

Wetlands and Streams

Wetlands and small streams throughout the watershed are collectively important for providing stormwater storage, slowing and spreading floodwaters, recharging groundwater, and moving water through the watershed. Numerous wetland and stream ecosystems can contribute significantly to the watershed's ability to reduce floodwaters, erosion, and subsequent property damage (Cappiella and Fraley McNeal, 2007).

Streams:

A network of small streams distributes floodwaters from heavy rainfall across the landscape and channels some of it to larger streams and rivers, lakes, ponds, and wetlands. Nutrients washed from the land (e.g., soil, leaf litter) by stormwater are carried downstream where they support aquatic food chains. Small tributary streams, especially those with cool and relatively clean water, may provide refuges and breeding areas for fish and other aquatic life during hot weather or periods of low flow in river channels.

Headwaters are the sources and upper reaches of river systems. They often include small intermittent streams, rivulets, wetlands, seeps, or springs. Headwater streams collect floodwater or runoff, support a high diversity of species, and sustain downstream waters. They comprise just over 50 percent of total stream miles in the continental United States and provide the foundation for all of our large river systems (Environmental Protection Agency website, accessed May 2016).

Wetlands:

In wetlands, soils are saturated with water long enough to produce conditions favoring plants that are adapted to grow in wet conditions. The U.S. Fish and Wildlife Service defines wetlands as follows:

Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water... wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes (plants specifically adapted to live in wetlands); (2) the substrate is predominantly undrained hydric (wetland) soil; and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year (Cowardin et al., 1979).

Wetlands occur throughout the Schoharie watershed. They are usually found in low-lying areas, depressions, or other places that collect water or are connected to the water table, but they can also be found on hilltops and slopes; along the edges of streams, rivers, floodplains, lakes, and ponds; in fields and meadows; and in forests. As transitional areas between land and water, some wetlands protect shorelines of lakes and streams and provide habitat for a variety of plants and animals. There are many different types of wetlands; some contain standing water year-round while others are seasonally dry. Wetland types include marsh, fen, wet meadow, prairie pothole, vernal pools, and forested swamp.

Maps generally show the approximate size and location of wetlands because an exact description requires an on-site wetland boundary delineation. The three types of maps described below provide a good idea of wetland location:

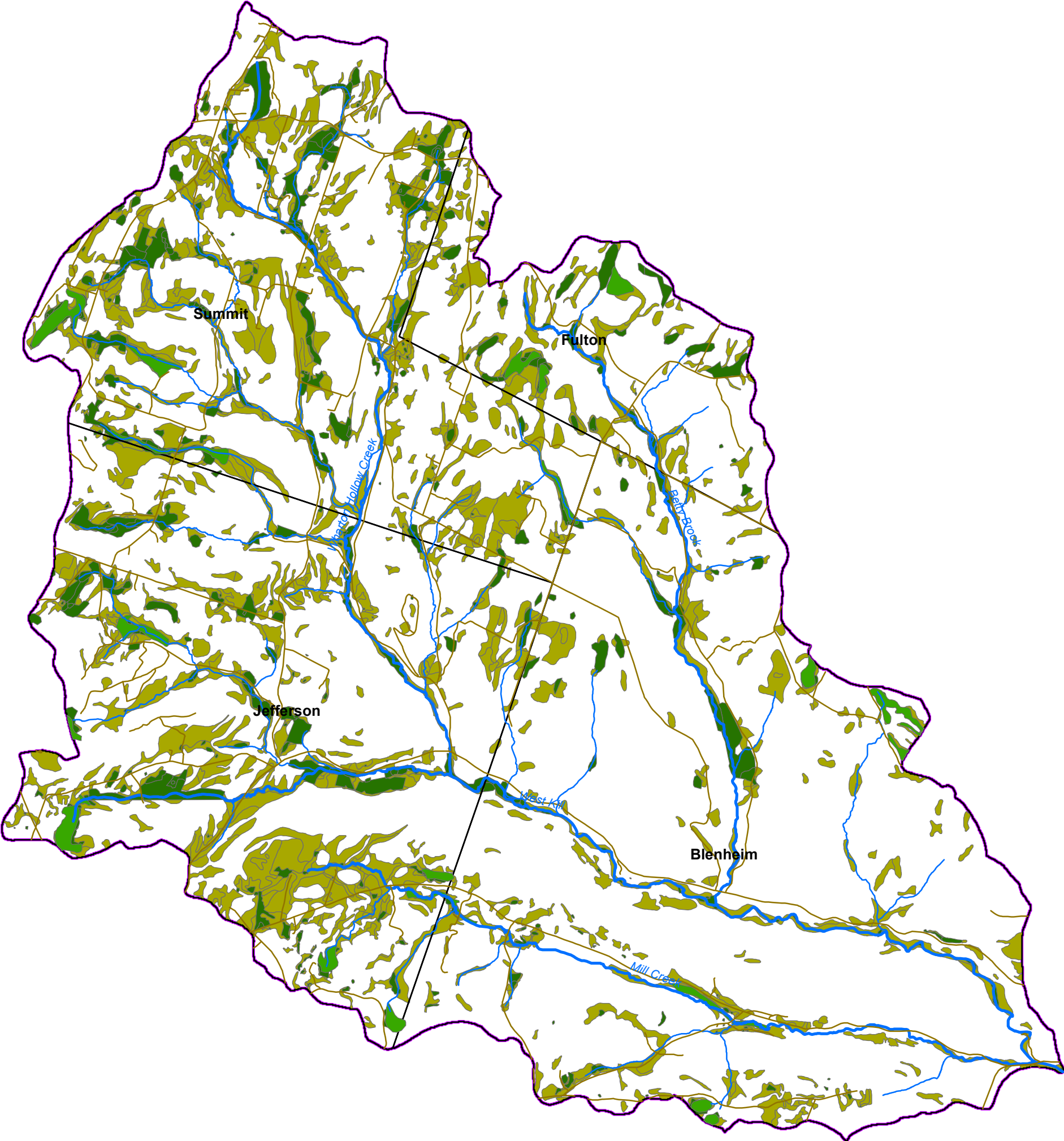
NYS Department of Environmental Conservation Regulatory Wetland Maps – Based on aerial photos (they are not ground verified unless a particular project calls for an accurate depiction of wetlands at a specific site), these maps show only the wetlands that are larger than 12.4 acres. DEC wetland maps do not necessarily include all wetlands of 12.4 acres or more; some of the mapped wetlands may be larger or a different shape from those on the official DEC maps (which is why they must be verified per site). DEC includes a "check zone" around all of these wetlands to underscore the fact that their boundaries as mapped are approximate. The lower Schoharie watershed contains 309 of these wetlands for an approximate total size of 17,030 acres.

U.S. National Wetland Inventory (NWI) Wetland Habitat Maps – The U.S. Fish and Wildlife Service classifies wetland types in terms of their shared physical, chemical, and biological characteristics (Cowardin et al., 1979). These maps, based on aerial photos, show wetlands according to their habitat (NWI website, accessed May 2016). There is no minimum size limit, and sometimes these wetlands overlap with DEC regulatory wetlands. Like the "DEC wetlands," they are an approximation of size and shape and require ground verification. The maps do not necessarily include all wetlands actually present in a given area. The lower Schoharie watershed contains 3,229 of these wetlands for an approximate total size of 10,425 acres. The total area of the wetlands shown on these maps in the lower Schoharie watershed basin is approximately 13,360 acres.

Hydric Soils (from County Soil Maps) – Hydric soils form under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions. Hydric soils along with hydrophytic vegetation and wetland hydrology are used to define wetlands. The NRCS maps soils by county; soil boundaries on these maps need to be field verified. Map units that are mostly hydric soils may include small areas of nonhydric soils, and map units that are mostly nonhydric soils may include small areas of hydric soils. The United States Department of Agriculture NRCS lists hydric soils by county; most areas with hydric soils are wetlands. The total area of the hydric soils shown on these maps in the lower Schoharie watershed basin is approximately 138,150 acres.

By combining wetland information from these three types of maps, it is possible to get a comprehensive look at the overall likely location of wetlands within a watershed. Because the Schoharie watershed is so large, many wetlands cannot be seen on one map at a small scale. A much clearer view of these areas is possible when the watershed is assessed at a subbasin scale. Figure 4-74 shows the West Kill subbasin and its wetlands based on DEC, NWI, and hydric soils maps. A total of 1,751 acres of wetlands are shown on DEC and NWI maps, and the soil maps show 6,348 acres of hydric soils in this subbasin.

Wetlands are scattered throughout the subbasin, often associated with headwaters and intermittent streams. Where they lie adjacent to streams, they are likely to absorb and slow floodwaters. Between streams, they are sponges across the land that capture and store water and keep it from flowing downstream and adding to flood flows. Some wetlands are particularly valuable because of their specific location in the watershed. For example, wetlands within and downstream of developed areas are important for counteracting the increased volume and flow of stormwater runoff from impervious surfaces. In agricultural areas, wetlands can store water to help prevent flooding of crops.



Legend

- NYSDEC Freshwater Wetlands
- NWI Wetlands
- Hydric Soils

SOURCE(S):
NYS GIS Clearinghouse, April 2016:
NYSDEC, Regulatory Freshwater Wetlands
NRCS SSURGO database, April 2016
USFWS National Wetland Inventory, Data
by State, April 2016.

Footnote:
The "Checkzone" is defined as an area around a NYSDEC
mapped wetland in which the actual wetland may occur.
It is an approximate location and not a precise boundary.


Figure 4-74: West Kill Watershed: Wetlands

Location:
West Kill Watershed, NY



Schoharie Basin Flood Analysis

Map By: EMH
MMI#: 4805-05
MXD: Q: Schoharie Basin Flood Analysis/Wetlands and Hydric Portrait
1st Version: 4/26/2016
Revision: 5/6/2016
Scale: 1 in = 4,634 ft

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The presence of wetlands throughout a watershed is one indicator of watershed health. Wetlands work as "sponges" on the landscape; they collect water until they become saturated and then release it slowly. The amount of water a wetland can store depends on local conditions, wetland type, and soil permeability. Storage capacity, or the space available for water storage, generally increases during the growing season when evaporation and transpiration from plants is high, and water tables drop. The ability of wetlands to absorb and store water also depends on an intact wetland buffer and the wetland's contributing drainage area, which is similar to a small watershed. The following studies provide examples of wetland storage capacity:

- Grant County, Minnesota – Wetlands have the potential to store up to 20 percent of the basin's total precipitation; restoring 25 percent of the farmed and drained wetlands within one drainage basin would increase watershed storage capacity by 27 to 32 percent. A 50-percent restoration would increase storage by 53 to 63 percent (Gleason et al., 2007).
- South Carolina – A subset of wetlands (wetland types without a surface connection to downstream waters) stores an estimated 45.8 billion gallons of water (enough to fill 70,000 Olympic-size swimming pools) (South Carolina Department of Health & Environmental Control, 2003).
- Indiana – A 1-acre wetland 1-foot deep can hold approximately 330,000 gallons of water. Networks of many small wetlands dispersed throughout the watershed can collectively store a significant amount of water (Purdue University Cooperative Extension website, accessed May 2016).

The USGS documents a strong correlation between the percentage of the watershed area that is lakes and wetlands and the size of flood peaks. The research documents that subbasins with 30 percent coverage by lakes and wetlands have flood peaks that are 60 to 80 percent lower than the peaks in basins with no lakes or wetlands (USGS website, accessed May 2016).

Wetlands can provide cost-effective flood control. When wetlands are removed, stormwater runs directly into streams or waterways, increasing flooding. Thus, wetland loss can result in costly flood damage in some areas. For example, the USACE calculated that loss of all wetlands in Massachusetts' Charles River watershed would cause an average annual flood damage cost of \$17M. The USACE concluded that conserving wetlands was a natural solution to controlling flooding, and because it was less expensive than the construction of dikes and dams alone, the USACE acquired 8,103 acres of wetlands in the Charles River basin for flood protection (U.S. Environmental Protection Agency, 2006).

Recommendations for Streams and Wetlands:

- Develop a watershedwide Aquatic Buffer Ordinance or Water Resources Protection Plan that includes specific guidelines for the size and vegetative composition of buffers along all stream, lake, and wetland edges. This should cover the entire watershed so that protective measures are consistent in all watershed municipalities. A water resources protection plan should include all headwaters, intermittent and perennial streams, lakes, ponds, and all types of wetlands regardless of regulatory or jurisdictional status.
- Develop a plan to implement watershedwide wetland, stream, and buffer protection as described above.

- Develop an inventory of "target" riparian areas for restoration to protect water quality, reduce flood damages, and provide habitat.
- Maintain natural stream channels and banks; avoid deepening or straightening channels.
- Use u-shaped rather than v-shaped runoff ditches along roads to decrease erosion and slow the water's flow.
- If there is uncertainty regarding whether a wetland is present in a particular location, have the site evaluated by a professional wetland delineator.
- Avoid dumping trash and other debris (including organic debris and yard waste) in wetlands and streams.



5.0 SUMMARY OF RECOMMENDATIONS

5.1 Focus Area Recommendations

A number of recommendations have been provided throughout this analysis. A summary of recommendations by specific focus area is presented in Table 5-1. Table 5-2 is a summary of cost opinions for implementation of the recommended flood mitigation alternatives. It should be noted that some types of mitigation alternatives such as the replacement of a bridge or culvert or the construction of an enhanced floodplain will have a quantifiable cost for design, permitting, and construction. For certain alternatives such as the relocation of a home or the floodproofing of a business, the cost of implementation will vary widely depending on which and how many measures are being implemented and on the size and value of the home or business. Alternatives that emphasize the protection of watersheds, wetlands, and floodplains or that rely on changing local floodplain zoning codes or enforcing NFIP regulations are programmatic in nature, and the cost of implementation can be difficult to quantify.

5.2 Funding Sources

The following funding sources may be available to towns within the Schoharie watershed for the implementation of recommended activities described in this report.

NYS DOS – The DOS may be able to fund some of the projects described in this report. In order to be eligible, a project should link water quality improvement to economic benefits.

NYS Grants – All NYS grants are now announced on the NYS Grants Gateway (a direct link is in the "Links Leaving DEC's Website" section of the right-hand column of this page). The Grants Gateway is designed to allow grant applicants to browse all NYS agency anticipated and available grant opportunities, providing a one-stop location that streamlines the way grants are administered by the State of New York.

Community Development Block Grant (CDBG) – The Office of Community Renewal administers the CDBG program for NYS. The NYS CDBG program provides financial assistance to eligible cities, towns, and villages in order to develop viable communities by providing affordable housing and suitable living environments as well as expanding economic opportunities, principally for persons of low and moderate income. It is possible that the CDBG funding program could be applicable for floodproofing and elevating residential and nonresidential buildings depending on the eligibility of those buildings relative to the program requirements.

Empire State Development – The state's Empire State Development program offers loans, grants, and tax credits as well as other financing and technical assistance to support businesses and encourage their growth. It is possible that the program could be applicable for floodproofing, elevating, or relocating nonresidential buildings depending on the eligibility of those businesses relative to the program requirements.

TABLE 5-1
Summary of Alternatives

Alternative	Recommended for Implementation?
Focus Area #1 – North Blenheim	
Alternative 1-1: Analysis of Historic Covered Bridge	M
Alternative 1-2a: Floodplain Enhancement	N
Alternative 1-2b: Floodplain Enhancement	N
Alternative 1-2c: Floodplain Enhancement	Y
Alternative 1-3: Sediment Removal	N
Focus Area #2 – Bear Ladder Road	
Alternative 2-1: Floodplain Modifications	N
Alternative 2-2: Raise Roadway	N
Alternative 2-3: Roadway Signage and Closure	Y
Focus Area #3 – West Fulton Hamlet	
Alternative 3-1: Replace Patria Road Bridge over House Creek	In future
Alternative 3-2: Replace West Fulton Road Bridge over Panther Creek	In future
Alternative 3-3: Create Compound Channel with Floodplain along Panther Creek	Y
Focus Area #4 – Village of Middleburgh	
Alternative 4-1: Modify/Replace NYS Route 30 Bridge	N
Alternative 4-2: Floodplain Enhancement	N
Alternative 4-3: Right Bank Floodplain Enhancement	N
Alternative 4-4: Dredging	N
Alternatives 4-5a and 4-5b: Flood Control Levee and Wall	N
Alternative 4-6: Individual Building Relocation, Elevation, Floodproofing	Y
Focus Area #5 – Christmas Tree Lane Culvert	
Alternative 5-1: Increase Culvert Capacity	N
Alternative 5-2: Raise Roadway	N
Alternative 5-3: Relocate Roadway	N
Alternative 5-4: NYS Route 30 Roadway Signage and Closure	Y
Focus Area #6 – Route 145 Culvert	
Alternative 6-1: Replace Culvert	M
Alternative 6-2: Program of Debris Management	Y
Focus Area #7 – Village of Schoharie	
Alternative 7-1: Floodplain Enhancement	N
Alternative 7-2: Dredging	N
Alternatives 7-3a and 7-3b: Levee Scenarios	N
Alternative 7-4: Individual Building Relocation, Elevation, Floodproofing	Y
Focus Area #8 – Fox Creek	
Alternative 8-1: Modification/Replacement of the State Route 443 Bridge (Upper)	N
Alternative 8-2: Modification/Removal of Abutments at Schell Road Bridge	M
Alternative 8-3: Modification/Replacement of Schoonmaker Road	In future
Alternative 8-4: Modification/Replacement of Zimmer Road Bridge	Y
Alternative 8-5: Modification/Replacement of Sholtes Road Bridge	Y
Alternative 8-6: Modification/Replacement of the State Route 443 Bridge (Lower)	In future
Alternative 8-7: Development of Sediment Management Plan	Y
Alternative 8-8: Bank Erosion Repairs	Y
Focus Area #9 – Gallupville	
Alternative 9-1: Modification/Replacement of School Street Bridge	N
Alternative 9-2: Floodplain Enhancement	N
Alternative 9-3: Individual Building Relocation, Elevation, Floodproofing	Y

TABLE 5-1 (continued)
Summary of Alternatives

Alternative	Recommended for Implementation?
Focus Area #10 – Railroad Bridge over Schoharie Creek	
Alternative 10-1: Modification/Replacement of Canadian Pacific Railroad Bridge	N
Alternative 10-2: Compliance with and Enforcement of NFIP Criteria	Y
Focus Area #11 – Cobleskill Creek Confluence	
Alternative 11-1: Modify/Replace Church Street Bridge	N
Alternative 11-2: Modify/Replace Route 30A Bridge and Roadway	N
Alternative 11-3: Individual Building Relocation, Elevation, Floodproofing	Y
Alternative 11-4: Roadway Signage and Closure	Y
Focus Area #12 – Fly Creek	
Alternative 12-1: SCSWCD Natural Channel Design Scenario #1	N
Alternative 12-2: SCSWCD Natural Channel Design Scenario #2	Y
Alternative 12-3: Develop a Sediment Management Plan	Y
Focus Area #13 – Colyer Road, Burtonsville	
Alternative 13-1: Modification or Enhancement of Channel or Floodplain	N
Alternative 13-2: Individual Building Relocation, Elevation, Floodproofing	Y
Focus Area #14 – Warnerville Cutoff	
Alternative 14-1: Elevation of the Roadway	N
Alternative 14-2: Elevation of Roadway and Installation of Bypass Culvert	N
Alternative 14-3: Elevation of Roadway and Installation of Bypass Bridge	N
Alternative 14-4: Warnerville Cutoff Roadway Signage and Closure	Y
Focus Area #15 – Potential for Flood Attenuation in Upper Watershed	
Alternative 15-1: Potential for Flood Storage at Warner Lake	N
Alternative 15-2: Potential for Flood Storage at Onderdonk Lake	N
Alternative 15-3: Potential for Flood Storage at Other Lakes, Ponds, and Wetlands	Conserve wetlands
Focus Area #16 – Review of Berms along Farm Fields	
Alternative 16-1: Removal of Agricultural Berms	Where possible
Focus Area #17 – Review of Potential for Flood Attenuation in Reservoirs	
Focus Area #18 – Recommendations for Protection of Watersheds, Wetlands, Floodplains	
Use green infrastructure and best management practices.	Y
Establish and maintain vegetated buffers.	Y
Protect forests and open space.	Y
Protect and reconnect floodplains.	Y
Develop guidelines to limit impervious surfaces.	Y
Implement watershedwide wetland, stream, and buffer protection.	Y

TABLE 5-2
Cost Opinions for Recommended Alternatives

Alternative	Recommended for Implementation?	Cost Opinion Design/Study/ Permitting	Cost Opinion Construction
Focus Area #1 – North Blenheim			
Alternative 1-2c: Floodplain Enhancement	Y	\$68,000	\$800,000 - \$1M
Focus Area #2 – Bear Ladder Road			
Alternative 2-3: Roadway Signage and Closure	Y	see note 1	Costs will vary depending on what measures are implemented.
Focus Area #3 – West Fulton Hamlet			
Alternative 3-1: Replace Patria Road Bridge over House Creek	In future	\$150,000	\$600,000 - \$1M
Alternative 3-2: Replace West Fulton Road Bridge over Panther Creek	In future	\$150,000	\$600,000 - \$1M
Alternative 3-3: Create Compound Channel with Floodplain along Panther Creek	Y	\$60,000-\$75,000	\$150,000 - \$ 200,000
Focus Area #4– Village of Middleburgh			
Alternative 4-6: Individual Building Relocation, Elevation, Floodproofing	Y	see note 2	Costs will vary depending on what measures are implemented.
Focus Area #5 – Christmas Tree Lane Culvert			
Alternative 5-4: NYS Route 30 Roadway Signage and Closure	Y	see note 1	Costs will vary depending on what measures are implemented.
Focus Area #6 – Route 145 Culvert			
Alternative 6-1: Replace Culvert	M	\$150,000	\$1M - \$1.5M
Alternative 6-2: Program of Debris Management	Y		
Focus Area #7 – Village of Schoharie			
Alternative 7-4: Individual Building Relocation, Elevation, Floodproofing	Y	see note 2	Costs will vary depending on what measures are implemented.
Focus Area #8 – Fox Creek			
Alternate 8-2: Modification/Removal of Abutments at Schell Road Bridge	M	\$5,000	Costs will vary depending on results of structural assessment.
Alternate 8-3: Modification/Replacement of Schoonmaker Road	In future	\$150,000	\$1.5M - \$2M
Alternative 8-4: Modification/Replacement of Zimmer Road Bridge	Y	\$150,000	\$1.4M - \$1.8M
Alternative 8-5: Modification/Replacement of Sholtes Road Bridge	Y	\$150,000	\$1.4M - \$1.8M
Alternative 8-7: Development of Sediment Management Plan	Y		
Alternative 8-8: Bank Erosion Repairs	Y		
Focus Area #9 – Gallupville			
Alternative 9-3: Individual Building Relocation, Elevation, Floodproofing	Y	see note 2	Costs will vary depending on what measures are implemented.

TABLE 5-2 (continued)
Cost Opinions for Recommended Alternatives

Alternative	Recommended for Implementation?	Cost Opinion Design/Study/ Permitting	Cost Opinion Construction
Focus Area #10 – Railroad Bridge over Schoharie Creek			
Alternative 10-2: Compliance with and Enforcement of NFIP Criteria	Y		
Focus Area #11 – Cobleskill Creek Confluence			
Alternative 11-3: Individual Building Relocation, Elevation, Floodproofing	Y	see note 2	Costs will vary depending on what measures are implemented.
Alternative 11-4: Roadway Signage and Closure	Y	see note 1	Costs will vary depending on what measures are implemented.
Focus Area #12 – Fly Creek			
Alternative 12-2: SCSWCD Natural Channel Design Scenario #2	Y	\$40k - \$50k	\$400k - \$500k
Alternative 12-3: Develop a Sediment Management Plan	Y		
Focus Area #13 – Colyer Road, Burtonsville			
Alternative 13-2: Individual Building Relocation, Elevation, Floodproofing	Y	see note 2	Costs will vary depending on what measures are implemented.
Focus Area #14 - Warnerville Cutoff			
Alternative 14-4: Warnerville Cutoff Roadway Signage and Closure	Y	see note 1	Costs will vary depending on what measures are implemented.
Focus Area #15 – Potential for Flood Attenuation in Upper Watershed			
Focus Area #16 – Review of Berms along Farm Fields			
Alternative 16-1: Removal of Agricultural Berms	M		
Focus Area #17 – Review of Potential for Flood Attenuation in Reservoirs			
Focus Area #18 - Recommendations for Protection of Watersheds, Wetlands, Floodplains			
Use green infrastructure and best management practices.	Y		
Establish and maintain vegetated buffers.	Y		
Protect forests and open space.	Y		
Protect and reconnect floodplains.	Y		
Develop guidelines to limit impervious surfaces.	Y		
Implement watershedwide wetland, stream, and buffer protection.	Y		

Note 1: Cost of road closures will vary depending on the length of the detour, the volume of traffic, and the mechanisms used to close the road.

Note 2: Costs of individual building relocation, elevation, floodproofing will vary depending on the size and number of structures in the floodprone area and on what measures are implemented. The following approximate costs are provided as examples:

- Elevating a residential structure: \$175,000
- Low door shield: \$1,500
- Door gaskets and seals: \$500 - \$1,500

- Fully floodproofed doors: up to \$4,000 per door
- Elevate electric service and meter: \$500 - \$1,500
- Floodproof HVAC equipment: \$500 - \$1,500 (and up)
- Implementing a variety of measures to protect a small business: \$6,000 to \$50,000

Mohawk River Watershed Grants – The Environmental Protection Fund provides grant awards aimed at promoting economic revitalization and environmental sustainability in the Mohawk River watershed. Municipalities and not-for-profit corporations are eligible to apply. Periodically, funding for environmental protection or improvement projects throughout the Mohawk River Basin is available through Requests for Proposals. Eligible projects include those that conserve, protect, and restore fish, wildlife, and their habitats; protect and improve water quality; and promote flood hazard mitigation and enhanced flood resiliency. Examples include installation of green infrastructure projects to reduce stormwater runoff, right-sizing of culverts, restoration of natural stream conditions, restoration of riparian buffers, farmland protection, elevating or floodproofing critical structures, and environmental education activities.

Private Foundations – Private entities such as foundations are potential funding sources in many communities.

FEMA Flood Mitigation Assistance (FMA) Program – The FMA program was created as part of the National Flood Insurance Reform Act of 1994 (42 U.S.C. 4101). FEMA provides FMA funds to assist states and communities with implementing measures that reduce or eliminate the long-term risk of flood damage to buildings, homes, and other structures insurable under the NFIP. The long-term goal of FMA is to reduce or eliminate claims under the NFIP through mitigation activities. The former Repetitive Flood Claims and Severe Repetitive Loss programs have been replaced by the following recent (2012) changes to the FMA Program:

- The definitions of RLPs and SRLPs have been modified.
- Cost-share requirements allow more federal funds for properties with repetitive flood claims and SRLPs.
- There is no longer a limit on in-kind contributions for the nonfederal cost share.

The FMA program focuses on mitigation for structures that are insured or located in significant flood hazard areas.

Emergency Watershed Protection Program (EWP) – Through the EWP Program, the U.S. Department of Agriculture's NRCS can help communities address watershed impairments that pose imminent threats to lives and property. Most EWP work is for the protection of threatened infrastructure from continued stream erosion. The NRCS may pay up to 75 percent of the construction costs of emergency measures. The remaining costs must come from local sources and can be made in cash or in-kind services. EWP projects must reduce threats to lives and property; be economically, environmentally, and socially defensible; be designed and implemented according to sound technical standards; and conserve natural resources.

FEMA Pre-Disaster Mitigation (PDM) Program – The PDM Program was authorized by the Robert T. Stafford Disaster Assistance and Emergency Relief Act (Stafford Act), 42 U.S.C. 5133. The program

provides funds to states, territories, tribal governments, communities, and universities for hazard mitigation planning and implementation of feasible, effective, and cost-efficient mitigation measures. The purpose of funding pre-disaster plans and projects is to reduce overall risks to populations and facilities. The PDM Program is subject to the availability of appropriation funding.

USACE Floodplain Management Planning – The USACE provides 100 percent funding for floodplain management planning and technical assistance to states and local governments under several flood control acts and the Floodplain Management Services Program. Specific programs include the following:

- Small Flood Damage Reduction Projects: Section 205 of the 1948 Flood Control Act authorizes the USACE to study, design, and construct small flood control projects in partnership with nonfederal government agencies. Feasibility studies are 100 percent federally funded up to \$100,000 with additional costs shared equally. Costs for preparation of plans and construction are funded 65 percent with a 35 percent nonfederal match. Maximum federal expenditure for any project is \$7M.
- Emergency Stream Bank and Shoreline Protection: Section 14 of the 1946 Flood Control Act authorizes the USACE to construct emergency shoreline and stream bank protection works to protect public facilities such as bridges, roads, public buildings, sewage treatment plants, and water wells and nonprofit public facilities such as churches, hospitals, and schools. Cost sharing is similar to Section 205 projects above. Maximum federal expenditure for any project is \$1.5M.
- Clearing and Snagging Projects: Section 208 of the 1954 Flood Control Act authorizes the USACE to perform channel clearing and excavation with limited embankment construction to reduce nuisance flood damages caused by debris and minor shoaling of rivers. Cost sharing is similar to Section 205 projects above. The maximum federal expenditure for any project is \$500,000.
- Floodplain Management Services: Section 206 of the 1960 Flood Control Act authorizes the USACE to provide technical services and planning guidance for floodplain management. Technical assistance includes site-specific data on obstructions to flood flows, flood formation, and timing; flood depths, stages, or floodwater velocities; the extent, duration, and frequency of flooding; natural and cultural floodplain resources; and flood loss potentials before and after the use of floodplain management measures. Studies include floodplain delineation, dam failure, hurricane evacuation, flood warning, flood damage reduction, stormwater management, floodproofing, and inventories of floodprone structures. When funding is available, this work is 100 percent federally funded.

5.3 Additional Resources

In addition to the funding sources listed in Section 5.3, other resources are available for technical assistance, planning, and information. While the following sources do not provide direct funding, they offer other services that may be useful for proposed flood mitigation projects listed in the table.

TABLE 5-3 Potential Funding Sources								
Type of project	US Dept. of State	FEMA Flood Mitigation Assistance Program	FEMA Pre- Disaster Mitigation Program	Emergency Watershed Protection Program	Community Development Block Grant	Empire State Development	Mohawk River Watershed Grants	USACE
Floodplain Enhancement	X	X	X	X		X	X	X
Bridge Replacement or Modifications	X	X	X				X	
Roadway Signage and Closure								
Create Compound Channel with Floodplain	X	X	X	X			X	X
Individual Building Relocation, Elevation, Floodproofing				X	X	X	X	
Replace Culvert		X	X	X			X	X
Program of Debris Management		X	X	X			X	X
Development of Sediment Management Plan		X	X	X			X	X
Bank Erosion Repairs	X	X	X	X			X	X
Compliance with and Enforcement of NFIP Criteria								

TABLE 5-3 Potential Funding Sources								
Type of project	US Dept. of State	FEMA Flood Mitigation Assistance Program	FEMA Pre- Disaster Mitigation Program	Emergency Watershed Protection Program	Community Development Block Grant	Empire State Development	Mohawk River Watershed Grants	USACE
SCSWCD Natural Channel Design	X	X	X	X			X	X
Removal of Agricultural Berms		X	X				X	X
Use green infrastructure and best management practices.							X	
Establish and maintain vegetated buffers.			X	X			X	X
Protect forests and open space.							X	
Protect and reconnect floodplains.				X			X	X
Develop guidelines to limit impervious surfaces.							X	X
Implement watershedwide wetland, stream, and buffer protection plan.							X	

Project eligibility for grants and other funding opportunities depends on project details.

Schoharie Area Long Term, Inc. (SALT) – SALT has a mission of rebuilding resilient and sustainable communities and a vision that the Schoharie Creek Basin and surrounding communities will be vibrant, thriving, resilient, and sustainable. While not a source of direct funding, SALT is dedicated to flood recovery in the Schoharie Creek watershed and is a potential partner in flood mitigation implementation and long-term recovery. Areas of interest include rebuilding infrastructure to meet future community needs; implementing mitigation strategies; control of flow and height of the water carried by the river, floodplain, and watershed; land-use practices to protect structures against flooding; and floodproofing.

Land Trust and Conservation Groups – These groups play an important role in the protection of watersheds, including forests, open space, and water resources.

Cornell Cooperative Extension: Schoharie and Otsego Counties – This nonprofit educational organization is part of the Cooperative Extension land grant system, a partnership between county, state, and federal governments that is administered in NYS by Cornell University. Extension serves the needs of local communities; staff work with residents to identify community issues and needs and create strategies and programs to address those needs. They deliver educational programs, encourage collaboration, and connect people with information. For example, Extension provides stream restoration information including guidance for stream buffer planting and woody debris removal.

NYSDEC "Trees for Tribs" Program – DEC's Trees for Tribs offers low-cost to no-cost native trees and shrubs for streamside restoration. The program also offers free technical assistance that includes plant selection and designing a site planting plan. Native bare root trees and shrubs are provided by the Saratoga State Tree Nursery. The goal of the program is to plant young trees and shrubs along stream corridors to prevent erosion, increase flood water retention, improve wildlife and stream habitat, and protect water quality. The program emphasizes comprehensive watershed restoration designed to protect "green infrastructure" and serves as the first line of defense against storm and flooding events, protecting property, water quality, and fish and wildlife habitat. The program also promotes best management practices and encourages tributary protection.

5.4 Regulatory Permitting Requirements

The following regulatory permits may be required for projects listed in Table 5-4.

USACE Individual Permit – Section 404 of the Clean Water Act establishes a program to regulate the discharge of dredged or fill material into waters of the United States, which includes wetlands. Proposed activities are regulated through review of individual permits, which are required for potentially significant impacts. Discharged or fill material includes earth moving or placement of fill to build any structure; causeway/road fills; levees, shore protection devices like riprap, breakwaters, and seawalls; most mechanical land clearing; and temporary stockpiling of soil from construction of a drainage ditch. Waters of the US include interstate waters such as wetlands; waters currently, formerly, or susceptible to use in interstate commerce; intrastate waters including lakes, streams, wetlands, sloughs, prairie potholes, etc. the use, degradation, or destruction of which could affect interstate commerce; all impoundments of waters otherwise defined as Waters of the United States; tributaries of waters of the U.S.; and wetlands "adjacent" to waters of the U.S.

TABLE 5-4 Potential Permitting Requirements									
Alternative	Recommend for Implementation	USACE Individual Permit	USACE Nationwide Permit	401 Water Quality Certification	NYSDEC Article 15 Protection of Waters Permit	NYSDEC Wetlands Permit	Local Building Permit	Local FEMA Permits	Comments
Focus Area #1 – North Blenheim									
Alternative 1-2c: Floodplain Enhancement	Y	X		X	X			X	
Focus Area #2 – Bear Ladder Road									
Alternative 2-3: Roadway Signage and Closure	Y								
Focus Area #3 – West Fulton Hamlet									
Alternative 3-1: Replace Patria Road Bridge over House Creek	In future		X	X	X			X	
Alternative 3-2: Replace West Fulton Road Bridge over Panther Creek	In future		X	X	X			X	
Alternative 3-3: Create Compound Channel with Floodplain along Panther Creek	Y	X		X	X			X	
Focus Area #4 – Village of Middleburgh									
Alternative 4-6: Individual Building Relocation, Elevation, Floodproofing	Y						X	X	Additional permits may be required depending on construction details.
Focus Area #5 – Christmas Tree Land Culvert									
Alternative 5-3 – NYS Route 30 Roadway Signage and Closure	Y								
Focus Area #6 – Route 145 Culvert									
Alternative 6-1: Replace Culvert	M		X	X				X	

Table 5-4 (continued)									
Alternative	Recommend for Implementation	USACE Individual Permit	USACE Nationwide Permit	401 Water Quality Certification	NYSDEC Article 15 Protection of Waters Permit	NYSDEC Wetlands Permit	Local Building Permit	Local FEMA Permits	Comments
Alternative 6-2: Program of Debris Management	Y							X	No permits are needed until the plan is implemented. Permits are required if work occurs below the HWM or involves heavy equipment in the channel.
Focus Area #7 – Village of Schoharie									
Alternative 7-4: Individual Building Relocation, Elevation, Floodproofing	Y						X	X	Additional permits may be required depending on construction details.
Focus Area #8 – Fox Creek									
Alternate 8-2: Modification/Removal of Abutments at Schell Road Bridge	M		X	X				X	
Alternate 8-3: Modification/Replacement of Schoonmaker Road Bridge	In future		X	X				X	
Alternate 8-4: Modification/Replacement of Zimmer Road Bridge	Y		X	X				X	
Alternative 8-5: Modification/Replacement of Sholtes Road Bridge	Y		X	X				X	
Alternative 8-7: Development of Sediment Management Plan for Fox Creek	Y							X	No permits are needed until the plan is implemented. Permits are required if work occurs below the HWM or involves heavy equipment in the channel.
Alternative 8-8: Bank Erosion Repairs	Y		X	X				X	

TABLE 5-4 (continued)									
Alternative	Recommend for Implementation	USACE Individual Permit	USACE Nationwide Permit	401 Water Quality Certification	NYSDEC Article 15 Protection of Waters Permit	NYSDEC Wetlands Permit	Local Building Permit	Local FEMA Permits	Comments
Focus Area #9 – Gallupville									
Alternative 9-3: Individual Building Relocation, Elevation, Floodproofing	Y						X	X	Additional permits may be required depending on construction details.
Focus Area #10 – Railroad Bridge over Schoharie Creek									
Alternative 10-2: Compliance with and Enforcement of NFIP Criteria	Y							X	
Focus Area #11 – Cobleskill Creek Confluence									
Alternative 11-3: Individual Building Relocation, Elevation, Floodproofing	Y						X	X	Additional permits may be required depending on construction details.
Alternative 11-4: Roadway Signage and Closure	Y								
Focus Area #12 – Fly Creek									
Alternative 12-2: SCSWCD Natural Channel Design Scenario #2	Y	X		X	X			X	
Alternative 12-3: Develop a Sediment Management Plan	Y							X	No permits needed until the plan is implemented. Permits are required if work occurs below the HWM or involves heavy equipment in the channel.
Focus Area #13 – Colyer Road, Burtonsville									
Alternative 13-2: Individual Building Relocation, Elevation, Floodproofing	Y						X	X	Additional permits may be required depending on construction details.

TABLE 5-4 (continued)									
Alternative	Recommend for Implementation	USACE Individual Permit	USACE Nationwide Permit	401 Water Quality Certification	NYSDEC Article 15 Protection of Waters Permit	NYSDEC Wetlands Permit	Local Building Permit	Local FEMA Permits	Comments
Focus Area #14 – Warnerville Cutoff									
Alternative 14-1: Roadway Signage and Closure	Y								
Focus Area #16 – Review of Berms along Farm Fields									
Alternative 16-1: Removal of Agricultural Berms	M		X	X	X			X	Required permits will depend on final project design.
Focus Area #18 – Recommendations for Protection of Watersheds, Wetlands, Floodplains									As these plans are developed and implemented, some actions may require permits on a case-by-case basis.
Use green infrastructure and best management practices.	Y							X	
Establish and maintain vegetated buffers.	Y							X	
Protect forests and open space.	Y								
Protect and reconnect floodplains.	Y							X	
Develop guidelines to limit impervious surfaces.	Y							X	
Implement watershedwide wetland, stream, and buffer protection plan.	Y							X	



USACE Nationwide Permit – Under Section 404 of the Clean Water Act, the USACE is authorized to issue general or "Nationwide" permits for categories of activities that are minor in scope with minimal adverse environmental impacts. Definitions of waters of the United States are the same as those described for individual permits. General permits are valid only if the conditions applicable to the permits are met (otherwise, an individual permit is required). Currently, there are 52 categories of nationwide permits authorizing a wide variety of project activities including utility lines, maintenance of previously authorized structures, bank stabilization, linear transportation projects, minor dredging or discharges, aquatic habitat restoration, residential developments, reshaping existing drainage ditches, and stormwater management facilities. These activities require compliance with specific conditions and scope-of-project limitations. Some of them require preconstruction notification.

401 Water Quality Certification (WQC) – Under Section 401 of the Clean Water Act, the NYSDEC is authorized to issue or deny WQC for USACE Nationwide permits. The Nationwide permits are divided into three categories for review:

- Twenty-four of the Nationwide permits are covered by WQC as long as the project meets the general regional conditions listed in the WQC (if not, an individual section 401 WQC from the NYSDEC is required). General conditions include this stipulation: *"This authorization does not allow the stacking of nationwide permits, so that in combination they exceed 1/4 of an acre of fill or 300 linear feet of stream disturbance. When used in combination, the most restrictive conditions apply."*
- Nine of the Nationwide permits are covered by WQC as long as they meet the general conditions as well as the listed special conditions.
- Eight Nationwide permits are not eligible for a blanket WQC and require an individual WQC from the NYSDEC.

NYSDEC Article 15 Protection of Waters Permit – For projects that require both federal and state permits, a joint application form is available from NYSDEC to streamline the paperwork for obtaining the necessary permits. The Protection of Waters Permit Program regulates the (permanent or temporary) disturbance of the bed or banks of a protected stream, which includes water bodies in the course of a stream of 10 acres or less, with a classification of AA, A, or B, or with a classification of C with a standard of (T) or (TS). Some examples of activities requiring this permit are placement of structures in or across a stream (i.e., bridges, culverts or pipelines); fill placement for bank stabilization or to isolate a work area (i.e., riprap or coffer dams); excavations for gravel removal or as part of a construction activity; lowering stream banks to establish a stream crossing; utilization of equipment in a stream to remove debris or to assist in-stream construction; excavation or placing of fill in navigable waters of the state, below the mean high water level, including adjacent and contiguous marshes and wetlands; construction, reconstruction, or repair of dams and other impounding structures; and construction, reconstruction, or expansion of docking and mooring facilities.

NYSDEC Wetlands Permit – The intent of the NYS Freshwater Wetlands Act administered by the NYSDEC is to preserve, protect, and conserve freshwater wetlands and their adjacent areas. Adjacent areas extend 100 feet from the wetland boundary. Protected wetlands must be 12.4 acres or larger; in rare cases, the DEC may determine that smaller wetlands may be protected if they have unusual local importance. The act requires DEC to map all state-regulated wetlands. Activities that could have

negative impacts on wetlands are regulated. A permit is required to conduct any regulated activity in a protected wetland or its adjacent area. Activities that require a wetland permit from the DEC include construction of buildings, roadways, septic systems, bulkheads, dikes, or dams; placement of fill, excavation, or grading; modification, expansion, or extensive restoration of existing structures; drainage, except for agriculture; and application of pesticides in wetlands.

Town Building Permits – Work on structures that have been damaged by flooding or will be floodproofed may require a building permit from the local township or village. The permit is required prior to construction or other improvements; removal, relocation, or occupation of a business; demolition of any building or structure; and before the installation of equipment (such as oil and gas heaters) that is not portable. Other stipulations may apply depending on the municipality.

Local FEMA Permits – All development within SFHAs is subject to floodplain development regulations. The SFHA is the area that would be inundated by the 100-year flood. Local communities that participate in the NFIP have a local law or ordinance that regulates development within mapped floodplains and SFHAs. Schoharie County participates in the NFIP, which makes flood insurance available to residents in the community both within and outside the 100-year floodplain. Any project located within either the floodway or floodplain as designated by FEMA and represented on the most recent FEMA maps may require a permit from the municipality in which it is located. Each municipality has a Building Inspector and/or Floodplain Administrator authorized to determine which local permits are required.

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4805-05-5-a1017-rpt



APPENDIX A

PUBLIC PRESENTATION - OCTOBER 26, 2015

Flood Mitigation Study

Schoharie Creek Watershed

Mark Carabetta, CFM

Milone & MacBroom

Karen Schneller-McDonald

Hickory Creek



Project Funding

- New York Department of State, with funds provided under Title 11 of the Environmental Protection Fund - Local Waterfront Revitalization Program
- The Study is part of Phase 1 of the Mohawk River Watershed Management Plan Implementation



**Department
of State**

Purpose of Tonight's Meeting

- Introduce the project team
- Explain goals of the study
- Explain public meeting process
- Review the study area
- Schoharie flood history
- Discuss potential flood mitigation strategies
- Collect information about flooding and flood damage



Schoharie Creek

Milone & MacBroom's Project Team



Jim MacBroom, P.E.



Jeanine Gouin, P.E.



David Murphy, PE, CFM



Mark Carabetta, CFM



Andie Greene, P.E.



Jessica Louisos, P.E.



Jenabay Sezen, E.I.T.



Vernon Bevan, E.I.T.



Project Steps and Goals

Goals:

- Evaluate the causes of flooding
- Recommend options for flood hazard mitigation

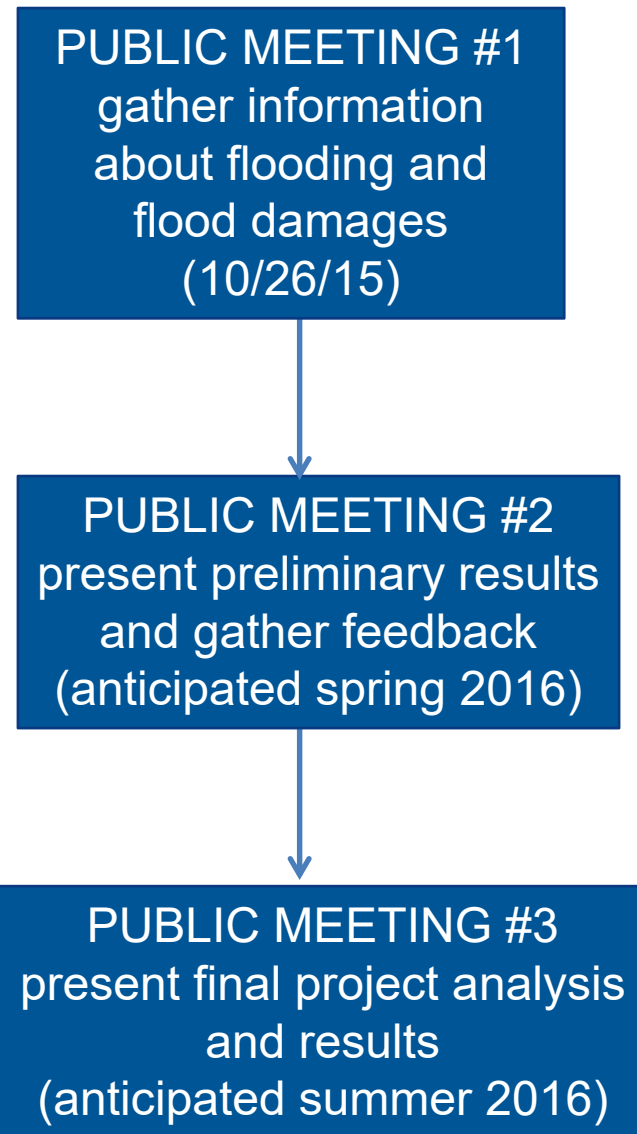
Steps:

- Collect input from property owners, municipal officials and other stakeholders
- Build upon FEMA flood modeling, previous studies, and County hazard mitigation plans
- Through field investigations and hydraulic modeling, assess the potential magnitude of flood relief alternatives
- Refine alternatives for approximately 15 sites, through vetting of cost, feasibility, and public input
- Develop Drainage Master Plan Report

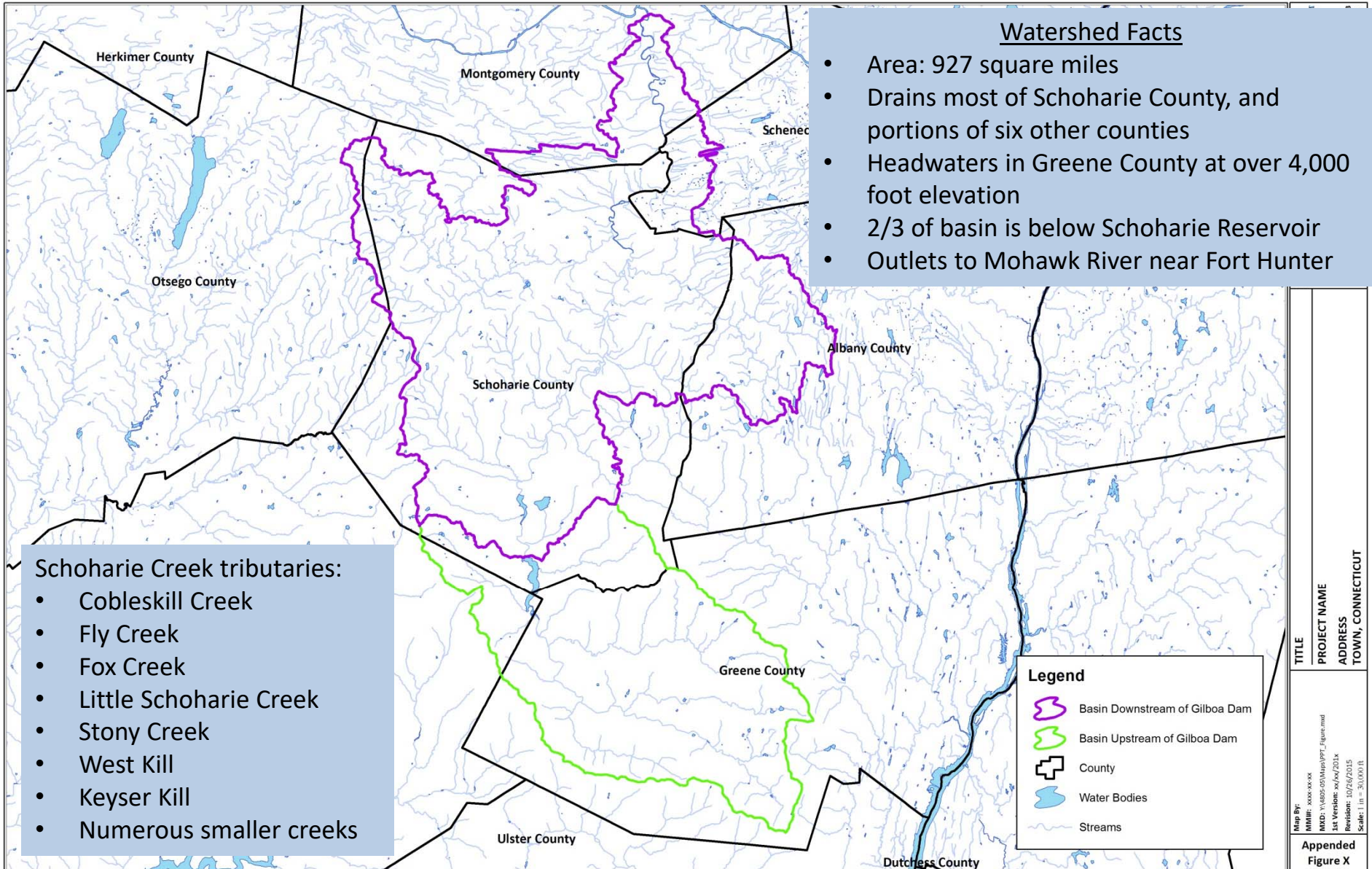


Fox Creek

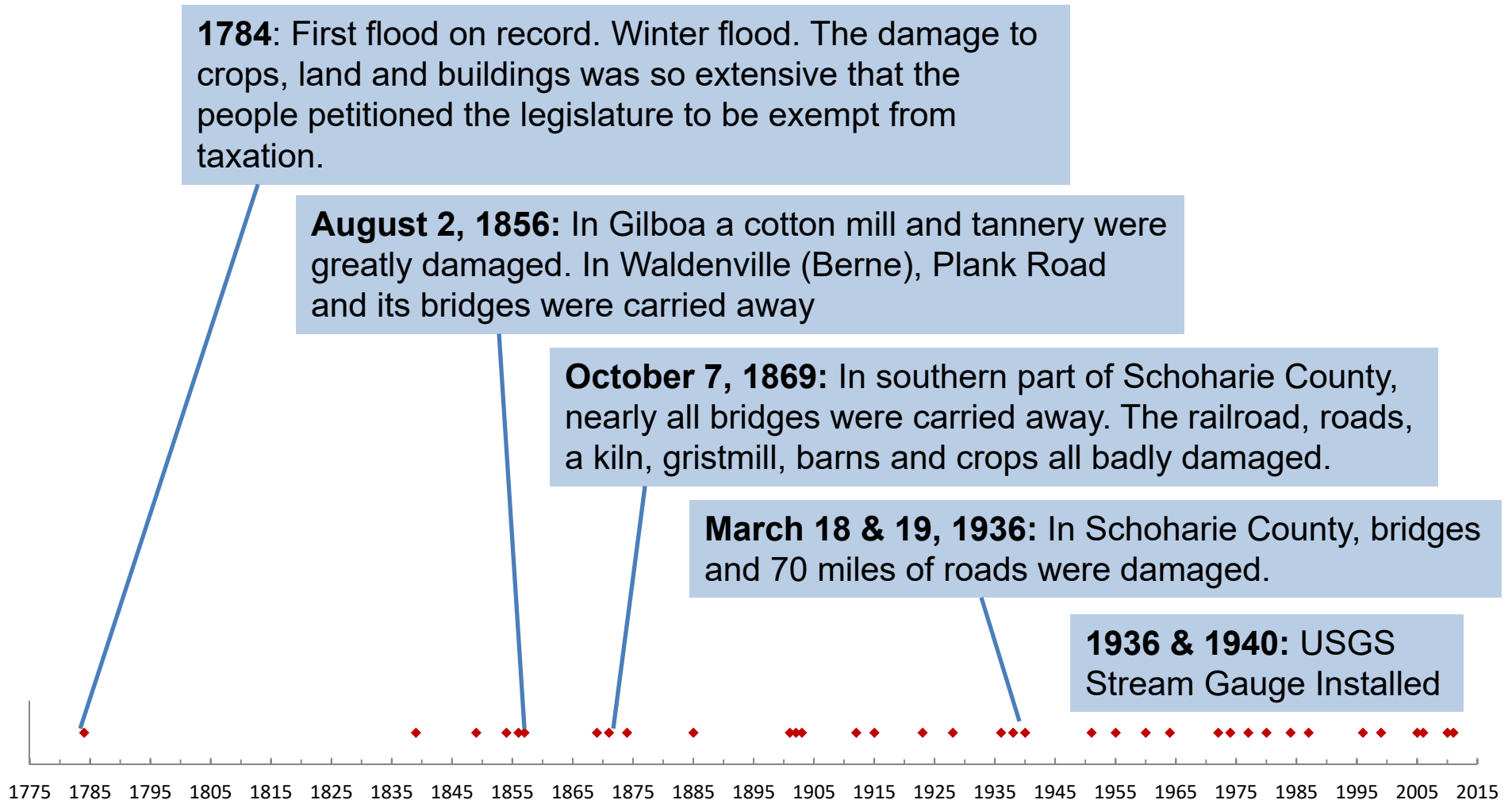
Public Meeting Process



Schoharie Creek Watershed

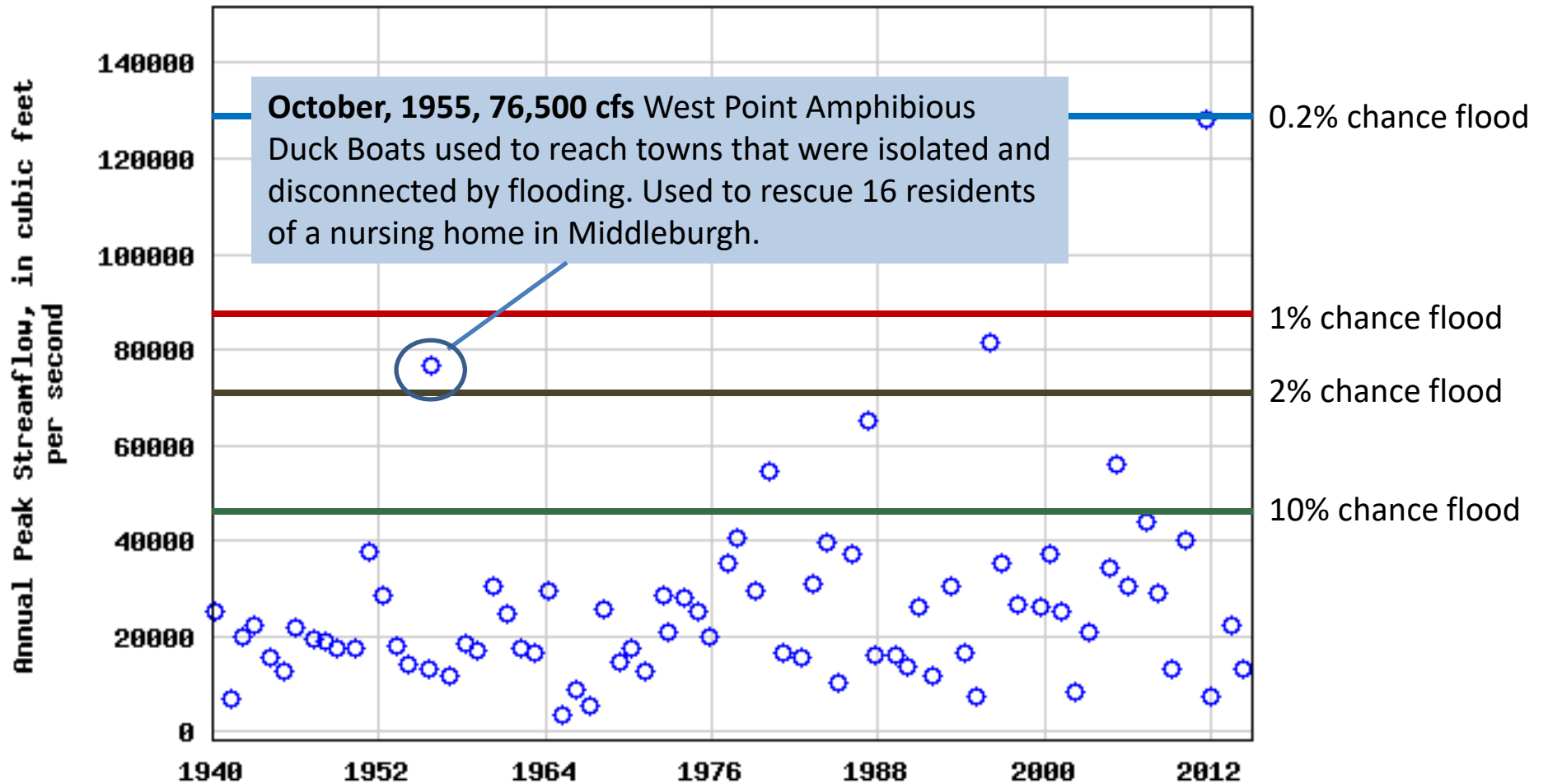


Flood History in the Schoharie Basin



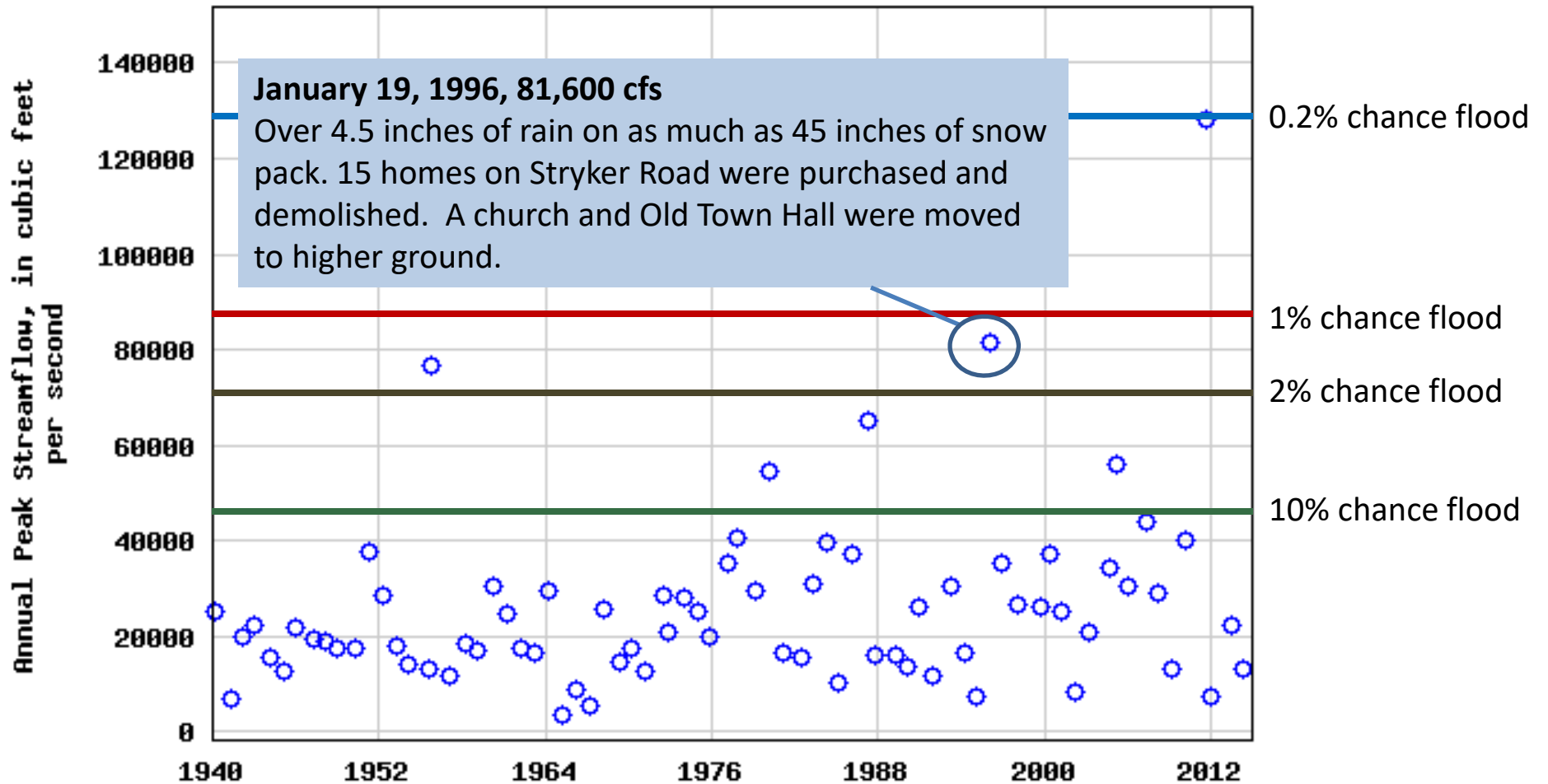
Flood History in the Schoharie Basin

USGS 01351500 SCHOHARIE CREEK AT BURTONSVILLE NY



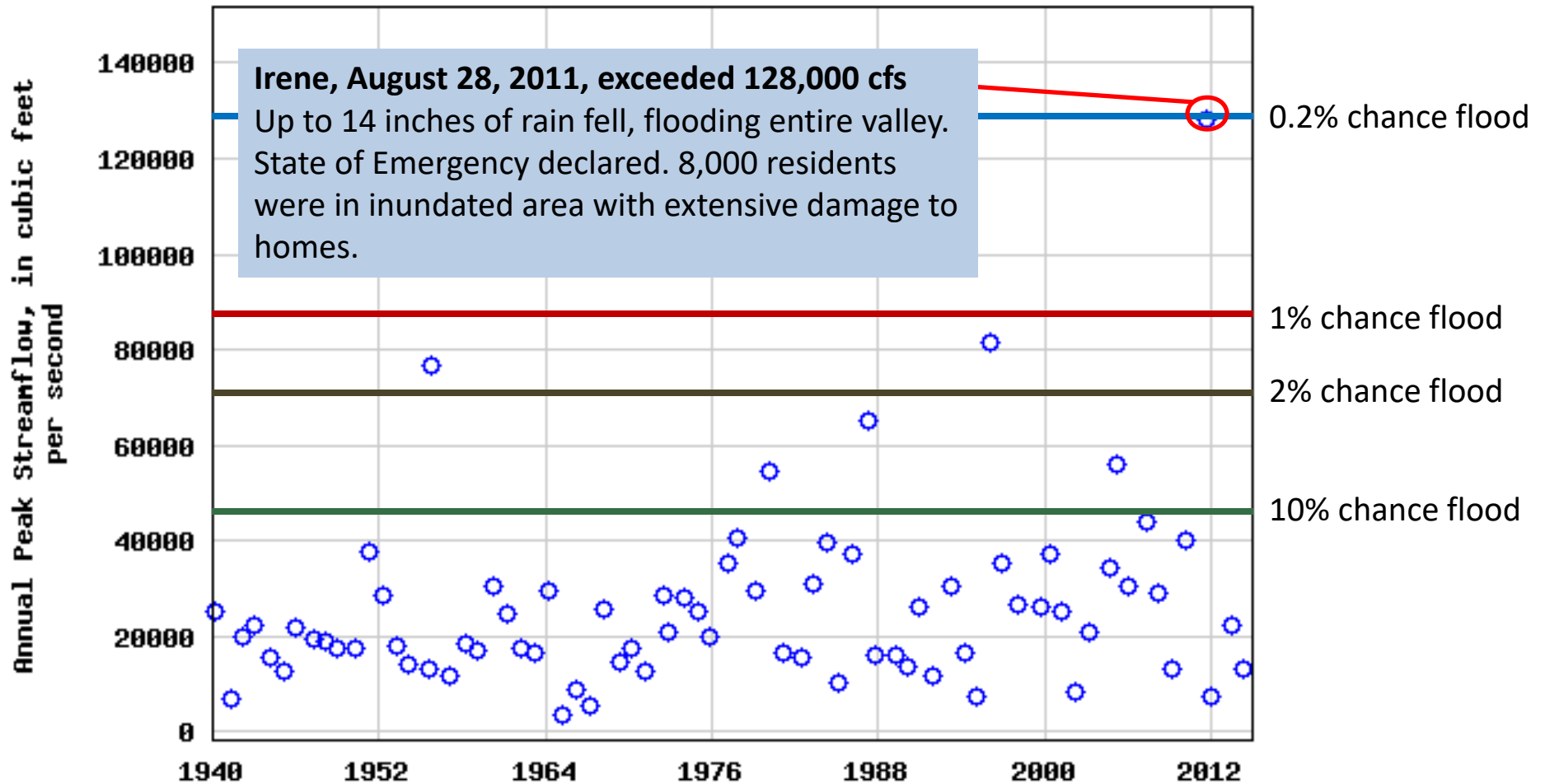
Flood History in the Schoharie Basin

USGS 01351500 SCHOHARIE CREEK AT BURTONSVILLE NY

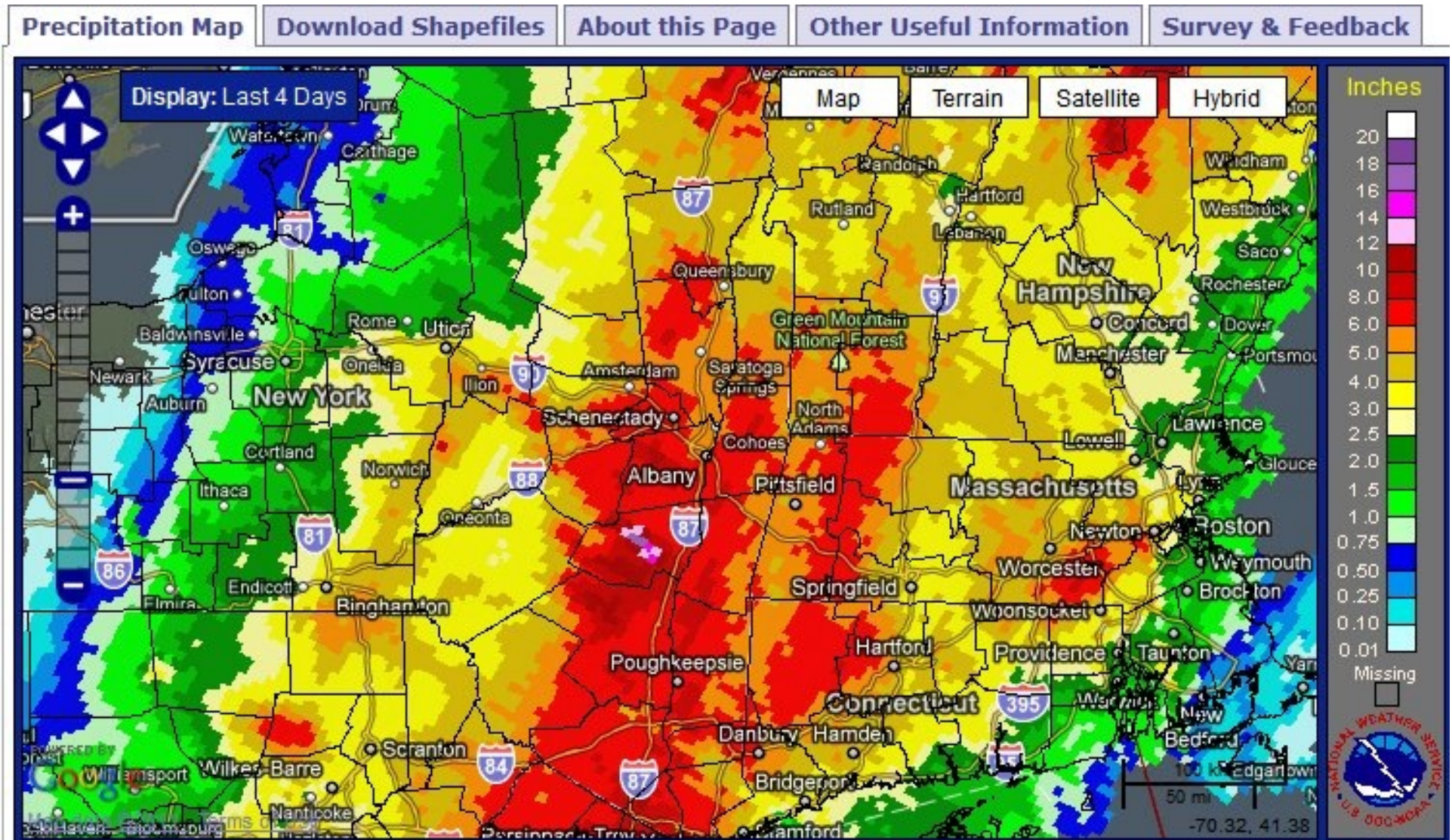


Flood History in the Schoharie Basin

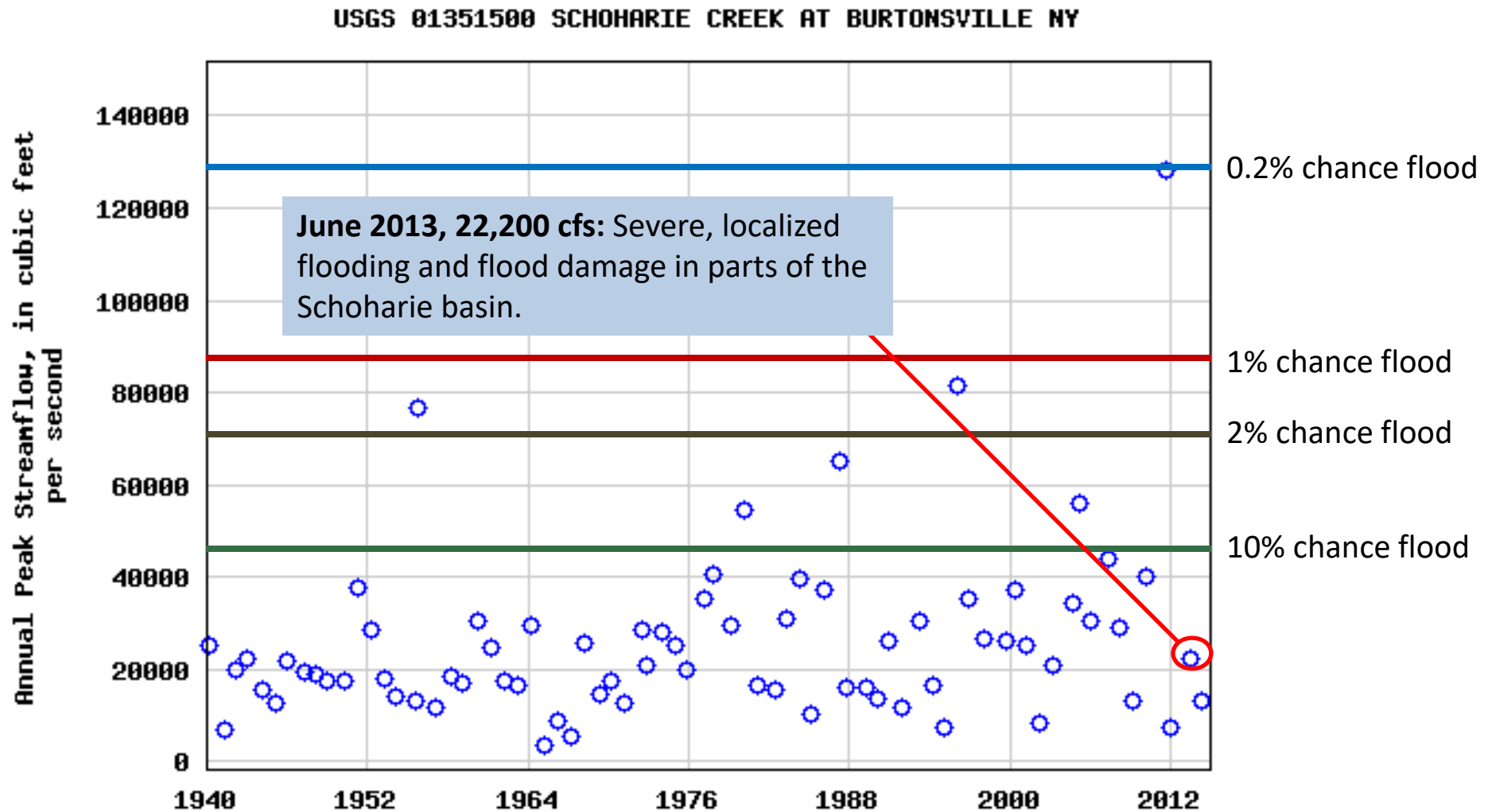
USGS 01351500 SCHOHARIE CREEK AT BURTONSVILLE NY



Tropical Storm Irene, August 2011



Flood History in the Schoharie Basin



Potential Flood Mitigation Strategies

Structural Solutions

- Bridge and culvert removal or replacement
- Dam removal or modification
- Sediment management
- Channel modification
- Floodwater attenuation/storage
- Wetland creation
- Floodplain restoration, creation or enhancement

Individual Property Solutions

- Elevation of individual structures
- Floodproofing of individual structures
- Relocation of floodprone structures

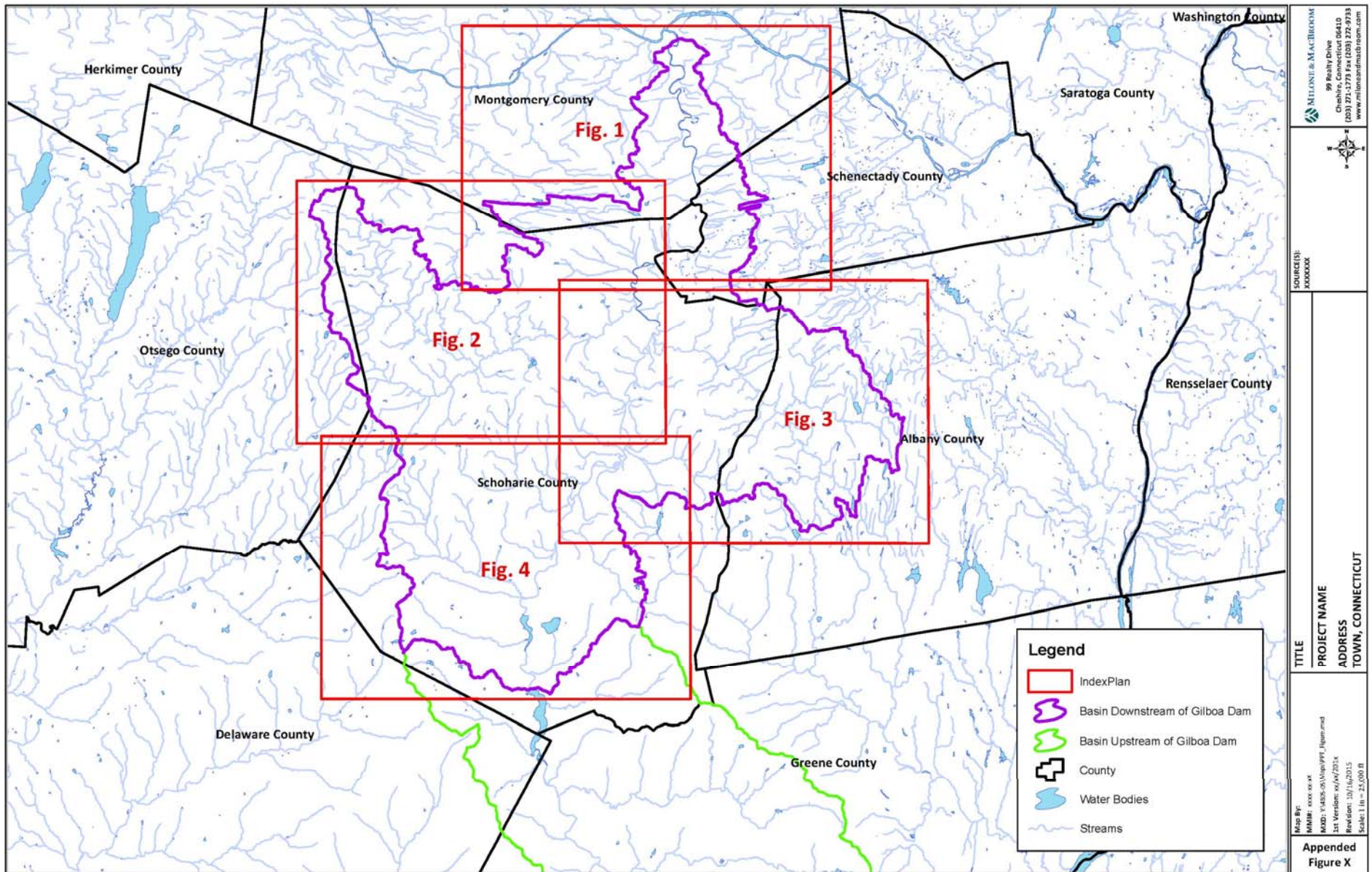
Programmatic Solutions

- Establishment or enhancement of floodplain zoning policy
- Development of programs such as the Community Rating System
- Public education programs

Final Outcomes

- Engineering Analysis – Scientifically Based
- Descriptions and Sketches of Flood Mitigation Options
- Cost Opinions – To Understand Viability
- Identification of Potential Funding Sources
- A Blueprint for Near-Term and Long-Term Flood Mitigation
- A Better Understanding of What is Feasible, What is Cost Effective, and What is Desired by Citizens of Schoharie Creek watershed

Maps



Ground Rules

- Your input is very important
- Join breakout group for your area of the watershed
- Discuss observations/concerns with station leader, and mark locations on map
- Complete Stakeholder Questionnaire
- Upload photos or video at link below
 - Label with name, date and location taken

<https://clients.miloneandmacbroom.com>

User Name: Schohariepublic

Password: Floodstudy



Fox Creek

Questions, Comments, or Thoughts?



APPENDIX B

MONTHLY PROJECT UPDATES



DATE: September 30, 2015

MMI #: 4805-05

PROJECT: Schoharie Creek Watershed Flood Study

SUBJECT: Project Status Report

Following is a brief report on the status of the Schoharie Watershed Flood Mitigation Study. The project officially got underway when the contract between Milone & MacBroom (MMI) and Schoharie County Soil & Water Conservation District (SCSWCD) was executed on August 21, 2015.

Subconsultants

Two subconsultants have been retained to assist MMI in the completion of the project. MJ Engineering and Land Surveying is a minority business enterprise (MBE), which has been retained to conduct survey. Hickory Creek Consulting is a women business enterprise (WBE), and will assist with field investigations, public outreach, identification of funding sources and permitting requirements, and drafting of the final engineering report. Agreements between MMI and the two subconsultants are in place or pending. MMI's invoicing will include subconsultant invoices as documentation of M/WBE involvement.

Data Gathering

Following is a summary of project-related information collected to date:

- FEMA HEC-RAS models for watercourses within study area
- Supplementary LiDAR and data associated with HEC-RAS models
- GIS mapping layers
- History of Schoharie County Floods
- FEMA Flood Insurance Rate Maps
- FEMA Flood Insurance Studies
- Schoharie County Multi-Jurisdiction Hazard Mitigation Plan (other counties pending)
- 1996 Russel Wege review of flood problems

Project Meeting

A project meeting was held on September 30, 2015, via conference call. Meeting minutes and a list of participants will be distributed separately.

Plan for Public Meeting

Date, location and format of initial public meeting were discussed on the project meeting call. Goals of meeting are to 1) inform members of the public about the Schoharie flood study, its goals, and intended outcomes; and 2) gather information on flood-prone areas and flooding problems. Meeting date will be the evening of Monday, October 26th. Location will likely be within the town of Schoharie or Middleburgh, although location may change if a system can be used that will allow for participation from remote locations in the project area, such as WebEx. A smaller group led by Pete Nichols will investigate possible venues for meeting, including the use of WebEx-type format. A call will be held on October 7th to finalize plans.



DATE: November 2, 2015

MMI #: 4805-05

PROJECT: Schoharie Creek Watershed Flood Study

SUBJECT: Project Status Report

Following is a monthly update on the status of the Schoharie Watershed Flood Mitigation Study. The contract between Milone & MacBroom (MMI) and Schoharie County Soil & Water Conservation District (SCSWCD) was executed on August 21, 2015.

Data Collection and Field Investigations

MMI has collected and reviewed available data and resource information from a variety of sources including:

- FEMA HEC-RAS models for watercourses within study area
- Supplementary LiDAR and data associated with HEC-RAS models
- County LiDAR for Schoharie and Montgomery Counties
- GIS mapping layers
- History of Schoharie County Floods
- FEMA Flood Insurance Rate Maps and Flood Insurance Studies
- Schoharie County Multi-Jurisdiction Hazard Mitigation Plan (other counties pending)
- 1996 Russel Wege review of flood problems
- Meeting with NYPA at Gilboa-Blenheim Facility on October 23
- Phone conversation with John Vickers of NYCDEP on October 26 regarding Gilboa Dam
- Input from SCSWCD on problem focus areas

Initial field investigations were conducted on October 13 and October 23.

A history of flooding in the Schoharie Creek watershed was compiled.

Public Meeting

Public Meeting #1 was held at 7pm on October 26, 2015, at the Schoharie Central School Auditorium, 136 Academy Drive, Schoharie. Goals of meeting were to 1) inform members of the public about the Schoharie flood study, its goals, and intended outcomes; and 2) gather information on flood-prone areas and flooding problems. Pete Nichols of SCSWCD opened the meeting and introduced the topic. Mark Carabetta of MMI and Karen Schneller-McDonald of Hickory Creek Consulting provided an overview of the study, and collected information from members of the public on flooding problems.

Next Steps

- Compile input from public meeting
- Identify focus areas for further investigation
- Conduct additional field investigations
- Prepare a technical memorandum summarizing above information



- Coordinate with MJ Engineering and Land Surveying to conduct survey
- Initiate hydraulic modeling and assessment



DATE: December 1, 2015

MMI #: 4805-05

PROJECT: Schoharie Creek Watershed Flood Study

SUBJECT: Project Status Report

Following is a monthly update on the status of the Schoharie Creek Watershed Flood Mitigation Study. MMI's work over the last month has focused on the selection of focus areas, and the coordination with MJ Engineering and Land Surveying (MMI's MBE subconsultant) to conduct survey.

Selection of Focus Areas

A total of 16 preliminary 'focus areas' within the Schoharie Creek watershed were identified. These focus areas were selected based on input collected at the October 26 public meeting at the Schoharie Central School Auditorium, from Conservation District staff, and based on MMI's review of technical documents, maps, and flood history reports. As field investigations continue, these focus areas will be refined, and some may be dropped or added.

The 16 preliminary focus areas are as follows:

Focus Area #1 – Bear Ladder Road: This area is located where Bear Ladder Road parallels Schoharie Creek, just north of the hamlet of Blenheim. The road reportedly floods frequently at a location about 2 miles downstream of the Route 30 Bridge, where there is a low spot in the road. When the road floods, access is cut off to several residences.

Focus Area #2 – Burtonsville: An approximately 0.75 mile reach of Schoharie Creek, located within the hamlet of Burtonsville, Town of Charleston, in Montgomery County along the county line. The reach extends to the north and south of the Route 160 Bridge. Participants at the public meeting reported flooding of roads and homes in this area.

Focus Area #3 – Central Bridge Area: This area through Central Bridge includes the downstream-most reach of Cobleskill Creek as it passes under the Church Street and Route 30A bridges, its confluence with Schoharie Creek, and extending along Schoharie Creek to downstream of the Canadian Pacific railroad bridge. Flooding and channel instability has been reported here.

Focus Area #4 – Cripplebush Creek confluence: Includes the lower portion of Cripplebush Creek, including the Route 30A bridge, the confluence with Schoharie Creek, and a section of Schoharie Creek including the Junction Road bridge. Flooding and channel instability is reported to occur in this area.



Focus Area #5 - Christmas Tree Lane Culvert: Located in the Town of Middleburgh just south of Christmas Tree Lane, this culvert traverses Route 30 and conveys an unnamed tributary to Schoharie Creek. This culvert is reported to overtop and flood Route 30.

Focus Area #6 – Fly Creek: Beginning at the Fly Creek and Schoharie Creek confluence adjacent to the Junction Bridge and extending upstream along the Fly Creek for approximately 1.5 miles to upstream of the Route 20 Bridge in the hamlet of Sloansville, Town of Esperance.

Focus Area #7: Fox Creek: Beginning in the hamlet of West Berne, Town of Berne in Albany County, and extending downstream to and including the hamlet of Gallupville in the Town of Wright, Schoharie County. This section of Fox Creek runs along or crosses Route 443 for its entire length and passes under several bridges. There have been numerous reports of flooding, sediment aggradation and debris jams in this area.

Focus Area #8 – Heathen Creek and House Creek Confluence: Located 1.5 miles north of the hamlet of West Fulton, in the Town of Fulton, the confluence of Heathen Creek and House Creek is to the south of the intersection of Nicolai Road and West Fulton Road (Route 4). The bridge at Nicolai Road is reportedly prone to debris jams and flooding.

Focus Area #9 – Village of Middleburgh: Schoharie Creek as it flows adjacent to the Village of Middleburgh, this reach extends from upstream of the Main Street (Route 145) bridge, along River Street, and downstream to include floodprone areas below the Village.

Focus Area #10 – North Blenheim: An approximately 1.5 mile reach of Schoharie Creek as it flows through the hamlet of North Blenheim, including the Route 30 bridge and the remains of the historic covered bridge. The hamlet was severely damaged by flooding during tropical storm Irene, and is subject to sedimentation, much of it reportedly originating from West Kill Creek. This reach passes and includes the confluence with the West Kill.

Focus Area #11 –Route 145 Culvert: This culvert is located at the crossing of Route 145 over an unnamed tributary to Schoharie Creek, in the Town of Schoharie. The culvert is reportedly undersized, floods frequently, and is prone to debris jams.

Focus Area #12 – Village of Schoharie: A floodprone reach of Schoharie Creek as it flows past the Village of Schoharie. The reach begins upstream of Bridge Street and extends approximately 1.5 miles downstream. Flooding problems have been reported to the west of Main Street, and Main Street reportedly flooded during Irene.

Focus Area #13 – West Fulton Hamlet: Patria Road, in the hamlet of West Fulton, crosses over House Creek just upstream of its confluence with Panther Creek. The bridge at this location reportedly becomes jammed with debris. Panther Creek contains debris jams which flood the hamlet of West Fulton.



Focus Area #14 – Village of Cobleskill: Floodprone areas of Cobleskill Creek as it flows through the Village of Cobleskill.

Focus Area #15 – General Review of berms along farm fields along Schoharie Creek.

Focus Area #16 – Review of potential for flood attenuation: This will include a review of potential flood storage at Gilboa Dam and the NYPA Gilboa-Blenheim pump-storage facility. It will also include an examination of potential for flood storage in ponds and wetlands located at various points throughout the watershed.

Coordination with MJ Engineering and Land Surveying to conduct survey

Survey is underway, and coordination with MJ Engineering to complete the survey is ongoing. There are not enough resources available to conduct survey at all of the Focus Areas, nor is new survey necessary at all sites. Emphasis is being placed on collecting new survey where it is needed most. MMI has prioritized the sites, and MJ will collect new survey at as many as they can with the available resources.

Next Steps

- Conduct additional field investigations
- Finalize list of focus areas
- MJ Engineering and Land Surveying to complete survey work
- Initiate hydraulic modeling and assessment