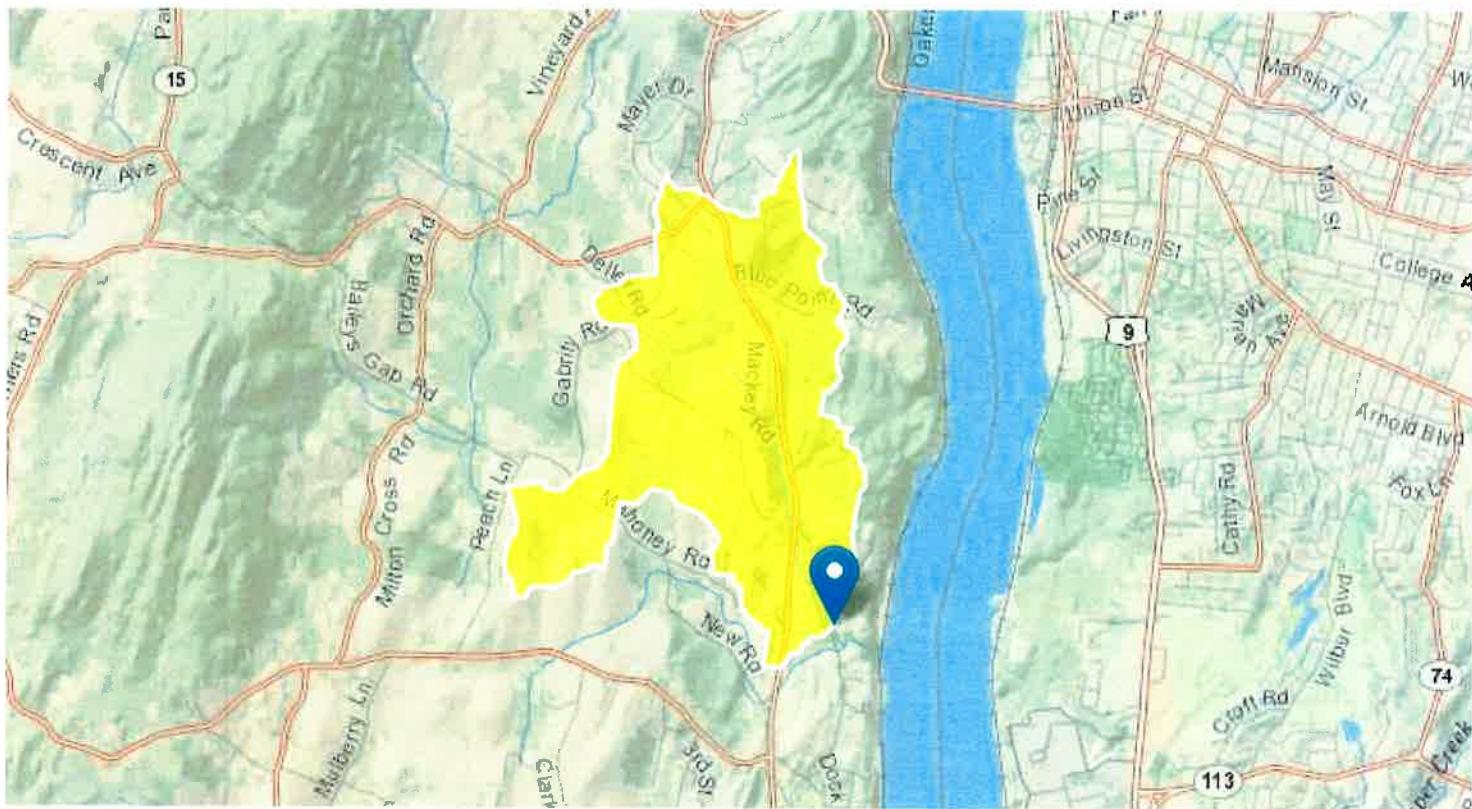
# StreamStats Report

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Workspace ID: NY20240612153020547000

Clicked Point (Latitude, Longitude): 41.66873, -73.95648

Time: 2024-06-12 11:30:55 -0400



[Collapse All](#)

## Basin Characteristics

Parameter	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	1.81	square miles
LAGFACTOR	Lag Factor as defined in SIR 2006-5112	0.0264	dimensionless
LENGTH	Length along the main channel from the measuring location extended to the basin divide	2.48	miles
MAR	Mean annual runoff for the period of record in inches	17.8	inches
SSURGOA	Percentage of area of Hydrologic Soil Type A from SSURGO	0.26	percent
SSURGOB	Percentage of area of Hydrologic Soil Type B from SSURGO	0.64	percent

Rt 9W Butterwick

Upstream  
North Rd  
Butterwick  
Falls

'x 12' Culvert  
box



