Overview of Projects Related to Flood Mitigation in Conway – May 2024

There is a lot of work going on in the Town of Conway to improve the overall health and climate resiliency of the South River Watershed! Below is a summary of current and future projects, as of May 15th, 2024.

<u>Current</u>

FY24 Municipal Vulnerability Preparedness (MVP) Grant – Conway Center Flood Mitigation Project

- This is our current MVP grant, which was awarded in July 2023. The grant provided funds for consultants to update the hydraulic and hydrologic model for **Conway Center**, and identify projects that could be implemented to alleviate flooding along Pumpkin Hollow Brook and the South River. This project is focusing on mitigating flooding in the Main Street, Elm Street, and Academy Hill Road area.
- At today's meeting, five potential projects will be presented by the consultant team. The presentation will include information about the updated flood model for Conway Center and provide the pros/cons and other considerations for each of the potential projects. Community members will then have the opportunity to select their top two projects, and the two projects with the highest ranking will move forward to the conceptual design phase.

Hydraulic Study on the Pine Hill Road Area

This area of town was badly affected by flooding in July 2023. The Town is using some of the state's disaster relief funding to have GZA GeoEnvironmental complete a hydraulic study/drainage model. This study will map the flow of water in the area encompassing the Pine Hill neighborhood (including Pine Hill Road, Upper Baptist Hill Road, Baptist Hill Road, Emerson Hollow Road, and Shelburne Falls road). The model will be used to evaluate potential drainage improvement measures on public property. The assessment and modeling were approved at a Selectboard Meeting in April 2024; the project is anticipated to be complete by June 2024.

Pending

FY25 Municipal Vulnerability Preparedness (MVP) Grant – Pine Hill Stormwater Improvement Project & Stormwater Management Education and Outreach *(Awards TBA Summer 2024)*

- Conway applied for another round of funding from the MVP program for FY25. The project aims to reduce risks of flooding with a two-pronged approach that integrates drainage improvements on public property in the Pine Hill neighborhood and a town-wide educational campaign.
- If this grant is awarded, the town will use the funds to implement some of the drainage improvements identified as a part of GZA's Hydraulic Study on the Pine Hill Road Area.
- Community outreach and engagement will focus on educational programming related to stormwater management on private property.

<u>Future</u>

September 2024 – Municipal Vulnerability Preparedness 2.0 Planning Grant

• In order to maintain eligibility in the MVP program, Conway will need to update the Town's current MVP Plan. We will apply for a planning grant in September.

FY26 Municipal Vulnerability Preparedness (MVP) Grant – Design & Permitting of a Conway Center Flood Mitigation Project

• In early 2025, the Town will submit another grant to the MVP program to prepare advanced designs & permit one (or both) of the projects selected by the community today. Due to the grant timeframes, this will be our earliest opportunity to seek MVP funding to implement a project in Conway Center.

More information on current and prior projects: https://conwayma.gov/p/39/South-River-Flood-Mitigation

Conway Center Flood Mitigation Project Update

Rosalie Starvish, GZA Nicolas Miller, Field Geology Services May 18, 2024

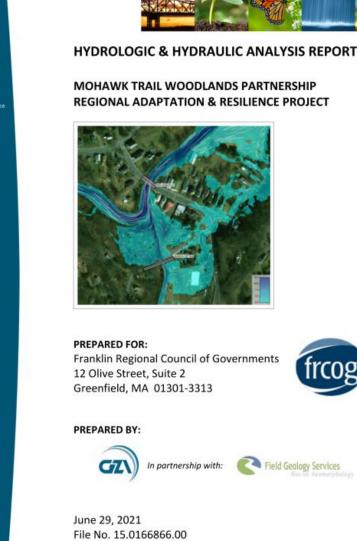


Agenda

- Hydrologic and Hydraulic Modeling Overview
- Existing Conditions Results
- Flood Resilience Projects
 - Overview
 - Modeling Results
 - Prioritization
- Next Steps
- Questions and Discussion
- Provide Your Input



- Objectives
 - Model the South River and Pumpkin Hollow Brook
 - Focus on Conway Center
 - Flood impacts
 - Flood mitigation strategies
- Methods
 - Surveyed data collection
 - Hydrology (Flows)
 - Hydraulics (Depth and Velocity)



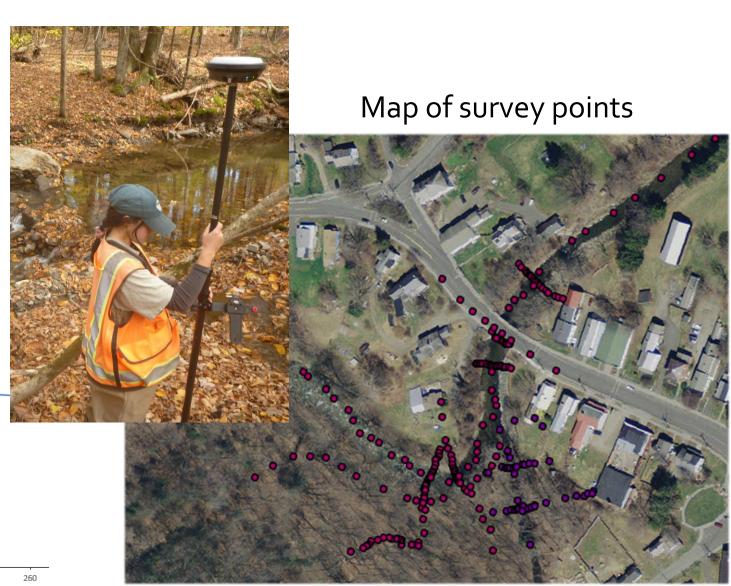
G7



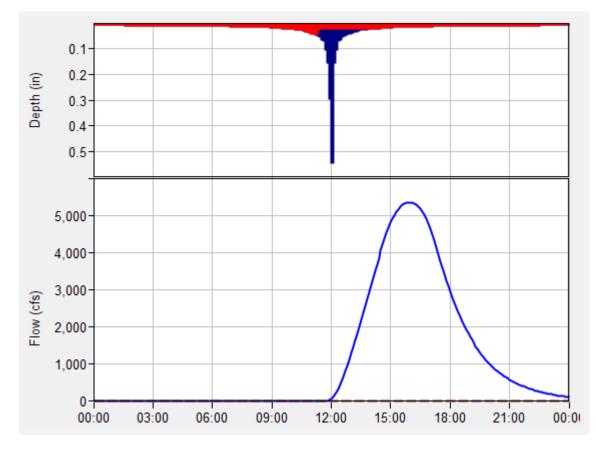
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- Surveyed Data Collection
 - Elevations
 - Bridge and culvert crossing dimensions

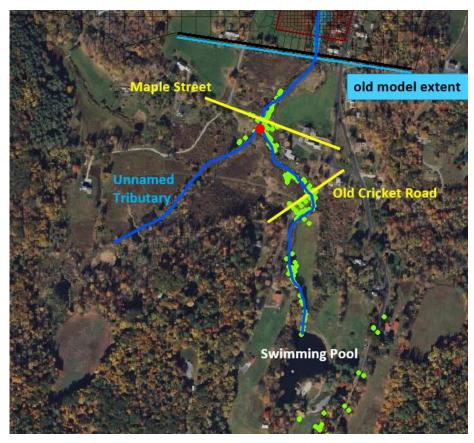
Survey transect – Main St bridge



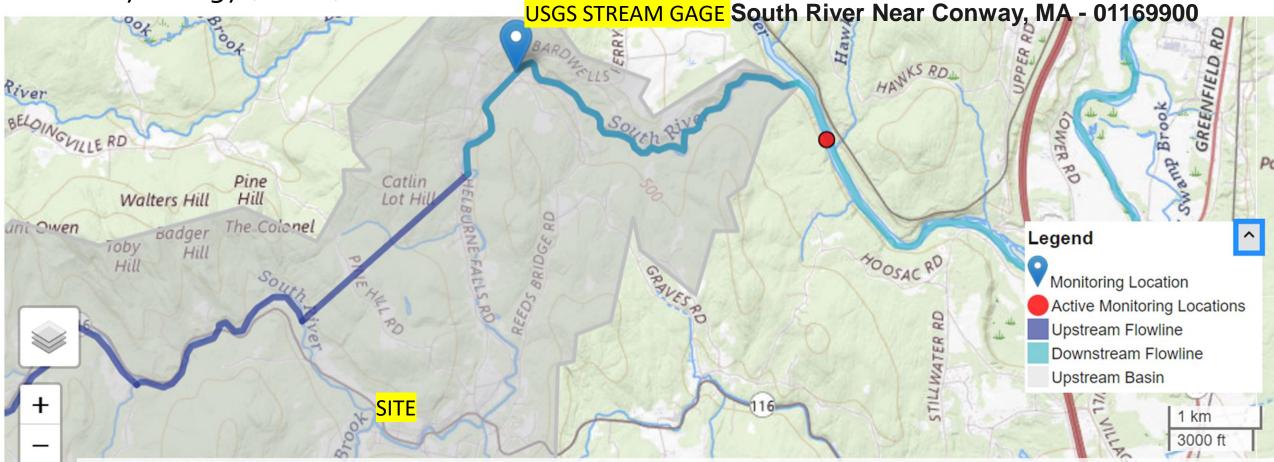
The Hydrologic Model component takes precipitation and outputs streamflow. Parameters are based on observed storms and knowledge of the watershed.



The Hydraulic Model combines streamflow with known and surveyed geometry to output depth and velocity of flow.



• Hydrology (Flows)



Leaflet | USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset,...

• Hydrology (Flows)

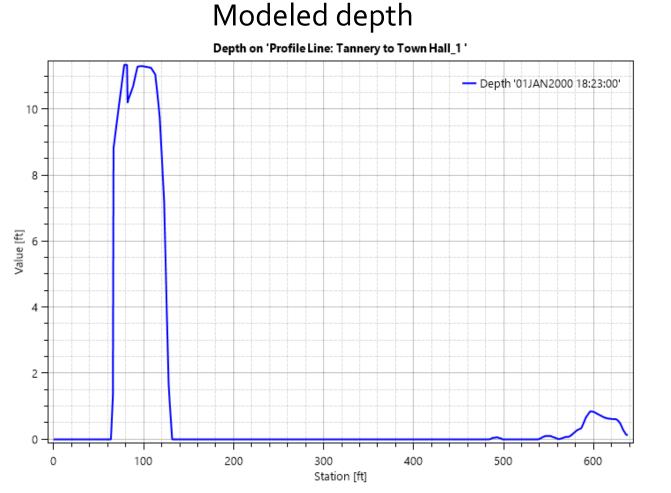
Annual Recurrence Interval	Annual Exceedance Probability	In any 1 year period	In any 30 year period
2-year	50%	1 chance in 2	99.9999999%
50-year	2%	1 chance in 50	45%
100-year	1%	1 chance in 100	26%
500-year	0.2%	1 chance in 500	6%

• Hydrology (Flows)

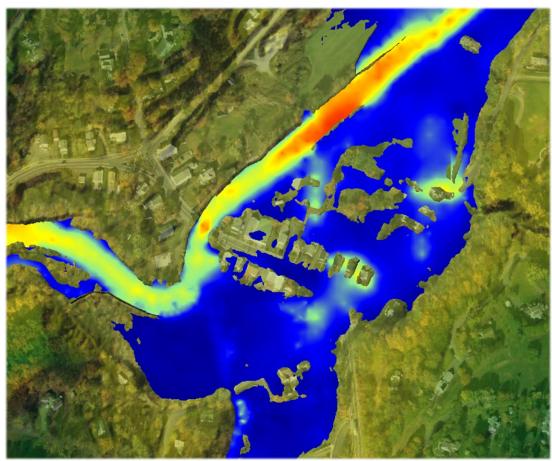
Irene (9,300 cfs at USGS gage)

Watershed	Drainage Area	Peak Flow (cfs)						
watersned		1 Year	2 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Main Street at South River	21.0	665	1,762	4,811	6,600	7,668	8,912	12,222
Pumpkin Hollow Brook	1.6	52	137	373	503	594	691	947
Johnny Bean Brook	1.1	34	90	247	345	394	458	628
South River	18.3	579	1,535	4,191	5,752	6,680	7,763	10,647

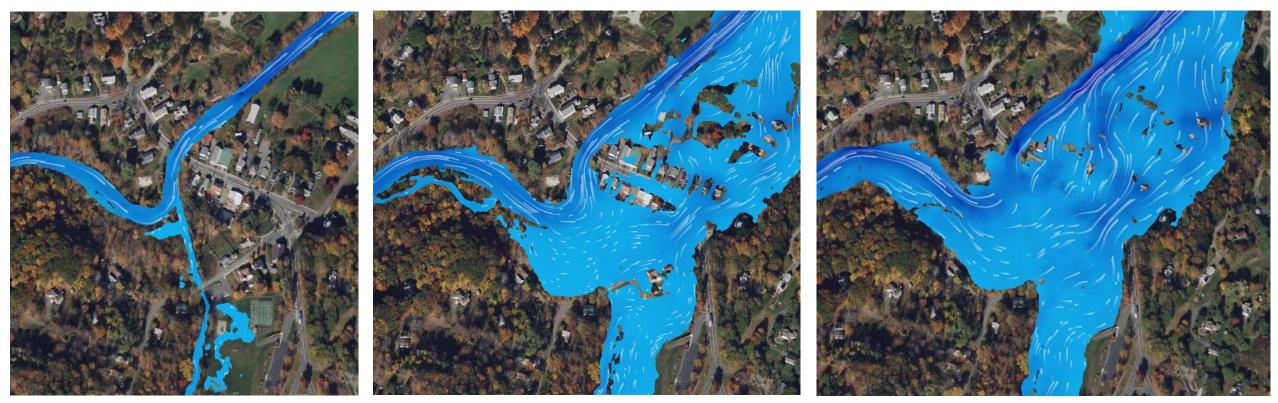
• Hydraulics (Depth and Velocity)



Modeled velocity



Extent of Flooding



2 Year

10 Year

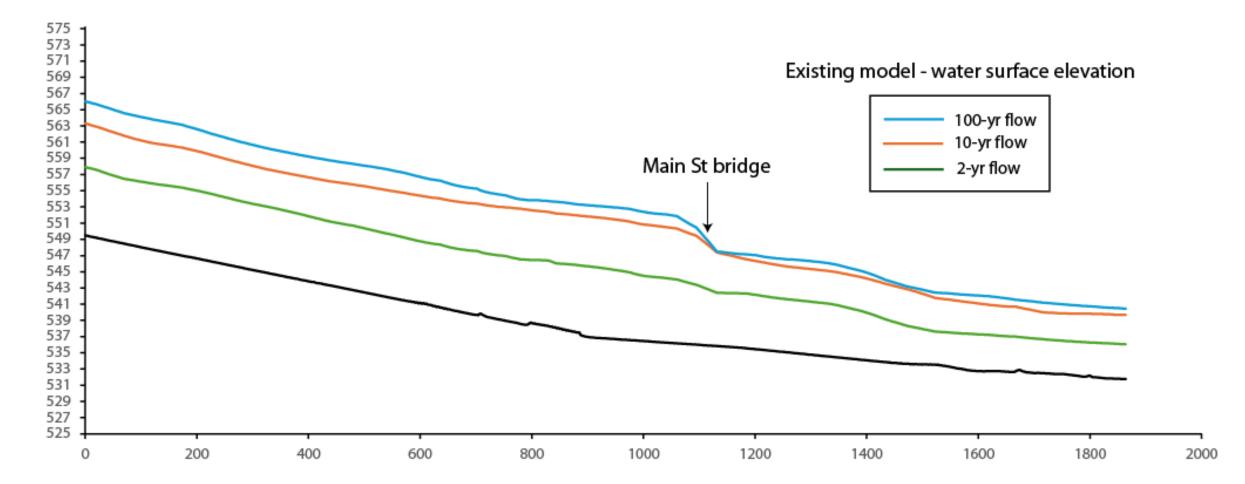
13' 3"

7' 4"

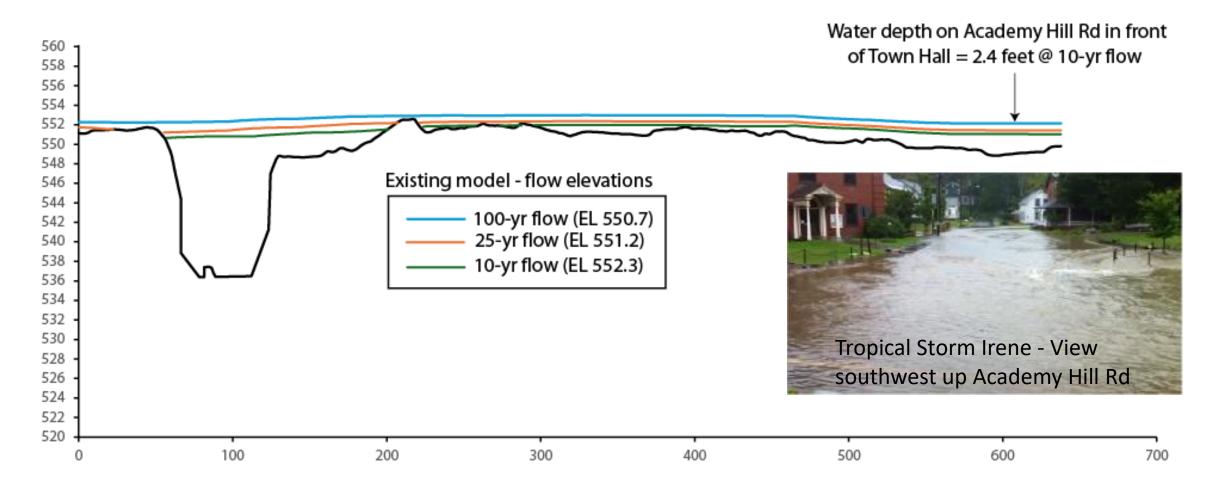
Depth of flow through Main Street Bridge

100 Year 14' 4"

Modeled water surface elevations – through Main St bridge

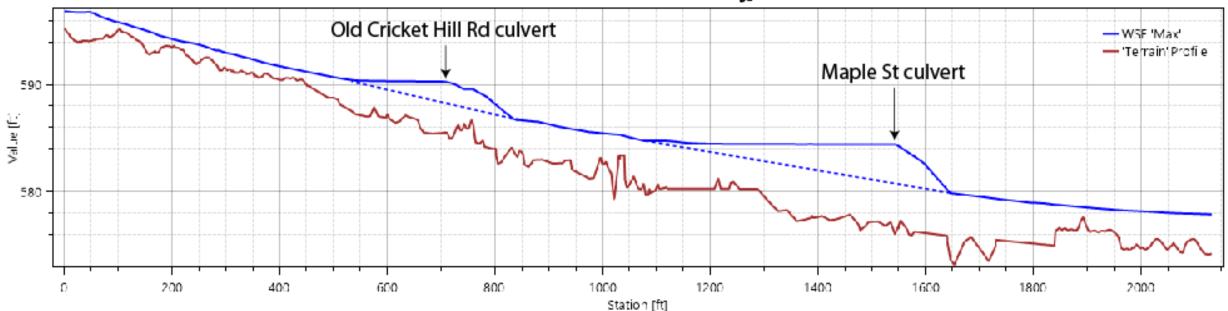


Modeled depth upstream of Main St bridge



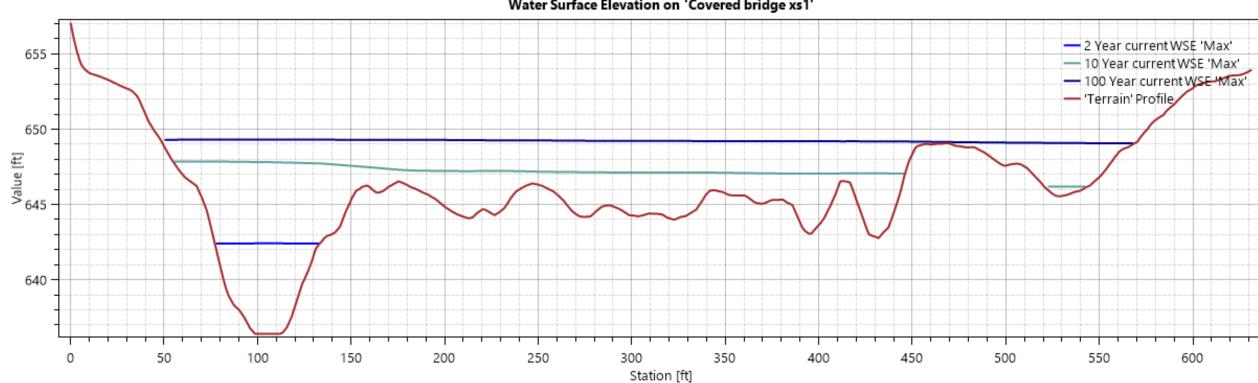
Undersized culverts on Pumpkin Hollow Brook





Water Surface Elevation on 'PHB Long_1'

Modeled depth upstream of the Covered bridge



Water Surface Elevation on 'Covered bridge xs1'

- Overview
- Modeling Results
- Prioritization/Discussion

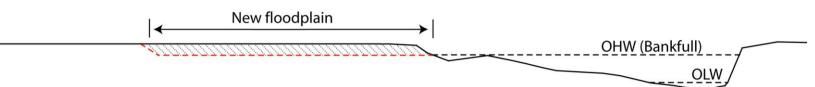
- Overview Project Types
 - Floodplain Reconnection/Lowering
 - Berm Removal (floodplain access)





South River Meadow









- Overview Project Types
 - Floodplain Reconnection/Lowering
 - Berm Removal (floodplain access)





• Floodplain Lowering

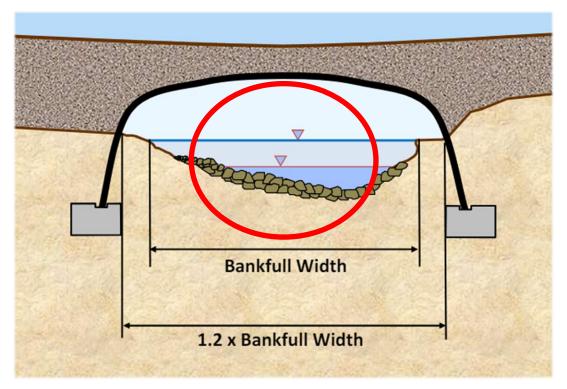




Legacy sediments upstream of covered bridge



- Overview Project Types
 - Bridge/Culvert Capacity (Upsizing)

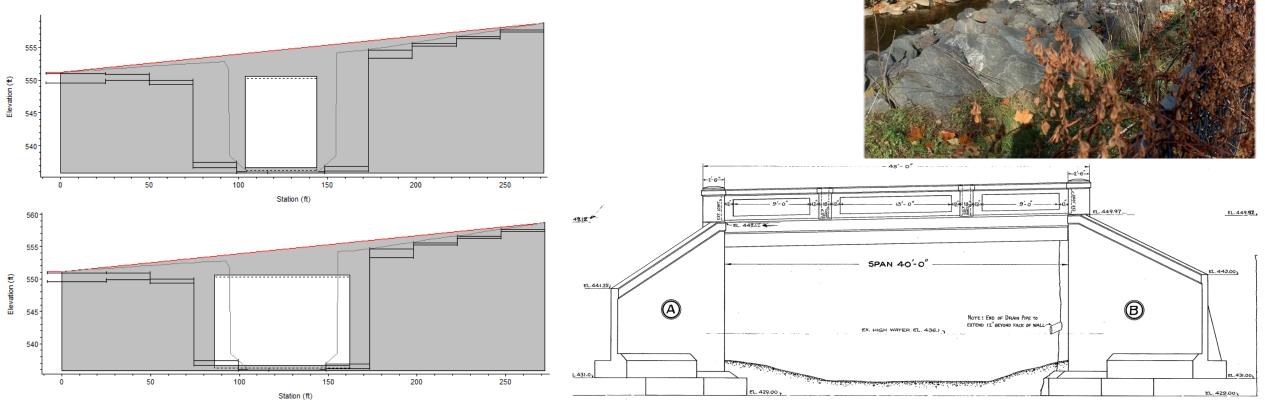


Source: MassDOT Stream Crossing Handbook



Old Cricket Hill Rd

- Bridge/Culvert Capacity (Upsizing) Main Street Bridge
 - Width 39 feet \rightarrow 76 feet

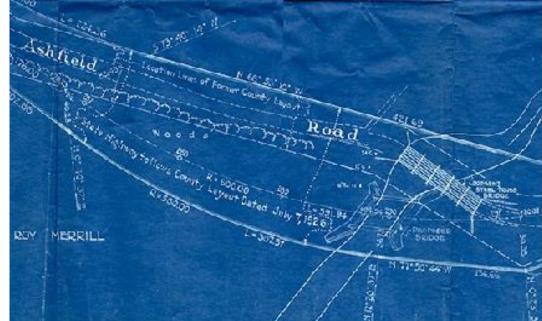


NORTHEASTERLY ELEVATION

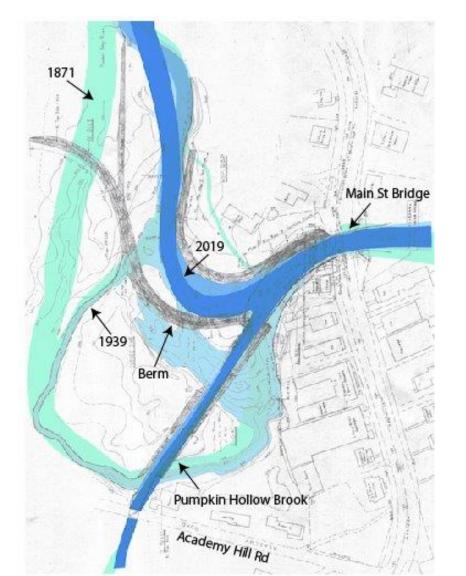


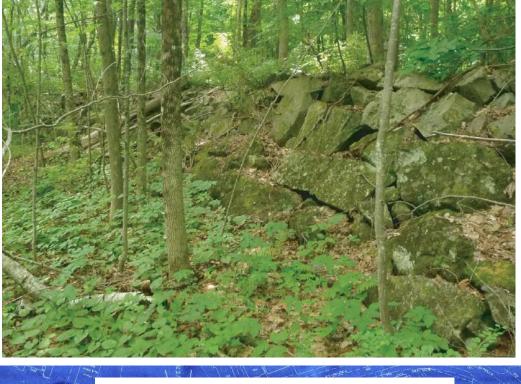
Photo of steel truss bridge, which replaced the wood trestle bridge, which was destroyed in flood of 1869 (from Picturesque Franklin, 1891, courtesy of the Conway Historical Society). The current bridge was built slightly upstream when the State Highway came through in 1926, as can be seen in the blueprints to the right. The bridge span was reduced by 31 percent from 57.1 to 39.7 feet (based on blueprints). The bridge constricts the flow during high flow events leading to increased erosion hazards.





Berm breaching/removal







- Overview Project Types
 - Flood Conveyance (Flood Diversion Culvert)

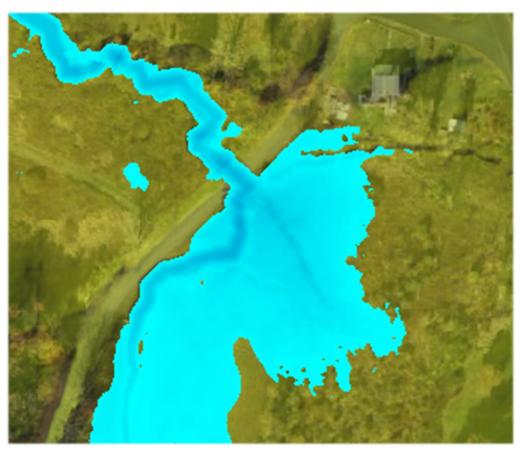


Source: ldpwatersheds.org

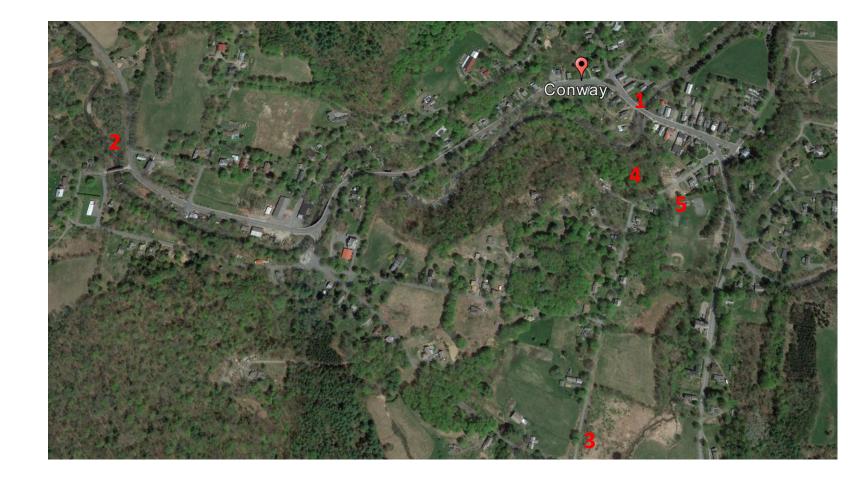


- Overview Projects Considered but not modeled
- Conway Swimming Pool dam
- Pumpkin Hollow Brook crossings:
 - Academy Hill Road
 - Maple Street
 - Old Cricket Hill Road

Old Cricket Hill Rd blocking floodplain



- 1. Enlarge Main Street bridge over South River
- Floodplain Lowering Upstream of Covered Bridge
- Floodplain Lowering –
 Pumpkin Hollow Brook
- 4. Berm Removal upstream of Main Street
- 5. Flood Diversion Culvert Pumpkin Hollow Brook

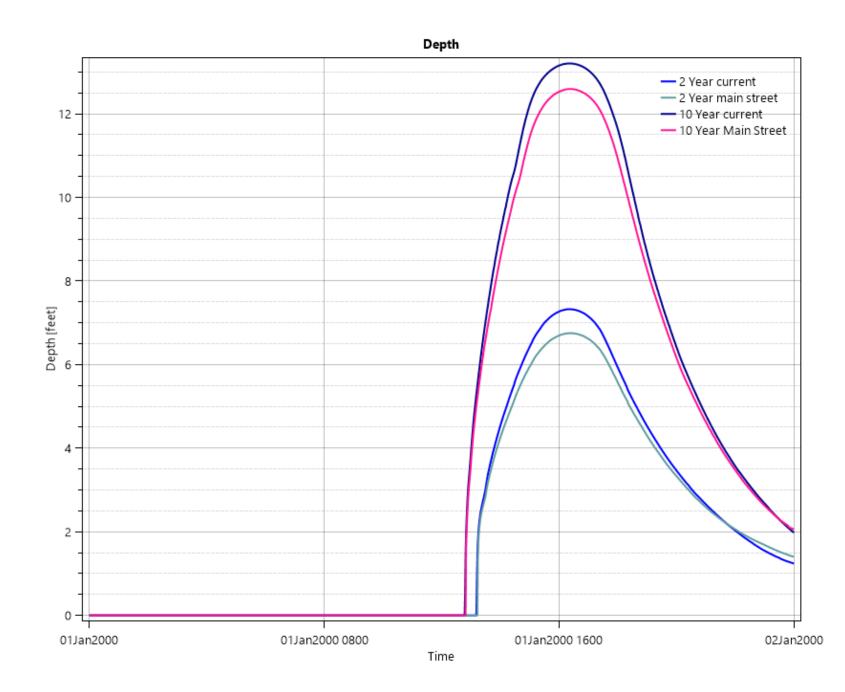


Main Street Bridge

Widening Main Street Bridge to 76 feet:

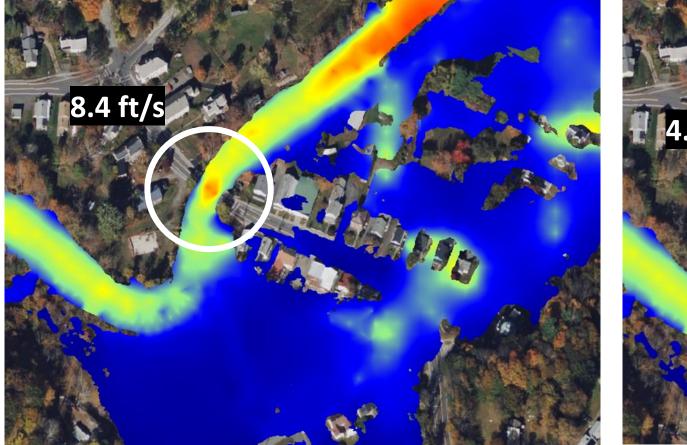
10 Year Flood:

- 9 inch reduction in peak depth
- 40% reduction in peak velocity

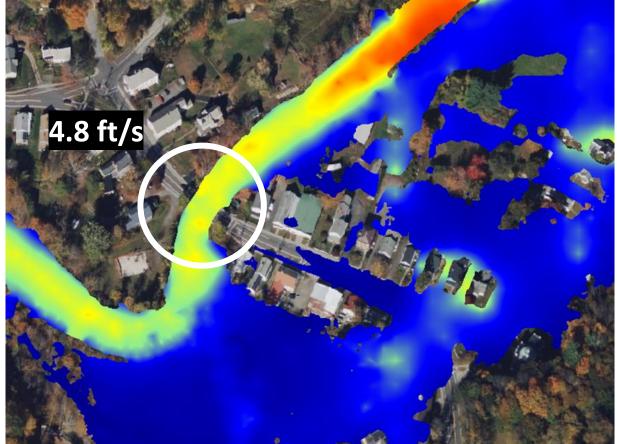


Main Street Bridge

10 Year Storm with Existing Bridge



10 Year Storm with 76' Span Bridge

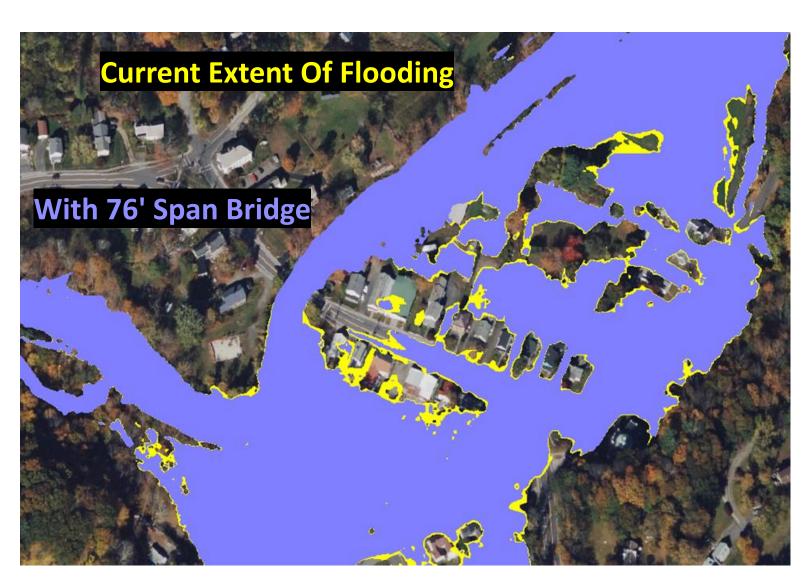


Reduction in peak velocity from 8.4 ft/s to 4.8 ft/s

Main Street Bridge

Reduction of extent of flooding from current conditions (yellow) to 76-foot span (purple)

Upstream floodplain lowering has a greater effect on the extent of flooding downtown. Widening the bridge has a greater reduction in velocity.





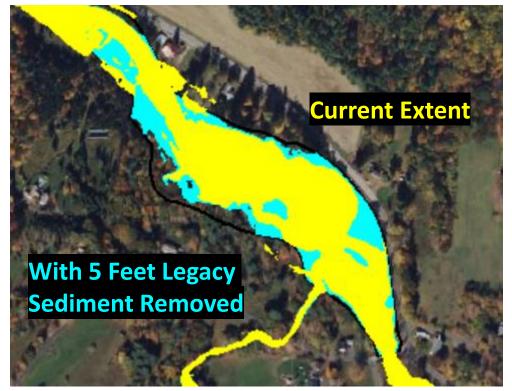
2 Year
6' 8"
8" reduction

10 Year 12' 7" 8" reduction in depth 100 Year 14' 4" No reduction in depth

Depth of flow through Main Street Bridge

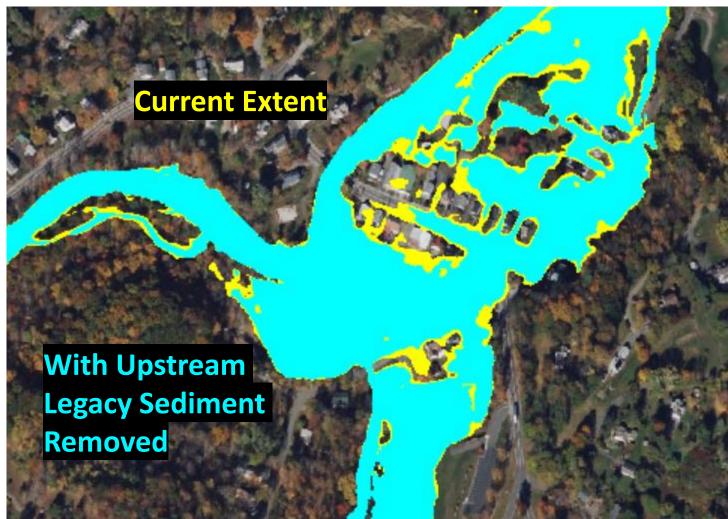
Floodplain Lowering

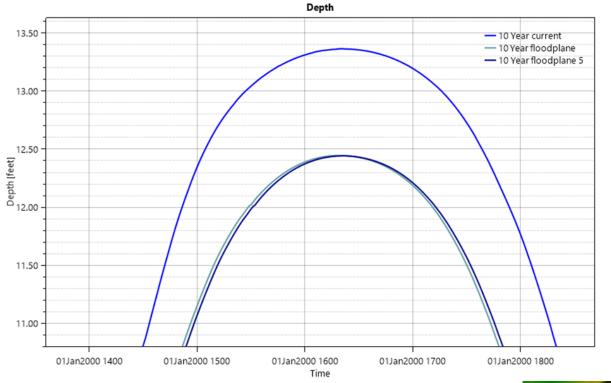
Upstream of covered bridge



Flow through Main Street Bridge Reduced from 13'3" to 12'5"

Downtown

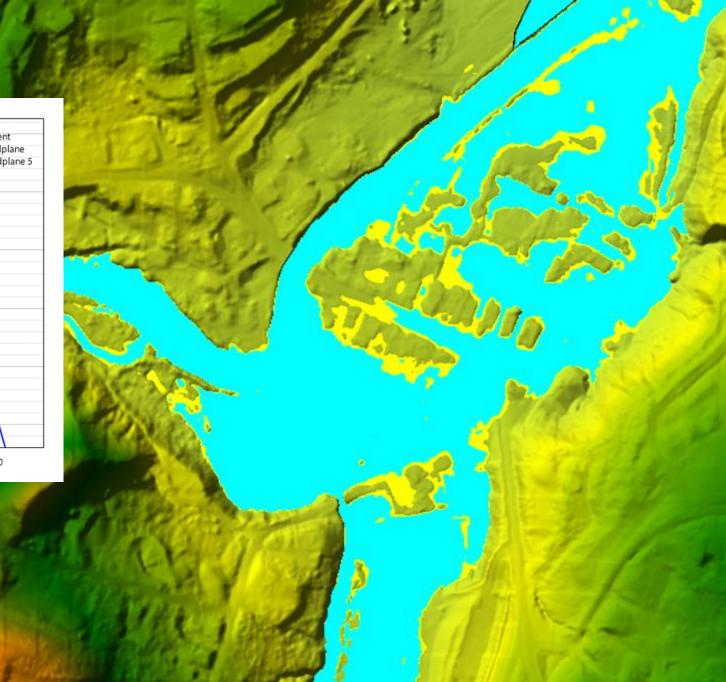




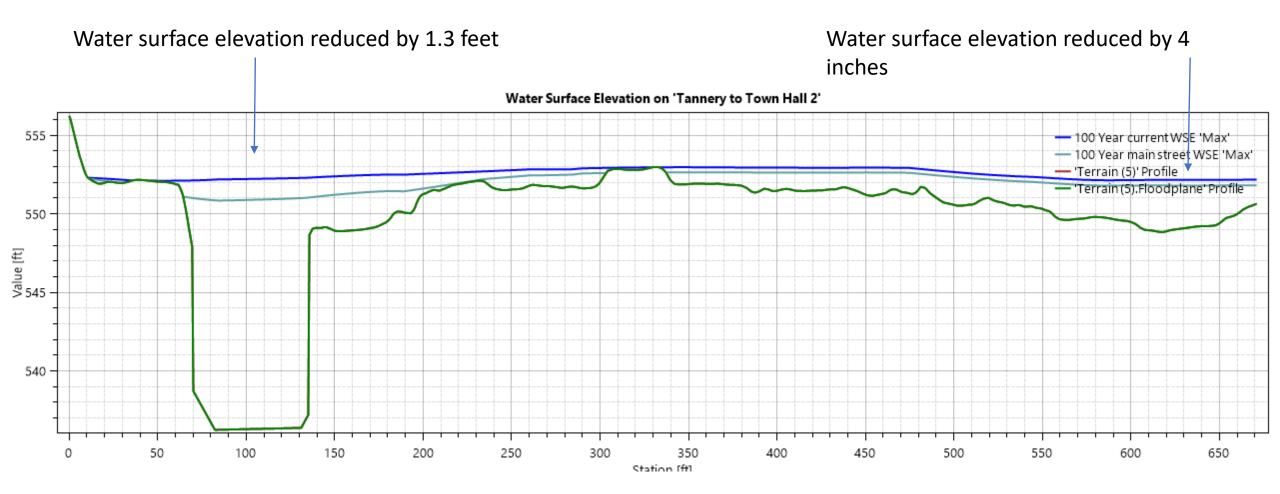
Floodplain lowering upstream of Covered Bridge:

Reduction of flow at Main Street Bridge: Peaks: 13.36 feet (current), 12.45 (2 foot), 12.43 feet (5 foot) Delays arrival time by ~ 1 minute.

Extend of downtown flooding reduced by upstream floodplain lowering. Current (yellow) and 5 foot (blue) lowering. (2 foot and 5 foot similar extents of flooding.)



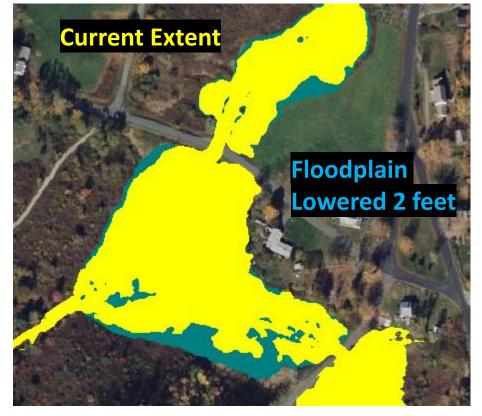
Floodplain Lowering in combination with Main St Bridge enlargement **100-year flow event**

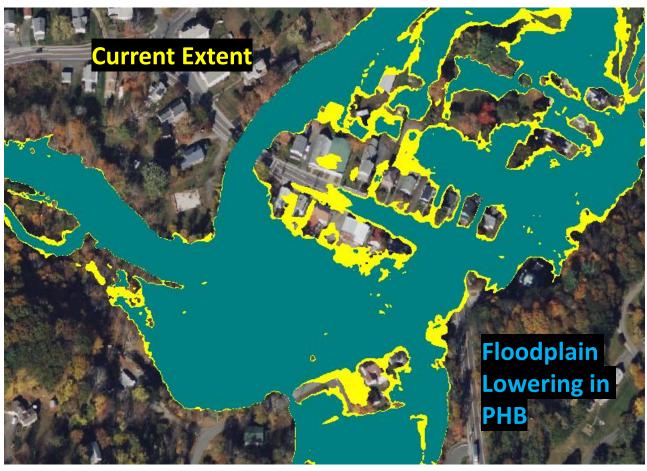


Pumpkin Hollow Brook Floodplain Lowering

Downtown

Pumpkin Hollow Brook





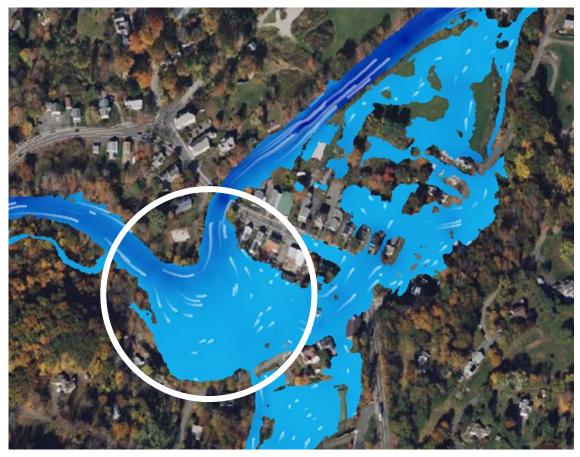
Reduces peak at Main Street from 13'3" to 12'5"

South River Berm Removal

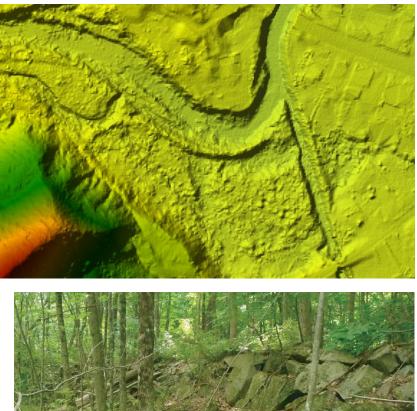
10 Year Storm with Existing Berm

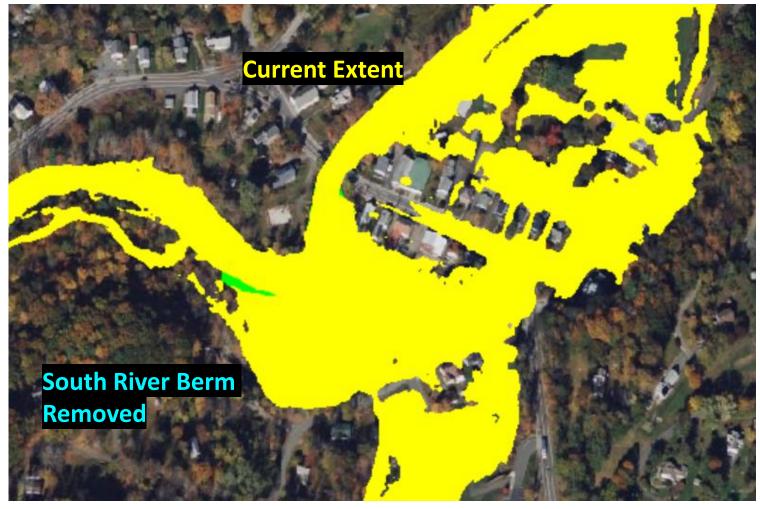


10 Year Storm with Berm Removed



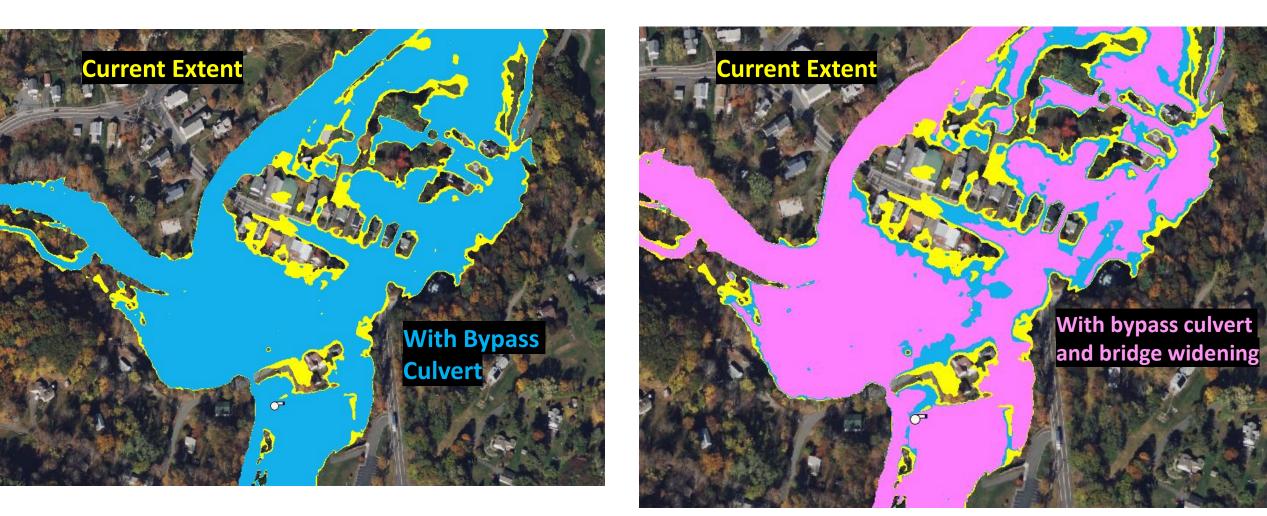
South River Berm Removal



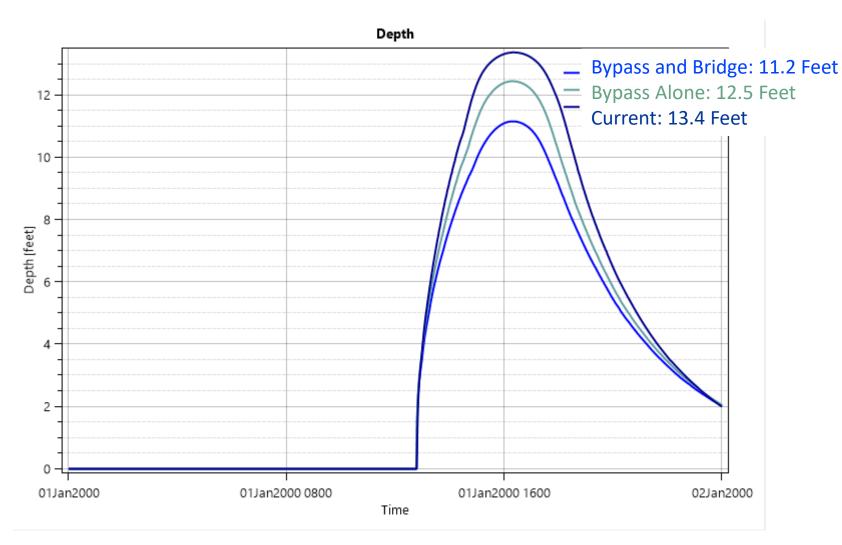


Minimal reduction in flooding for 10 Year Storm

Bypass Culvert



Bypass Culvert



A bypass culvert from PHB in combination with Main Street Bridge widening result in a peak flow reduction of 2.2 feet at Main Street.

Minimal effect on downstream velocities during 10 year flood.

• Prioritization/ Discussion

Project/Project Type	Benefits	Limitations
Floodplain Reconnection (Floodplain Lowering, Berm Removal)	 Increase upstream storage of floodwater Improve downstream water quality (Sediment and nutrient storage) Benefits for instream and riparian habitat 	Constraints in available area/depth can limit downstream flood mitigation benefit
Bridge/Culvert Widening (Main Street Bridge)	 Some reduction in flood depth and extent of flood inundation Larger reduction in scour/erosion potential Reduced erosion hazards/risk to crossing Improve sediment continuity/transport through crossing Structure has aged out (built 1925-26) 	Potential impacts to abutting properties to fit the abutments for the wider bridge
Flood Diversion Culvert	Convey floodwaters around developed areasReduced flood inundation/flood depth	Not nature-basedHigh cost

Next Steps

Conceptual designs for 2 resilience projects with cost opinions

• Pursue grant funding for priority designs

Questions and Discussion

Rosalie Starvish, GZA <u>Rosalie.Starvish@GZA.com</u>

Nicolas Miller, Field Geology Services <u>Nicolas.Miller1@GMAIL.com</u>



Provide your Input 算

Drop 1 card in the box for your 2 most preferred projects.

- 1. Enlarge Main Street bridge over South River
- 2. Floodplain Lowering Upstream of Covered Bridge
- 3. Floodplain Lowering Pumpkin Hollow Brook
- 4. Berm Removal upstream of Main Street
- 5. Flood Diversion Culvert Pumpkin Hollow Brook



Online feedback – fill out the survey at the Town of Conway website

https://conwayma.gov/p/39/South-River-Flood-Mitigation