INVITATION TO SUBMIT PROPOSALS
Willow Local Flood Analysis
Town of Woodstock, Ulster County, New York

Date: July 29, 2026

Proposal Submission: Cornell Cooperative Extension Ulster County
PO Box 667
Shokan, NY 12481

Submission Date: **Wednesday, August 26, 2026**

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It is the responder's responsibility to read the RFP specifications below.

Purpose:
The purpose of this Request for Proposals (RFP) is to secure a qualified firm to conduct a Local Flood Analysis (LFA) for the community of Willow in the Town of Woodstock, Ulster County. The project will be funded through a grant to the town with funding coordinated by Cornell Cooperative Extension of Ulster County (CCEUC) on behalf of the Ashokan Watershed Stream Management Program (AWSMP). Members of the Woodstock Flood Advisory Committee (FAC) organized by the Town Board will direct the flood analysis process. The LFA project will be carried out in two phases. Phase I is an engineering analysis and Phase II is a feasibility analysis that ends in creation of a final report.

Project Timeline and Estimated Selection Schedule:

- Proposal posting date July 29, 2026.
- Submit questions to laz5@cornell.edu by August 12.
- Questions answered on the project finding website by August 13.
- Full proposal is due **Wednesday, August 26**.
- Applicant will be notified of selection after September 4.
- Anticipated project start date in October-November 2026.
- Anticipated project completion and final LFA plan by early 2028.

The RFP is posted online at: https://ashokanstreams.org/projects-and-funding/

RFP Submittal: Please submit one (1) electronic copy of the proposal to CCEUC, Leslie Zucker, laz5@cornell.edu and Woodstock Supervisor at supervisor@woodstockny.gov.

Evaluation Criteria: Proposals will be evaluated and scored for appropriateness of methods, project timeline, reasonableness of budget, applicant qualifications, and partnerships and coordination with stakeholders. The town requires proof of expertise in industry standard hydrologic and hydraulic modeling methods for engineering and design of stream and floodplain projects. The Town of Woodstock reserves the right to reject all proposals that are non-responsive, vague, or non-conforming.

Minimum Qualifications Requirements:
Proposers must demonstrate they meet the following minimum qualifications:

1. Vendor should employ a fluvial geomorphologist with demonstrated experience in assessing and diagnosing stream channel and floodplain conditions in mountain river settings.
2. Vendor should have demonstrated experience with flood modeling and best management practices to reduce flood inundation and erosion hazards. Experience with both riverine and stormwater-related flooding is preferred.
3. Vendor should have demonstrated experience communicating technical investigation results to a non-technical audience.

Contract Requirements:
Funding for this project is provided by the New York City Department of Environmental Protection through a grant that is locally administered by CCEUC for the Ashokan Watershed Stream Management Program. Before responding to this solicitation, carefully review information on Insurance Requirements, Intellectual Property, and Subcontractor Approval policies, online at:
https://ashokanstreams.org/projects-and-funding/smip-project-insurance-requirements/
https://ashokanstreams.org/projects-and-funding/copyrights-and-access-to-information/
https://ashokanstreams.org/projects-and-funding/subcontractor-approval-policy/

Proposal Content & Format: The proposal should be organized in sections containing the following information:

- **Description of Company**: Provide the address of the main office(s) (for legal purposes) and the address of the office(s) that will manage the project.
- **Qualifications and Experience:** Provide the history of the company, describe professional qualifications, prior experience and prior reports from similar projects, demonstrated capabilities, including demonstrated ability to work effectively with other service and system providers (e.g., municipal government).
- **Personnel:** Identify personnel who will conduct the project and their qualifications relevant to the project. Submittals must identify a project manager, who would be responsible for the day-to-day management of project tasks and would be the primary point of contact between your company and the town FAC.
- **Proposed Plan:** In a narrative format, describe in detail how the project will be structured, explaining how each of the requirements of the Scope of Work and other tasks will be accomplished. Include any other additional services, enhancements and/or options that will be provided to the town. Explain what steps will be necessary to implement services. Describe what information will be provided to the town FAC and on what timeline. Describe the plan to work

with the town FAC. Include any additional services or information seen beneficial to this project that the town should consider.

- **Project Cost:** State the full cost of undertaking the proposed services. Include a detailed, itemized cost statement that estimates costs associated with each task and total hours and calendar time associated with each task. Include detail showing total personnel costs associated with each task and other fees that are anticipated, such as travel, printing and materials costs, etc.

Project Description:

The Willow study area in northwest Ulster County is adjacent to the Beaver Kill, a major tributary to the Esopus Creek at Mt. Tremper, NY. The Town of Woodstock seeks to complete a Local Flood Analysis (LFA) for the hamlet of Willow and included housing clusters and critical infrastructure. The Willow LFA will proceed under revised LFA Program Rules issued October 25, 2024. The Town Flood Advisory Committee and its technical advisors have identified a hamlet study area boundary provided in **Attachment A – Study Area Maps** and described below. This will be the first Local Flood Analysis completed in the Town of Woodstock.

The primary transportation access to residents of the Willow study area is State Route 212 that parallels the Beaver Kill. Sickler Road provides an alternative route providing access to the hamlet in the event NY-212 is closed. Sickler Road runs parallel to sections of the Beaver Kill. The study area also includes the lower section of Wagner Creek (also called Silver Hollow Creek), a tributary to the Beaver Kill, that flows through the center of the Willow hamlet area. An Extended Study Area follows the Beaver Kill along Mink Hollow Road.

The study will be guided by a Flood Advisory Committee (FAC) appointed by the Town of Woodstock assisted by the AWSMP and other technical advisors. The FAC will meet monthly over the duration of the LFA study. The FAC anticipates the Willow Local Flood Analysis may take 12 to 16 months to complete based on similar studies utilizing the scope of work below.

Willow LFA Study Area

The Willow LFA Detailed Study Area (see **Attachment A – Study Area Maps**) borders the Beaver Kill and begins at its western extent at the Grog Kill Road intersection with NY-212 and extends eastward to the upper Beaver Kill bordering Mink Hollow Road. The study area's northern extents include the Willow hamlet center along Wagner Creek to just above Silver Hollow Road's intersection with Lane Road. In the upper Beaver Kill, the study area extends northwest to the boundary with a Kingston Water Supply Intake structure. The study area's southern extents incorporate a housing development, Ideal Park, located partly in the floodplain, and all of Sickler Road and the "Willow Flats" (a large wetland complex that includes the Beaver Kill between NY-212 and Sickler Road). Other than where noted, the Study Area generally follows the extents of the 0.2% annual chance flood hazard area (500-year flood zone).

An Extended Study Area follows the Beaver Kill along Mink Hollow Road and begins downstream at the Kingston Water Supply Intake structure and includes the floodplain to where the Beaver Kill branches in its upper valley. The scope of work within the Extended Study Area is confined to consideration of floodproofing, elevation, and buyout and relocation of structures. No hydraulic modeling of mitigation solutions for road-crossings or channel and floodplain enhancement is anticipated within the Extended Study Area.

The Detailed Study Area and the Extended Study Area combined are the "Willow LFA Study Area." Within the Willow LFA Study Area approximately 20-30 structures lie within the SFHA, approximately 8 appear to be in the Floodway. One of the structures is a critical community facility, the Willow Post Office. Based on FEMA FIS flood profiles, there are approximately 7.5 stream miles within the Study Area; 3.8 miles of the Beaver Kill within the Detailed Study Area and 2.8 miles in the Mink Hollow Extended Study Area, and 0.87 miles on Wagner Creek.

The Beaver Kill is a gauged stream, and both streams were covered by a detailed FEMA Flood Insurance Study (FIS) within the LFA study area. In addition, the Beaver Kill received geomorphic and water quality assessment by the AWSMP, NYCDEP Stream Management Program, and funded partners. Foundational reports are available online:

USGS Monitoring Location – Beaver Kill at Mount Tremper, NY-USGS-01362487: https://waterdata.usgs.gov/monitoring-location/USGS-01362487/#dataTypeId=continuous-00065-0&period=P7D&showFieldMeasurements=true
Beaver Kill Stream Management Plan (2015): https://ashokanstreams.org/publications-resources/stream-management-plans/

Flood Hazards Within LFA Study Area

In preparation for the LFA, the Woodstock Flood Advisory Committee met to identify observed flood conditions, review records, and identify locations where known flood hazards may occur. A list of identified hazard sites and possible analysis needs are provided in **Attachment B – Flood Hazard Sites** and should be reviewed to aide in scoping the project.

Scope of Work and Deliverables:

PHASE I – FLOOD ENGINEERING ANALYSIS

In Phase I, the Town of Woodstock and its consultant will better understand the nature of flooding, what significant factors exacerbate flooding, consider options for reducing losses, model potential projects to mitigate flooding, document community opinions about these options, and decide whether to proceed to Phase 2 for a subset of actions that stand out as potentially effective and feasible based on Phase 1 results.

Task 1 – Project Management, Coordination, and Meetings

1.1 Project Management - Throughout the course of the project, the consultant will coordinate tasks; perform project-related managerial tasks; maintain project records, technical data, drawings, and reports; maintain financial records; and coordinate with the Town Board and/or their appointed designees.

1.2 Project Initiation – The Town of Woodstock has established a Flood Advisory Committee (FAC) to assist in the LFA process. The FAC includes town officials and invited agency representatives from Ulster County Soil and Water Conservation District, Cornell Cooperative Extension, Ulster County's Dept. of Environment; and the NYCDEP, Catskill Watershed Corporation, and other agencies with interests in flood-prone areas. The consultant will meet and collaborate with the FAC and Town Board. The consultant will engage and communicate with project stakeholders in support of the overall process, which will include explaining the engineering analysis to be undertaken and its results. The consultant will solicit input from project stakeholders relative to the identification of

flooding threats and potential mitigation strategies to be included as part of the analysis, as well as prioritizing recommendations based upon the results of the analysis. Where possible the process should be integrated with similar or on-going efforts, such as updates to the Ulster County Multi-Jurisdictional All Hazard Mitigation Plan.

1.3 Educational Materials - As requested by the FAC, the consultant will prepare general and technical educational materials, as well as participate and contribute to ongoing education and outreach efforts regarding LFA.

1.4 Public Meetings - Prepare for and attend a minimum of **three** (3) public information meetings. The first meeting will provide an introduction and general overview of the scope of the Local Flood Analysis to the public and Town Board and will gather information from property owners about historic flooding and property damage in the study area. Meeting two will be a follow-up to present preliminary results and invite participants to provide input on mitigation alternatives in the study area. Meeting three will present the final project analysis and results to the public and Town Board before town adoption, or acceptance of the final LFA plan.

1.5 Planning Meetings - Prepare for and attend (at the option of the Town Board) **eight** (8) FAC meetings. Four (4) of the FAC meetings should be attended in-person, while four may be attended online. In-person FAC meetings will likely be held at the AWSMP office in Shokan, NY. FAC meetings can be attended or billed for only up to 1-2 key consultant staff. An initial fact-finding meeting may include a field tour attended by flood committee members and landowners. Subsequent committee meetings should cover presentation of initial findings and possible mitigation solutions, iterations of findings at key decision points, and benefit-cost analysis results and final mitigation recommendations. The committee may also request attendance at meetings to review draft LFA reports.

1.5.1 Project Reports - Throughout the project duration, coordinate with the Town Board, and/or their designees, to provide written and verbal project updates and technical information.

1.5.2 Outreach Materials – Provide handouts and slide presentations to the flood advisory committee and at public meetings.

1.5.3 Educational Support - Provide additional educational support activities and materials as determined by the Town Board, and/or their designees,

Task 1 Deliverables

- Preparation for and attendance at 3 public meetings
- Preparation for and attendance at 8 flood committee meetings (4 in person, 4 remote)
- Meeting minutes
- Periodic project updates to the client
- Educational support materials
- Complete set of all records including any digital copies of any model files, maps, datasets, FEMA BCA toolkit files, GIS map layouts, survey records, AutoCAD files produced for this project
- Prepare a record of time spent on each task in an invoicing format consistent with the LFA grant funding agreement

Task 2 –Data Collection and Field Verification

Two primary areas of investigation are anticipated under Task 2. First, an investigation of flooding and related hazards on roads and at road-stream crossings. The second priority of investigation is flooding affecting residential and commercial structures in the hamlets. The consultant will conduct field investigations to support development and prioritization of likely mitigation measures such as property protection, floodproofing and elevation, and potential buyout and relocation.

2.1 Data Gathering - Gather, compile, and review existing available mapping and aerial photography of the river channel and floodplain as well as information regarding potentially flood-prone structures, infrastructure, and water quality threats located along the river corridor and within the floodplain. The following information will be provided by the Ulster County Soil & Water Conservation District for use in the analysis:

a. Available construction drawings of bridge crossings and structures; and associated hydraulics models for bridges, where available.

b. Available aerial photogrammetry (DOQQs), topographic mapping, LiDAR based DEMs (1m horizontal resolution).

c. 2013 Preliminary and 2016 Final FEMA Flood Insurance Study for the Ashokan Watershed including both the Hydrology and Hydraulics study reports, Digital Flood Insurance Rate Maps (DFIRMs) and depth grids, and associated surveys and HEC-RAS models.

d. Reports of flooding that have been compiled and documented by the local Town, county or federal government (i.e., Damage Survey Reports).

e. Water quality reports that have been compiled and documented by the local community, the county, or NYCDEP.

f. Prior reports and analyses that may be available.

g. The community's flood mitigation plans (including the county-wide all-hazard mitigation plan, other multi-jurisdiction plans, a community annex, or a single-jurisdiction plan if applicable).

h. Stream Management Plans; and

i. Stream Feature Inventory Geodatabase, in ESRI ArcGIS formats.

The following data, mapping, reports, and information will be sought by the consultant:

a. Request from NYCDEP a revised land use/land cover layer developed from aerial imagery.
b. Repetitive Loss Area Analysis and any other relevant datasets.

2.2 List of Resource Material - Compile a list of resource material from Task 2.1 and submit an electronic copy of same. Periodically update the list as it is expanded.

2.3 Field Assessment - Conduct a visual assessment of the river channel and floodplain in the project area. The assessment will include identification of low-lying structures, stream bank and channel conditions, and vegetation along the stream corridor. Photo-document channel reaches.

2.4 Watershed Survey - Perform a “windshield survey” to observe the watershed and site conditions.

2.5 Identify Sources of Water Quality Impairment - Identify potential sources of water quality impairment within the Study Area that could result from flood discharges, such as residential, commercial and transportation-related hazardous contaminants, roadway contaminants, streambank and bed erosion, fuel tanks, and other sources as appropriate to the project area. Document any known historic impacts to water quality that resulted from flooding.

2.6 Survey Structures - To facilitate the Benefit Cost Analysis, carry out a field survey of structures located within the FEMA 500-year flood zone (or estimated 500-yr flood zone developed for this study) within the Study Area. Property access will be coordinated by the town and private landowner participation is voluntary. Note the following features and verify against parcel data contained in the Ulster County Parcel Viewer https://ulstercountyny.gov/maps/parcel-viewer/.

- Is the structure commercial or residential?
- If the structure is commercial, is it a retail establishment, a warehouse, or vacant?
- Does the structure have a basement, crawlspace, or slab foundation?
- What is the number of stories?
- Is the structure split level?
- What is the elevation of the first floor in relation to the lowest adjacent grade? Map structures on the base flood depth grid to illustrate the range of first-floor elevation findings relative to flood depth.

2.7 Technical Memorandum - Prepare a technical memorandum summarizing data, mapping, and information obtained in Tasks 2.1 through 2.6. Identify any constraints and/or deficiencies in the existing database, including known changes in the system that have occurred following data collection. Evaluate the vulnerability of the system under study to potentially undergo rapid changes.

Task 2 Deliverables
- List of resource materials gathered
- Technical memorandum of existing conditions presented to the FAC and incorporated into the final LFA report

Task 3 – Hydraulic Modeling Baseline

The following Task 3 activities will be conducted within the Detailed Study Area only.

3.1 FEMA Effective Model - Obtain the most recent FEMA modeling (Effective Model) in digital format for use in evaluating possible mitigation measures. The model must be obtained either directly from FEMA or as provided by FEMA to the state, county or local community.

3.2 FEMA Duplicate Model - Import the FEMA model into HEC-RAS software to develop a "FEMA Duplicate Effective Model" model[1]. This is necessary to demonstrate the reproducibility of the model results obtained by FEMA on the consultant’s equipment/software. Compare output with

[1] If HEC RAS is not used, the consultant must use another FEMA approved modeling software and provide justification why HEC RAS is not appropriate for the analysis (attach list).

published FEMA data and identify any discrepancies. This modeling effort will be conducted in accordance with FEMA requirements.

3.3 Corrected Effective Model - Review the FEMA model cross sections, Manning's 'n' coefficients, site conditions, and expansion/contraction coefficients to ensure that the information in the Effective FEMA model and the FEMA Duplicate Effective Model accurately reflect site conditions. If warranted, prepare a "Corrected Effective Model" to modify the Duplicate Effective Model. This modeling effort will be conducted in accordance with FEMA requirements. Acquisition of additional survey or topographic information is not permitted.

In a Discovery Report for the Mid-Hudson Watershed HUC 02020006 dated August 2017, FEMA noted the following issue: A possible error on the soon-to be effective countywide FIRM for the county: The new (currently still preliminary) Base Flood Elevations along Beaver Kill in the vicinity of Willow (Sickler Road and Flats) may be incorrect (Town of Woodstock). The area is very flat, and two tributaries enter which can cause discrepancies in the HEC-RAS modeling, resulting in large "jumps" in Base Flood Elevations (Wagner Creek and Mink Hollow).

3.4 Additional Survey/Modeling Assessment - Determine the need to run HEC-RAS split channel flow (or 2-D) and sediment transport modules, alternative modeling software, as conditions dictate. The need for 2D modeling is expected within the Detailed Study Area. If recommended, identify the need to acquire additional survey and other field data to run the models. If approved to advance, acquire needed additional data. Incorporate new survey data, as well as known forthcoming channel modifications, including scheduled bridge replacements, using existing design data.

3.5 Existing Conditions Model - Run the model for the 2-, 10-, 25-, 50-, 100-, and 500-year flow conditions utilizing FEMA published flows. For undefined flow conditions (i.e. 2-year flow) use USGS regression analysis and compare to statistical analysis of USGS stream gage data (if available) for the specific flow to adjust flow values if needed. Calibrate model using most recent flood events, including June 26-28, 2006, August 28, 2011, December 25, 2020, and August 22, 2021.

3.6 Additional Survey/Modeling - Develop and run the HEC-RAS split channel flow and/or sediment transport module or alternative modeling software, approved under Task 3.4, as needed, on selected reaches. Use 2-D modeling where appropriate to understand flood routing.

3.7 Floodplain Mapping - Import floodplain shape files from available GIS and FEMA data and present the existing floodplains on available LiDAR based DEM or GIS mapping of the stream channel corridor on the most recent available aerial imagery.

3.8 Floodprone Property Mapping - Identify and map flood-prone properties and infrastructure (i.e. roads, bridges, utilities, etc.).

3.9 Erosion Risk Mapping – Identify and map structures at increased risk of erosion. AWSMP will provide information related to bank erosion mapping where it exists within and adjacent to the Detailed Study Area for consideration in documenting erosion hazard risk to homes and public infrastructure. No additional survey or modeling is anticipated to complete this task.

3.10 Climate Change Scenario Summary and Mapping: Use the existing HEC-RAS model to evaluate the effect on Phase II recommended projects of potential increases in peak flows under future climate change, for a range of return intervals that are relevant to the project. Future peak flows can be estimated by multiplying design flows by a factor based on geographic region following methods outlined in the NYS Flood Risk Management Guidance for Implementation of the Community Risk and Resiliency Act (August 2020) or other applicable and referenced method. Map and summarize flood depths at key locations in the hamlet.

3.11 Technical Memorandum - Prepare a technical memorandum summarizing Tasks 3.1 through 3.10 presented to the FAC and incorporated into the final LFA report.

Task 3 Deliverables

- Electronic versions in HEC-RAS of all model input and output (presentation of analysis to be provided in Task 6) and supporting documentation and project files necessary for future reuse
- Revised digital planimetric inundation maps and depth grids depicting revised pre-project conditions
- Flood-prone property mapping
- Technical memorandum incorporated into the final LFA report

Task 4 – Evaluate Mitigation Alternatives

4.1 Mitigation Alternatives - Working with the FAC, identify flood mitigation goals and objectives, and develop potential actions for the following categories of flood hazard mitigation:

a. Property Protection - Actions that reduce potential damage to buildings, infrastructure and other kinds of physical property (including property acquisition/relocation, elevation or flood proofing of buildings).
b. Flood Damage Prevention and Planning - Actions that lower flood elevations or prevent future losses (such as channel and floodplain modifications, floodplain reclamation, and adoption or amendment of land use regulations, building codes or flood damage prevention regulations).
c. Natural Resource Protection - Actions that minimize hazard loss of or preserve/ restore the function of natural systems and associated ecosystem services, including water supply (such as soil stabilization measures such as bank protection and stabilization or landslide stabilization, attenuation of peak flows through detention and enhanced storage, debris management).
d. Structural Projects - Actions that use or modify structures to mitigate a hazard (such as replacement or retrofit of bridges and culverts, protection of critical utilities and infrastructure).
e. Emergency Services - Actions that mitigate risks to the provision of emergency services that protect people and property during and immediately following a flood.
f. Community Pollution Prevention - Actions at the community scale that reduce pollution during a flood event (such as securing oil and propane tanks).
g. Public Education and Information - Education efforts centered on the benefits of general best management practices to code enforcement officers, realtors, contractors, municipal officials and property owners about how to protect themselves and the community from flood disasters and associated losses.

Consult with the local hazard mitigation plan as needed to ensure consistency with the goals and potential actions listed in that plan.

4.2 Modeling of Mitigation Measures - Using the modeling from Task 3, develop, analyze and evaluate potential structural flood mitigation in an attempt to decrease or alleviate flooding and flood-related damage in populated areas using technically and economically justifiable alternatives. Such evaluation may include the following:

- Replacement or retrofits of bridges or culverts.
- Removal or relocation of structures, buildings, or channel encroachments.
- Stream channel and floodplain modifications.

Consultant should be prepared to model key road-stream crossings, both public and private. Assess the extent to which each crossing is causing flooding or erosion and identify conceptual solutions that will lead to estimated treatment costs and feasibility analysis under Phase 2.

Considered options may include acquisition of flood-damaged or flood-threatened properties, including properties with structures after which the structures are removed and the properties are restored or allowed to revert to a natural condition to mitigate the impacts of future floods. Options to be considered also include relocation of anchor businesses, critical community facilities, residences, and non-anchor businesses as recommended by the analysis.

4.3 Evaluate Alternative Actions - Evaluate the potential of the alternative actions, alone and in combination, to mitigate flood hazard risks at each of the flows modeled. Evaluate and summarize model output relative to each potential mitigation alternative to include changes in water surface elevations, extent of inundation, depth of flooding, and flow conditions in the floodway. A comparison shall be made between existing and proposed conditions (i.e. with and without the proposed mitigation). Assess potential alternatives individually and in combination, to evaluate collective flood reduction potential. Plot flood profiles and prepare inundation maps for individual measures as well as those that will be achieved with combined measures.

4.4 Impact Analysis - Identify potential impacts associated with structural mitigation alternatives, including the potential for downstream impacts caused by greater flood conveyance and the effect on sediment transport.

4.5 Cost Opinions - Develop preliminary cost opinions for mitigation alternatives.

4.6 Feasibility Analysis - Complete an initial feasibility analysis of structural mitigation measures identified in tasks 4.2 and 4.3, as a first-cut determination of which measures should be evaluated in greater detail, and which are so unlikely to provide acceptable benefit/cost ratios that they don't merit more detailed analysis. Alternatives shall be evaluated based on initial estimates of tangible benefits, project goals, impacts, regulatory requirements, and costs associated with design and construction.

4.7 Evaluate Non-Structural Alternatives - For areas where flood protection through structural modifications is determined to be not feasible, non-structural measures shall be evaluated. Non-structural alternatives do not try to limit flooding but instead attempt to reduce flood damage by protecting structures in the flood prone areas. Evaluation and recommendations shall include flood proofing, relocation, and purchase of flood insurance, potentially with "increased cost of compliance" coverage.

4.8 Additional Data Needs - Identify the need for any future data collection, analysis, and design.

Task 4 Deliverables

- Electronic versions in HEC-RAS of all model input and output (presentation of analysis to be provided in Task 6) and supporting documentation and project files necessary for future reuse
- Technical memorandum describing analysis, including the results of any sediment transport analysis performed, mitigation alternatives, initial feasibility analysis and recommendations presented to the FAC and incorporated into the final LFA report
- Inundation mapping

Task 5 –Flood Engineering Analysis Report

5.1 Draft Flood Engineering Analysis Report - Prepare a draft local flood mitigation plan that documents the results of Tasks 1 through 4. It is anticipated that the plan will include the information and analysis contained in the numerous technical memoranda developed in previous tasks. Specifically, the plan will include the following:

- Summary of public outreach process and results.
- Narrative and mapping to present existing conditions, including results of field assessment.
- Mapping of inundation and floodprone areas.
- Alternatives analysis, including feasibility.
- Narrative and mapping of hydraulic modeling, including a summary of model output relative to forecast reductions in flood inundation areas, depth of flooding, and water surface elevations.
- Inundation mapping and flood profiles (for all relevant existing and proposed flood conditions including the 100-year event).
- Recommended mitigation actions.
- Preliminary benefit cost analysis summarized in the main body of the document and with detail reported in an appendix using the table (one per recommendation) provided at the end of this Scope of Services.
- Implementation plan and prioritization of mitigation actions.
- Recommendations for future analysis; and
- List of reference and resource materials.

5.2 Distribute Draft Report - Provide electronic (pdf) copies of the draft plan for review by the Town Board, FAC and funding agencies. Draft report materials should be presented for initial review to the FAC during modeling of mitigation solutions and alternatives. The full written draft report should be provided to the FAC immediately following or near the completion of modeling and analysis to aid the FAC's input on a project implementation plan. Consultant should anticipate at least two rounds of FAC review of a final draft written report with potential follow-up edits before completion.

5.2.1 Present Draft Report - Meet with the FAC to present draft findings and implementation plan and recommendations to the FAC for review, revision, and approval for certain projects to proceed to Phase 2.

5.3 Final Flood Engineering Analysis Report - Modify and revise the flood mitigation plan based on review comments and provide the final plan in paper and electronic (pdf) format.

Task 5 Deliverables

- Draft Flood Engineering Analysis Report presented to the FAC and incorporated into the final LFA report
- Final Flood Engineering Analysis Report

Phase 2–Feasibility Analysis

In Phase 2, the consultant will explore in detail the costs, benefits and feasibility of each option deemed in Phase 1 as having a flood inundation reduction or water quality benefit and as acceptable to the Town Board. Phase 2 will culminate with a plan for implementing the projects that are deemed viable.

Task 6 – Local Flood Hazard Mitigation Feasibility Analysis and Plan

6.1 Review Municipal Regulations - Working with FAC or their designees to review municipal regulations concerning zoning, subdivision of land, and flood damage prevention to verify compatibility with NFIP regulations and determine where modifications may be feasible.

6.2 Benefit Cost Ratio - Using the FEMA BCA toolkit, determine the benefit cost ratio (BCR). Where site-specific information is available (i.e. cost of response or repairs, such as damage to flooded structures and the contents of such structures; the lost functions of roads, utilities, and services; and the time and costs incurred to clean up from flooding and repair facilities and infrastructure), the damage frequency assessment module will be used. Otherwise, the flood module will be used, with default values. Purchase of a property for buyout will be considered in itself a flood hazard mitigation project.

Identify properties expected to be substantially damaged over time based on existing conditions. Develop an estimated BCR for floodproofing, elevation or buyout of all residential and commercial structures that could have damages over 50% of the value shown through flood model analysis.

Characterize sections of the Study Area with the highest threat to structures and the level of threat based on flood depths. The product may be used to prioritize structures for buyouts and elevations.

Develop a table estimating the flood reduction benefits of recommended flood mitigation options for key structures within the community at different flood return frequencies.

6.3 Potential Water Quality Benefits - Identify potential water quality benefits and give general enumeration of scale of benefits for each feasible option defined in Tasks option. The reservoir basin, its status with respect to various pollutants, and the specific pollutants mitigated will be taken into consideration. The following is an example of the enumeration:

- Number of residential structures mitigated
- Number of commercial structures mitigated
- Number of tons of sediment from erosion mitigated

6.4 Funding Sources - Identify likely funding sources for the feasible mitigation alternatives.

For projects with benefit-cost ratios at 1.0 or greater, identify funding sources for mitigation actions such as NYS and FEMA's grants programs, Stream Management Implementation

Program, and CWC Flood Hazard Mitigation Implementation Program; and determine which programs are most appropriate based on the type of recommendation and the funding available from each program at the time of analysis.

For projects with benefit-cost ratios less than 1.0, identify relevant funding sources including, for example the, New York State's Consolidated Funding Application (CFA), which allows communities to apply for multiple funding projects (such as the Green Infrastructure Grant Program, Climate Smart Communities Smart Growth, Water Quality Improvement Program, etc.) with just one application, Stream Management Implementation Program, and CWC Flood Hazard Mitigation Implementation Program.

6.5 Implementation and Prioritization - Update the implementation plan and prioritization of mitigation actions based on 6.1-6.4.

6.6 Local Flood Hazard Mitigation Plan - In close coordination with the Town Board, and their designees, prepare a Local Flood Hazard Mitigation Plan that includes and documents the results of Tasks 6.1 through 6.5. Specifically, the plan will include the following:

- Assessment of local regulations currently in force and their adequacy relative to flood prevention and protection.
- Discussion of known historic and potential sources of water quality impairment within the Study Area.
- Mapping of inundation areas and flood-prone and flood-damaged properties.
- Assessment of available funding.
- Implementation plan and prioritization of mitigation actions.
- Recommendations for future analysis, including hydrologic assessment and/or two-dimensional hydraulic modeling; and
- List of reference and resource materials.

Task 6 Deliverables

- Preparation and presentation of the Local Flood Hazard Mitigation Plan ("the final LFA report") findings at a Town Board meeting
- Final Local Flood Hazard Mitigation Plan
- Six paper copies and electronic version of the final Local Flood Hazard Mitigation Plan delivered to the FAC, Town Board, and funding agencies
- Digital files used to prepare the Local Flood Hazard Mitigation Plan in native, editable format and pdf, including all images and graphics in native files
- GIS data that is ESRI-compatible and associated project files

POTENTIAL SUPPLEMENTAL TASKS

The following tasks may be required to supplement the initial assessment and can be added with approval from the Town Board.

P2.1 Identify and map flood-damaged properties and infrastructure (i.e. roads, bridges, utilities, etc.), including those located outside of special flood hazard areas, repetitive loss properties (RLPs), and severe repetitive loss properties.

P2.2 Working with the local floodplain administrator, characterize and categorize flood-prone and flood-damaged properties into groups based on types of damage suffered, use (i.e. residential vs. non-residential), building or structure type (basement, crawlspace, slab on grade, number of stories, etc.), types of accessory structures on the properties, and location of building utilities relative to basements and first floors. If known, determine whether damage resulted from flood inundation, avulsion, or slope failure. Develop a database of such properties by address.

P2.3 Working with Ulster County, NYSDEC, and the local floodplain administrator, and to the extent that data is available, determine which flood-prone and flood-damaged properties are insured under the National Flood Insurance Program (NFIP) and which are not insured.

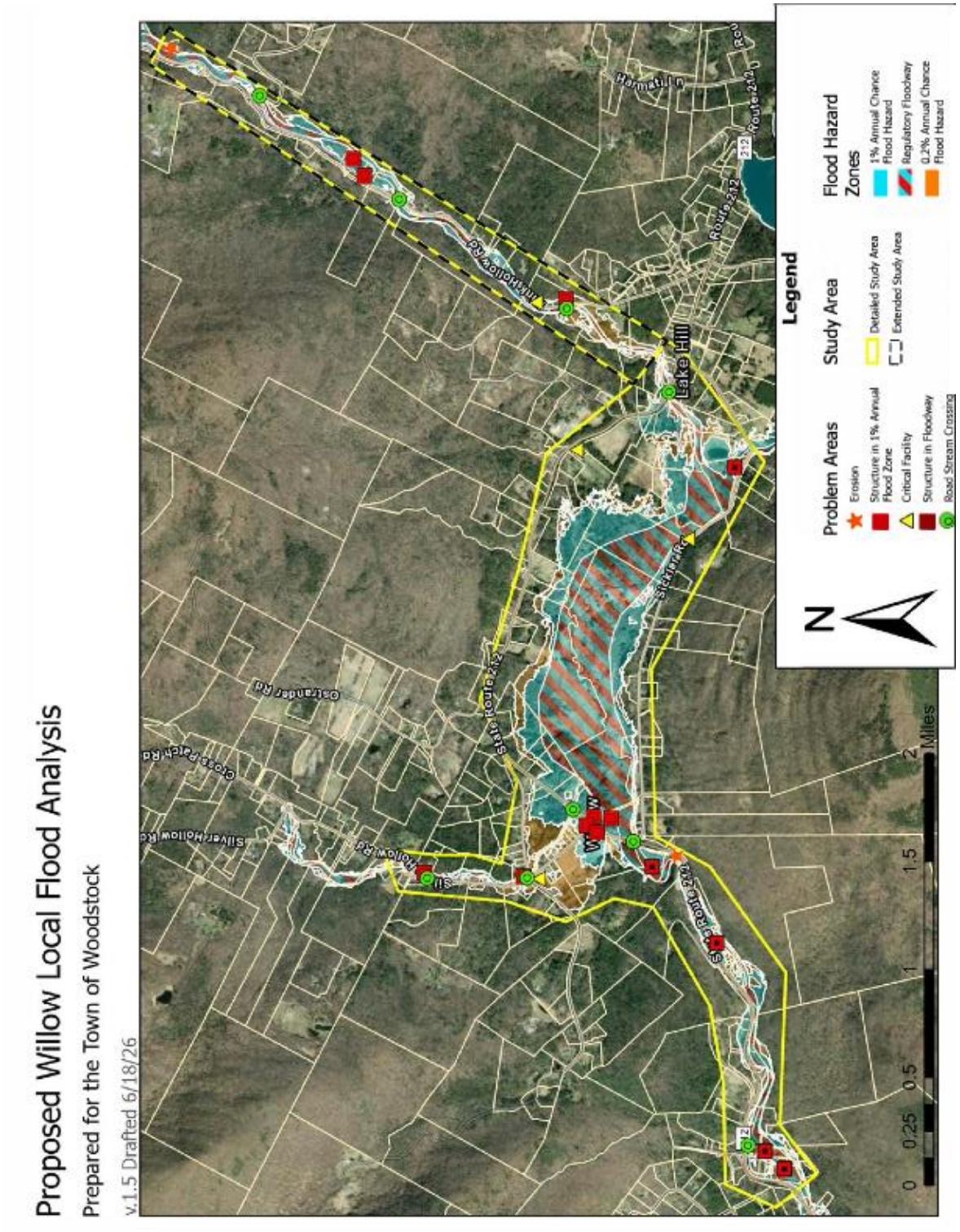
P2.4 Utilize HAZUS to evaluate cost-effectiveness.

P2.5 Prepare information to estimate the social and economic impacts of select options identified during the analysis and planning phases. Such information might include identification of potential impacts to business community, residents, property values or the local tax base.

P2.6 Prepare SEQR documents to enable the municipal to adopt the plan if desired by the municipality.

Attachment A – Study Area Maps

Note: The Willow Local Flood Analysis Study Area Map is shown twice. The map contains labels with notes provided by the Town of Woodstock Flood Advisory Committee with known issues in the area.



Attachment B – Flood Hazard Sites

Moving west to east within the study area, flooding issues have been observed at:

NY-212 from Grog Kill to Willow Hamlet Center

1. Five bridges carry NY-212 over the Beaver Kill or its tributaries within the LFA study area. The first bridge is west of Grog Kill Road crossing over a small tributary that drains into the Beaver Kill. This marks the western edge of the LFA study boundary. NY-212 is potentially overtopped at this location.
2. Floodwaters expand over NY-212 at a low-lying area immediately east of Grog Kill Road.
3. At Ideal Park Road housing units are in a floodprone area, with some structures mapped within the 100-year floodplain and approximately five structures in the floodway.
4. The housing development is accessed via a private bridge with steel supports under a wooden deck. The adjacent landowner reports the current bridge was built in the late 1970s. The crossing appears hydraulically insufficient. A small tributary joins the Beaver Kill just upstream of this bridge and combines with Beaver Kill flows to potentially overtop NY-212. Lower floor (basement to first floor) flooding of several structures occurred at the corner of Ideal Park Road and NY-212 in June 2006 and August 2011, with 2006 the higher elevation. According to residents, this location also flooded in the 1950s and 1980s.
5. The Beaver Kill crosses under NY-212 at a second bridge near Woods Road within a confined valley bordered by an eroding hillslope (glacial moraine) on the right bank. This area was the focus of a planned Emergency Watershed Protection stream restoration project following Tropical Storm Irene in 2011 that was not implemented. Potential channel adjustments during flooding may threaten NY-212 at this location.
6. The landscape flattens and valley widens immediately east of Woods Road near the intersection of NY-212 and Sickler Road at the hamlet of Willow. Flooding occurs upstream of a third bridge that carries NY-212 over the Beaver Kill near the intersection of NY-212 and Sickler Road.

Willow Hamlet Center

1. Multiple structures are in the 100-year floodplain of the Beaver Kill including an art gallery, automotive shop, residences, and NY-212.
2. A post office is located at the intersection of Van Wagner Road with Jessop Road and Eighmey Roads. A town culvert that appears hydraulically constricted carries Wagner Creek (known locally as Silver Hollow Creek) under Eighmey Road at the intersection.
3. An undersized and damaged squash pipe carrying Silver Hollow Road over Wagner Creek just east of the intersection with Lane Road has been identified by the town as a hazard since at least 2012. Silver Hollow is a dead-end road that provides access to over 40 structures. An analysis completed by Milone & MacBroom in 2016 reports the crossing is hydraulically inadequate with low durability and potential for flows to go around or under the culvert. MMI's analysis included subsurface investigation, alternative roadway and culvert alignments, and consideration of utilities. The town reports structures near the culvert have experienced flooding from backwatering. The LFA study

area along Wagner Creek ends to the northern edge of 101 Silver Hollow Road immediately above this culvert.

NY-212 and Sickler Road at Willow Flats

The Beaver Kill flows about 1 mile through a large wet meadow called the Willow Flats bordered by NY-212 to the north and Sickler Road to the south. A fourth bridge carries NY-212 over Wagner Creek above its confluence with the Beaver Kill, although the confluence is located well within the Willow Flats. Only a few flooding hazards are reported in this section of the study area. However, Sickler Road is the alternative route for closure of NY-212 at Willow.

1. A leach field piped under Sickler Road at the western end of Willow Flats was eroded away during Tropical Storm Irene.
2. The Beaver Kill is pinched near 195 Sickler Road where the Woodstock Highway Department repaired a failed stacked rock wall. The river is trying to rebuild sinuosity in this section.
3. Properties along Bass Meadow Lane and the eastern section of Sickler Road are prone to basement flooding. A structure on Sickler Road is frequently inundated.
4. A fifth bridge carries NY-212 over the Beaver Kill just east of Bass Meadow Lane. The Beaver Kill carries a high sediment load exiting the much steeper Mink Hollow valley and a sharp slope break above the bridge causes sediment to accumulate downstream and upstream of the crossing making the channel prone to instability. A streambank downstream of the bridge along Bass Meadow Lane has eroded several times during flow events. The town worked with a contractor to undertake permitted work removing sediment deposition in this section of the Beaver Kill following Tropical Storm Irene but views the work as a temporary solution. Property above the bridge has flooded due to apparent backwatering. The town would like to evaluate flooding and erosion risk to adjacent structures, the bridge, and NY-212, Bass Meadow Lane, and Louies Way roads. Evaluation of concepts for channel dimensioning and longer-term solutions for sediment management in this section could be explored for recommendations using non-LFA funding sources.

Mink Hollow

An extension of the study area along Mink Hollow Road from its intersection with NY-212 north to the confluence of an east and west branch of the Beaver Kill headwaters is included primarily for consideration of floodproofing, elevation, relocation and buyout and other residential protection measures where flood risks are high. The Beaver Kill in Mink Hollow has remained relatively stable since Tropical Storm Irene in 2011 due to lack of severe flooding and the re-establishment of riparian vegetation. In addition, both the town and the AWSMP have constructed several stream restoration and road-crossing enlargement projects on the Beaver Kill in Mink Hollow.

Hydraulic modeling will not be conducted upstream of a stacked rock wall located at the downstream side of the Kingston Water Supply Intake Structure on the Beaver Kill in Mink Hollow. Above this location, the focus is on the need for residential property floodproofing, elevation, relocation and buyout. Several sites are identified as issues:

1. A stacked rock wall immediately below the Kingston Water Supply Intake has breached several times in past high flow events leading to Mink Hollow Road flooding. Mink Hollow is a dead-end road serving multiple developed properties. Residents report flooding has occurred about once every five years. Flows inundate the road, yards, garages and basements and deposit sediment along the flow path. Residents report at higher discharges, water can cross the NY-212 intersection with Mink Hollow Road.
2. A property (15.-2-15) on the left bank of the upstream reach of the Beaver Kill in Mink Hollow lost about one acre of property due to channel avulsion during TS Irene.

First Floor Elevations

The hired consulting firm will be asked to collect first floor elevations where housing is clustered such as along Mink Hollow Road, Ideal Park Road, and the Willow hamlet center, and possibly other locations. The collected information is used to evaluate flood risk and made available to participating landowners. Stormwater analysis and solutions can't be addressed through the LFA study.

Photos - Photos dated June 4, 2026. Source: AWSMP

Ideal Park

Private crossing over Beaver Kill entering Ideal Park.

Structures immediately adjacent to private bridge, Ideal Park. Landowner marked high water mark on outbuilding in 2006, 2011.

Structures located in floodway, Ideal Park.

Low-lying area adjacent to Grog Kill Road on NY-212.

Willow

Cox Gallery located in floodway. Beaver Kill located off picture right.

Willow Post Office Van Wagner Road.

Eighmey Road crossing.

Silver Hollow Road at Lane Road intersection. Failing culvert.

Silver Hollow Road at Lane Road intersection during flood conditions, July 29, 2026.

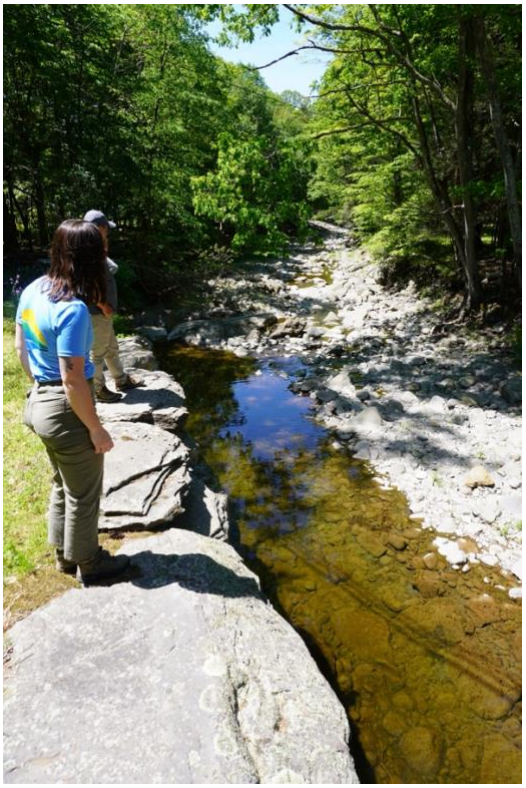
Large failing hillslope (moraine) bordering NY-212.

Willow Flats and Sickler Road

NY-212 crossing over Beaver Kill near Lake Hill (fifth bridge) at sharp valley slope break with resulting deposition.

Rock wall along Sickler Road where road and stream interact.

Mink Hollow



Rock wall along Mink Hollow Road.