

**NYC Watershed Stream Management Program
Local Flood Analysis (LFA) Program Rules
Final Version
July 23, 2014**

A. Program Background

Following Tropical Storms Irene and Lee in 2011, a framework was developed for funding flood hazard mitigation in the NYC West of Hudson watersheds. It has been recognized that flooding produces a variety of hazards and impacts not only to public safety, but also to water quality. Under this new initiative, Stream Management Programs in the NYC water supply watersheds and the Catskill Watershed Corporation are supporting the analysis of flood conditions and the identification of hazard mitigation projects. The process consists of two steps: 1) an engineering analysis of flood conditions and identification of potential flood mitigation projects articulated in a plan and 2) project design and implementation. The engineering analysis and plan are termed “Local Flood Analysis.” These program rules (Section C) define the process for municipalities to apply for funding to complete a Local Flood Analysis (LFA). These program rules (Section D) also define the process for municipalities to seek funding from the Stream Management Program to implement projects that involve streams, floodplains and adjacent infrastructure to reduce flood hazards. The Catskill Watershed Corporation also has a Flood Hazard Mitigation Implementation Program where project implementation funding can be sought (www.cwconline.org).

B. Definitions

- a. LFA Applicant (Part C). A town or village located wholly or partially in the West of Hudson NYC Watershed and listed in Appendix B
- b. Project Applicant (Part D). A town, village or county located wholly or partially in the West of Hudson NYC Watershed.
- c. Flood Advisory Committee. A body appointed by a municipality to represent the municipality’s interests in Flood Hazard Mitigation, to engage in the Local Flood Analysis process, and to coordinate municipal decisions regarding that process and the project recommendations that result. A town or village board may choose to serve as the Flood Advisory Committee and may define the role of the Flood Advisory Committee specifically for its needs. Multiple towns may, at their discretion, coordinate to form a single Flood Advisory Committee. The Flood Advisory Committee, or equivalent, shall include advisors to the Committee from SWCDs/CCEUC, CWC and DEP.
- d. Local Flood Analysis. An analysis that meets the intent defined in Section C(1) (below) and the objectives described in the Local Flood Analysis (LFA) Scope of Services (attached as Appendix A).

- e. Plan. A Plan is the product of the Phase 2 LFA, or equivalent, that prioritizes flood hazard mitigation projects by benefit versus costs, and identifies potential funding sources.
- f. Population Centers. For the purpose of this program, Population Centers are as defined by the 1997 watershed MOA “Designated Areas (Villages, Hamlets and Village Extensions)”. See Appendix B, Map of Designated Areas. The geographic boundaries of an LFA study area may be extended upstream or downstream of the Designated Areas’ boundaries at the advice of SMP/SWCD/CCE staff upon their review of stream process up and downstream of the Population Center, and pursuant to goals of optimizing benefits, and with DEP approval.
- g. Projects. Local Flood Analysis recommended projects.
- h. Project Sponsor: person or entity responsible for the implementation of a project that has been selected for funding through a SMIP Program.
- i. SMIP Program: The implementation funding for projects recommended in stream management plans and by Local Flood Analyses. Administered by SMP Partners.
- j. SMP Partners. Delaware County SWCD, Sullivan County SWCD, Greene County SWCD, Ulster County SWCD and the Cornell Cooperative Extension of Ulster County (CCEUC).
- k. Qualified Consultant. A qualified consultant is one who has demonstrated experience in hydraulic modeling with HECRAS, community-based flood mitigation planning, and Benefit/Cost Analysis of Flood Hazard Mitigation alternatives.

C. Local Flood Analysis (LFA) - Engineering Analysis and Feasibility Study

1. Local Flood Analysis: Intent

A new category of funding within the existing Stream Management Implementation Program (hereafter, “SMIP”) is established to support the identification of effective flood hazard mitigation projects and programs within the New York City West of Hudson Watershed. This new category funds Local Flood Analysis (hereafter, “LFA”), which is intended to provide for community-based evaluation of potential flood hazard mitigation projects in Population Centers.

The intent of the LFA is to provide resources to help WOH municipalities:

- Confirm that there is a significant flood hazard in the target area through engineering analysis;

- Use engineering analysis to develop a range of hazard mitigation alternatives; the primary focus of the analysis is to identify the potential for reducing flood elevations through channel and floodplain restoration, as the first alternative to other hazard mitigation solutions;
- Evaluate both the technical effectiveness and the benefit/cost effectiveness of each solution, and compare different solutions to each other for the most practical, sustainable outcome.

Project recommendations generated through an approved LFA may be eligible for Flood Hazard Mitigation funding available through the Stream Management Implementation Program (administered by the County Soil and Water Conservation Districts or Cornell Cooperative Extension of Ulster County, hereafter “SWCD/CCEUC”), the Catskill Watershed Corporation’s Flood Hazard Mitigation Implementation Program, or the NYCDEP Land Acquisition Floodplain Buyout Program. Rules governing flood hazard mitigation project priorities and eligibility will be issued separately for each of these funding streams.

3. Applicant Eligibility Requirements

Municipalities are eligible to apply for LFA funding provided they meet the following criteria:

- a. The municipality has adopted, by resolution, its respective stream management plans, and entered into an Memorandum of Understanding with their County SWCD/CCE to collaborate and seek guidance on stream management issues;
- b. The municipality has designated a “flood advisory committee” or equivalent official representative body of the municipality (e.g., the town or village board) to oversee the process of the LFA with the consultant;
- c. The municipality has agreed to use the attached LFA Scope of Services to select a proposal for which they will request funding, or has officially authorized the SWCDs/CCEUC to do so on their behalf.
- d. The areas scoped for LFA studies must be a Population Center.

4. Contracting for the LFA

The LFA Services may be contracted in one of two ways:

- a. Municipality-led:
 - i. Municipalities (or group of municipalities working together) issue an RFP for the LFA Scope of Services (see Section 6) to secure a consultant for some or all of the population centers in the town(s).

- ii. Upon consultant selection, the municipality (or group of municipalities) applies to their County SMP SMIP Flood Hazard Mitigation program for LFA funding for their selected consultant, using the consultant's technical and cost proposals as Scope and Budget in the application.
 - iii. The application is reviewed by the SWCDs/CCEUC and its designated SMIP committee for technical merit, cost and consultant qualifications.
 - iv. If approved, the municipality enters into contract for the award with the SWCDs/CCEUC.
 - v. The municipality then contracts with the consultant, determines the order of priority in which it will address its Population Centers, and issues task orders to the consultant to initiate the LFA process for each priority Population Center.
 - vi. The municipal flood advisory committee oversees the LFA process for the municipality.
 - vii. The municipality submits vendor invoices to SWCDs/CCEUC for reimbursement. Payment procedures, including invoicing and deliverables requirements follow the SMIP process as established by the individual basin programs.
- b. SWCDs/CCEUC-led (the process outlined below need not follow strictly in the sequence outlined).
- i. The municipality (or municipalities) passes a resolution designating the SWCDs/CCEUC as administrator of the LFA on behalf of a municipality (or group of municipalities).
 - ii. SWCDs/CCEUC agrees to accept sponsorship and issues the RFP for LFA Scope of Services.
 - iii. The municipal board appoints a Flood Advisory Committee or its equivalent to coordinate the LFA process for the municipality or (group of municipalities).
 - iv. The Flood Advisory Committee or its equivalent reviews the proposals received and recommends one for funding to the municipality. The municipality approves the proposal that will be advanced.
 - v. Upon consultant selection, the municipality (or municipalities) applies to their SMIP Flood Hazard Mitigation program for LFA funding for their

selected consultant, using the consultant's technical and cost proposals as Scope and Budget in the application.

- vi. The application is reviewed by the SWCDs/CCEUC and its designated SMIP committee for technical merit, cost and consultant qualifications.
- vii. Upon approval, the municipality (or municipalities) authorizes (by resolution) the SWCDs/CCEUC to enter into contract with the selected consultant.
- viii. The SWCDs/CCEUC contracts with the consultant on behalf of the municipality (or municipalities), and administers the LFA services contract on behalf of the municipality.
- ix. The municipality or municipalities are not required to enter into a SMIP contract with the SWCDs/CCEUC for completion of the LFA, however, if there is no SMIP contract, then the municipality shall enter into an LFA MOU with the District.

5. Deliverables and invoicing process

- a. Where the municipality contracts directly with a consultant for the LFA, the award for the LFA will be transmitted through an LFA SMIP contract between the SWCDs/CCE and the municipality (or municipalities).
- b. Payment procedures will follow the SMIP process as established by each SMP Partner.
- c. Payments will be by reimbursement; interim payments can be made, contingent on basin-specific SMIP rules and Subcontracts.
- d. Deliverables are as defined in the Scope of Services.

6. LFA Funding Award Process

- a. Municipalities meeting the eligibility requirements will be invited to apply for funding to conduct LFAs in their Population Centers. Funding for the LFA will be allocated to the SMP Partners for each population center identified in Appendix B. The SMP Partners will keep LFA funds available until December 1, 2017, or until each town is offered the opportunity to complete an LFA and/or decides in writing not to participate in the LFA Program. If a Town decides not to pursue an LFA, the funds will roll back into the pool of SMIP FHM project implementation funds;

- b. Application may be made on a rolling basis (no annual application deadline). Application review and funding decisions will be made as applications are received, reviewed and approved

7. LFA Scope of Services

The attached Scope of Services is the template for an RFP that shall be issued to seek a qualified consultant for the LFA. The work may be undertaken in phases (Phase I = engineering analysis; Phase II = action plan). The Scope of Services cannot be modified without the written approval of the SMP Partner and DEP.

D. SMIP Program Rules for Funding Projects Recommended by Local Flood Analysis

1. Program Funding

Funds for the LFA Recommended Projects (“Projects”) will be allocated by Delaware County SWCD, Sullivan County SWCD, Greene County SWCD, Ulster County SWCD and the Cornell Cooperative Extension of Ulster County (“SMP Partners”) through their Stream Management Implementation Programs (SMIPs). These programs are the established mechanism for SMP funding to local communities for implementing priority Stream Management projects, including dedicated funding for flood hazard mitigation programming.

2. Eligible Applicants

Applications will be accepted from Towns, Villages and Counties (“Applicant”). County applicants must have a municipal letter of support submitted with their application. Towns may apply on behalf of Not for Profit organizations.

3. Eligibility Requirements

Town/Village and County governments are eligible to apply for Project funding when they and/or the projects meet the following criteria:

- a. Located wholly in the Watershed;
- b. Located in a town/village that has completed an LFA;
- c. Approved by the Town or Village;
- d. Municipality has completed a Community Assistance Visit or Community Assistance Contact with the New York State Department of Environmental Conservation within five (5) years of the date of application, and is in good standing with the National Flood Insurance Program.

4. Eligible Projects include:

Eligible projects are those that are recommended in a LFA as having a measurable off site flood reduction benefit, or is a component of a larger LFA recommended project that was shown through LFA to have a measurable flood reduction benefit. The following types of projects are eligible:

- a. Design and construction of alterations of existing infrastructure to reduce flood water velocities, flow paths and/or elevations;

- b. Design and construction of projects that positively address hydraulic constrictions (e.g. increasing the size of undersized culverts);
- c. Design and construction of floodplain restoration and reconnection projects;
- d. Design and construction of the restoration of naturally stable stream channel dimensions and sediment transport processes.

5. Ineligible Projects include:

- a. Structural flood control practices such as flood walls, berms and levees;
- b. Stream dredging or channelization;
- c. Projects or groupings of projects where the cost outweighs the benefit;
- d. Projects consisting of routine annual maintenance;
- e. Projects that can be fully funded under a state or federal program;
- f. Replacement of privately owned bridges, culverts or roads.

6. Application Process and Evaluations:

Applications will be accepted and evaluated according to the SMIP application and review process defined locally by the respective basin-specific SMP Partners. These application materials are also available at www.CatskillStreams.org.

7. Contracting Requirements:

The municipal applicant or SWCDs/CCEUC shall be entering into subcontracts (agreements) with consultants for the implementation of projects under their individual contracting requirements. These additional requirements apply:

- a. SMIP Agreement
 - i. Applicants must submit with their SMIP Agreement a resolution passed by the appropriate governing body authorizing a designated representative to enter into such Agreement.
 - ii. Project funding may be reallocated if a funding award does not result in a signed agreement after one year, or if no action on a signed agreement is taken after two years. Extension can be made by mutual written agreement between the parties for 1 year. In cases where funding is rescinded, the SWCD/CCEUC or municipality will notify the Applicant in writing that the funding has been rescinded.

- iii. Project Agreements shall contain a schedule and milestones for design and construction of the Project (where applicable).
- iv. Applicants shall abide by their respective SWCD/CCEUC procurement policy.

Project Agreements shall provide that if the cost of design, construction and/or installation of any project exceeds the maximum amount of SMIP funds awarded to the Project, the Applicant shall either complete construction of the project using its own resources or funding obtained from other sources.

b. Subcontracts

- i. Absolutely no construction work shall occur prior to an executed subcontract, executed landowner agreements and regulatory permitting approval.
- ii. Subcontracts shall not be issued until they have been reviewed and approved by the respective SMP Partners and DEP.
- iii. Work, including design, shall not commence until subcontracts are approved by DEP, SMP Partners and the Applicant (where applicable).
- iv. Prior to the final payment on any project, the SWCD/CCEUC or Applicant shall provide the SMP Partner and DEP with a site inspection and a project close-out report as required through the SMIP for review and approval.
- v. Subcontracts between Applicants and subcontractors for construction shall require the subcontractor to post a performance and completion bond in the full amount of the contractor's bid to secure the successful completion of all project-related construction work and a payment bond to insure that all parties are paid for work performed.

8. Design and Inspection Procedures

- a. Applicants must attend a pre-application meeting with the appropriate SMP Partner and DEP.
- b. Predesign and design plan approval by the appropriate SMP Partner and DEP may be required for certain projects at intervals to be determined on a project by project basis following the pre-application meeting. Applicants may not proceed to construction of any portion of a Project without said approval(s).
- c. In order to ensure compliance with the NFIP, Conditional Letters of Map Revision (CLOMR) must be filed with FEMA prior to moving earth. Upon

completion of construction, a Letter of Map Revision will be filed within 6 months.

- d. Applicants shall provide written notice to the appropriate SMP Partner of substantial completion (general construction prior to contractor leaving site) of all SMIP funded Projects so that the appropriate SMP Partner and DEP, and any other entity determined to be necessary can inspect such work and provide comments prior to final completion.
- e. The SMP Partner and DEP must approve the completion (general construction, plantings and reporting) of all Projects prior to the release of any retainage amounts held under funding provided by the Program.
- f. Applicants shall coordinate and comply with all statutory and regulatory requirements applicable to a project, including acquiring all necessary permits to undertake the project. No design shall be considered complete until all regulatory reviews are complete and all approvals and permits have been obtained.
- g. All modifications to these rules require written DEP approval.

Appendix A
Model Scope of Services
for
Local Flood Analysis
Request for Proposals

Finalized in June 2013, as agreed upon by NYC DEP Stream Management Program (SMP) and the SMP Partners (Soil and Water Conservation Districts of Greene, Delaware, Ulster and Sullivan Counties), Cornell Cooperative Extension of Ulster County, and the Catskill Watershed Corporation.

LOCAL FLOOD HAZARD MITIGATION ANALYSIS (LFHMA)

Note: Local Flood Hazard Mitigation Analysis (LFHMA) is the exact same process as the shorter expression, Local Flood Analysis (LFA)

Program Overview:

Flooding produces a variety of hazards and impacts to public safety, homes and businesses, infrastructure (roads, utilities, etc.) and the natural environment. It can have direct impacts on water quality, including contamination from dislodged fuel and chemical storage tanks, mobilization of household waste and toxic substances, excessive riverine erosion and massive hill slope failures. As such, flood hazard mitigation – the work of reducing the impacts from flooding - supports the social, economic and environmental interests of communities in the NYC watershed and the water supply protection mission of the New York City Department of Environmental Protection (NYCDEP).

Following Tropical Storms Irene and Lee in 2011, a framework was developed for funding flood hazard mitigation in the NYC West of Hudson watersheds. Under this new initiative, Stream Management Programs¹ in the NYC water supply watersheds and the Catskill Watershed Corporation are supporting the analysis of flood conditions and the identification of hazard mitigation projects. The process consists of two steps: 1) an engineering analysis of flood conditions and identification of potential flood mitigation projects articulated in a plan and 2) project design and implementation.

¹ Contact for the Stream Management Programs in the NYC water supply watersheds are as follows:

Delaware County Stream Corridor Management Program - Delaware County Soil and Water Conservation District, 44 West St. Suite 1 Walton, NY 13856. Tel 607 865-7161 Graydon Dutcher, Program Coordinator

Ashokan Watershed Stream Management Program - Cornell Cooperative Extension of Ulster County, 6375 Highway 28, Phoenicia, NY, 12464. Tel; 845 688-3047, Leslie Zucker, Program Coordinator; Ulster County Soil and Water Conservation District, Address, Highland, NY Tel Gary Capella, Executive Director

Schoharie Watershed Program – Greene County Soil and Water Conservation District, 907 County Office Building, Cairo, NY, 12413 Tel. 518 622-3620 Jeff Flack , Executive Director

Rondout and Neversink Watershed Program, Sullivan County Soil and Water Conservation District, PO Box 256, 273 Main St. Grahamsville, NY, 12740 Tel 845 985-2581, Karen Rauter ,Program Coordinator

NYC DEP Stream Management Program, 71 Smith Ave, Kingston, NY 12401. Tel 845-340-7838, Elizabeth Reichheld, Program Manager

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The first step, called Local Flood Hazard Mitigation Analysis (LFHMA), is undertaken to determine the causes of flooding, investigate and analyze the overall potential of specific projects, and projects in combination, in an attempt to mitigate flood damages and hazards. A planning effort associated with this analysis will complement past planning, such as All Hazards Mitigation Plans, by further defining future projects and prioritize between projects. Upon completion of the engineering analysis and plan, funding for design of priority projects and their implementation can be sought. Communities eligible for participation in the initial rollout of the LFHMA include those identified in the original hamlet, village and village extension parcel boundaries developed for the 1997 Watershed Memorandum of Agreement. Prioritized efforts in these areas will focus limited program resources on the majority of the WOH population centers. Study limits within each hamlet will be determined by the potential flood mitigation strategies being analyzed by the consultant.

There are various types of hazards caused by flooding, for example, inundation, erosion and debris are three that are common in this region. The LFHMA and planning effort at this time is intended to principally address inundation hazards in villages, hamlets and population centers. NYC Watershed Stream Management Programs will provide funds for the cost of hiring consultants to perform the LFHMA and associated planning services. Stream Management Programs will also provide technical, administrative, coordination and outreach support and guidance to communities undertaking this effort. Municipalities within the Watershed are required to form flood advisory committees or flood commissions to advise and assist this process on behalf of their community. The local representatives to the flood commission should be appointed by the Town/Village Board, and recommendations will be presented to the Town Board. A Town Board can appoint itself as the Flood Advisory Committee, but an attempt should be made to provide continuity through election cycles.

Once municipal projects, or other actions, are shown to be effective by the LFHMA and recommended in its subsequent plan, they may be eligible for grant funding through Federal or State funding sources, Stream Management Program's Implementation Grants Program (SMIP) and/or the CWC's Flood Hazard Mitigation Program. The plan will identify the best funding opportunities for each project. Projects must undergo the Phase 1 and 2 components of the LFHMA as one of the eligibility requirements for flood hazard mitigation implementation funding under the SMIP and, pending CWC Board approval, CWC programs. Only the Town/Village board, or their designees, can decide which projects to seek funding to implement.

Assistance for LFHMA and Planning activities:

The attached template scope of services has been developed to provide the framework for LFHMA and mitigation planning related to inundation hazards. It defines the activities and deliverables expected of consultants who would advise communities under the program. Communities who seek professional services to analyze inundation hazards should use this language in their consultant solicitation process. It is anticipated that the scope will be tailored in a manner that is appropriate to site specific conditions and consistent with the economy and character of the community. As such, this analysis is intended to be practicable and scalable without sacrificing the rigor needed to produce sound technical information for making decisions. The scope of services is phased to limit any unnecessary analysis. Some options for

mitigating hazards may only require completion of some of these subtasks. Additionally, efforts previously undertaken, such as planning activities under the All Hazards Mitigation Planning process may satisfy some of the elements contained within the template scope.

This analysis of inundation hazards is made possible by the re-mapping of flood maps in this region by Federal Emergency Management Agency (FEMA). FEMA is updating digital hydraulic models as part of the mapping effort, and these models are powerful tools to enable communities to evaluate the alternative projects to mitigate flooding.

For more information, please contact the Stream Management Program leader in your county (see page 1).

**DRAFT TEMPLATE SCOPE OF SERVICES
FOR LOCAL FLOOD HAZARD MITIGATION ANALYSIS (LFHMA) AND
INUNDATION-RELATED FLOOD HAZARD MITIGATION PLANNING**

(This document should be used as a template by the Town/Village Board and/or their designees, as the template for a scope of services to hire a subcontractor to complete the LFHMA (AKA LFA). It is envisioned that Town/Village Board will appoint a Flood Advisory Committee to advise and assist the Town/Village in this process, and that Committee will serve the Town/Village Board. The Town/Village Board can appoint itself to serve as the Flood Advisory Committee for the purposes of completing the LFA.)

PHASE I – FLOOD ENGINEERING ANALYSIS

Task 1 – Project Management, Coordination, and Meetings

In this Phase, the Town 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 projects that stand out as potentially effective and feasible based on Phase 1.

- 1.1 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/Village Board and/or their appointed designees.
- 1.2 **Project Initiation.** At the commencement of the LFHMA process, a Town/Village will designate a Flood Advisory Committee to assist and advise in the LFHMA process. The Flood Advisory Committee may be the Town/Village Board, or a new group including local officials, planning boards, county planning, county soil and water conservation district, floodplain administrators, county emergency services/hazard mitigation coordinators, NYCDEP, CWC, regulatory agencies, residents and businesses located within flood-prone areas, and the general public). The Flood Advisory Committee should be structured in a manner to provide continuity through election cycles. The consultant will meet and collaborate with the Town/Village Board and, if separately established, the appointed Flood Advisory Committee. The consultant will engage and communicate with these 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 LFHMA. Where possible the process should be integrated with similar or on-going efforts, such as the creation of All Hazard Mitigation Plans.

- 1.3 Educational Materials. As requested by the Town/Village Board, and/or their designees, the consultant will prepare general and technical educational materials, as well as participate and contribute to ongoing education and outreach efforts regarding LFHMA.
- 1.4 Public Meetings. Prepare for and attend a minimum of ___ (*indicate number*) public information meetings. The purpose of these meetings will be to gather information from property owners about specific flooding issues and to communicate the project analysis and results. The purpose of the first meeting will be to describe the scope of the local flood hazard mitigation analysis (LFHMA) and solicit input relative to historic flooding and property damage. The purpose of the final meeting will be to present the preliminary findings of the analysis and invite participants to weigh in on the mitigation alternatives.
- 1.5 Planning Meetings. Prepare for and attend a minimum of ___ (*indicate number*) Town/Village Board meetings and (at the option of the Town/Village Board) ___ (*indicate number*) Flood Advisory Committee meetings.
- 1.6 Throughout the project duration, coordinate with Town/Village Board, and/or their designees, to provide written and verbal project updates and technical information.
- 1.7 Provide additional educational support activities and materials as determined by the Town/Village Board, and/or their designees,

Task 1 Deliverables

- Preparation for and attendance at ___ (*indicate number*) public meetings
- Preparation for and attendance at ___ (*indicate number*) Town/Village Board meetings and (if applicable) ___ (*indicate number*) Flood Advisory Committee meetings
- 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, 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 LFHMA grant funding agreement.

Task 2 –Data Collection and Field Verification

- 2.1 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 District for use in the analysis: (*The following list should be adapted to reflect data, mapping, and information that can be provided to the consultant. Those items that the consultant will need to independently obtain should be moved to the second set of bullets.*)
 - a. Available construction drawings of bridge crossings and structures;
 - b. Available aerial photogrammetry, topographic mapping, LiDAR based DEM and/or GIS data of the project area;

- c. FEMA Flood Insurance Study, Flood Insurance Rate Maps (FIRMs), and HEC-RAS modeling;
- d. Depth grids available from the FEMA Flood Insurance Studies or the county;
- e. Reports of flooding that have been compiled and documented by the local community or county;
- f. Water quality reports that have been compiled and documented by the local community, the county, or NYCDEP;
- g. Prior reports and analyses that may be available;
- h. The community's all-hazard mitigation plan (including the county-wide all-hazard mitigation plan, other multi-jurisdiction plans, a community annex, or a single-jurisdiction plan if applicable);
- i. Stream Management Plan, if available; and
- j. Stream Feature Inventory, if available.

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

- a. *(List resources expected to be sought by the consultant, including any of the lettered items listed above that will NOT be provided by the partnering agency.)*
- 2.2 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 Conduct a visual assessment of the river channel and floodplain in the project area. The assessment will include identification of low lying structures, bank and channel conditions, and vegetation along the stream corridor. Photo-document channel reaches. Identify significant storm drainage discharge points into the stream and locations of known or suspected inadequate road drainage conveyance.
 - 2.4 Perform a "windshield survey" to observe the watershed and site conditions.
 - 2.5 Identify potential sources of water quality impairment within the study area that could result from flood discharges, such as household 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 Prepare a technical memorandum summarizing data, mapping, and information obtained in Tasks 2.1 through 2.5. 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.

Task 3 – Hydraulic Modeling Baseline

- 3.1 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 Import the FEMA model into HEC-RAS software to develop a "FEMA Duplicate Effective Model" model². This is necessary to demonstrate the reproducibility of the model results obtained by FEMA on the consultant's equipment/software. Compare output with published FEMA data and identify any discrepancies. This modeling effort will be conducted in accordance with FEMA requirements.
- 3.3 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.
- 3.4 Run the model for the 2-, 10-, 25-, 50-, 100-, and 500-year flow conditions utilizing FEMA published flows. Undefined flow conditions (i.e. 2-year and 25-year) shall use USGS regression analysis.
- 3.5 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.
- 3.6 Identify and map flood-prone properties and infrastructure (i.e. roads, bridges, utilities, etc.).
- 3.7 Prepare a technical memorandum summarizing Tasks 3.1 through 3.7.

Task 3 Deliverables

- Electronic versions in HEC-RAS of all model input and output (presentation of analysis to be provided in Task 6)
- Technical memorandum
- Inundation mapping
- Flood-prone property mapping

² 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).

Task 4 – Evaluate Mitigation Alternatives

- 4.1 Working with the Town/Village Board, and at their discretion the Flood Advisory Committee 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 and preserve or restore the function of natural systems (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 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 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;
- Channel and floodplain modifications; and
- Floodplain improvements or reclamation.

Assess the statistical flood events that such mitigation alternatives protect against.

- 4.3 Evaluate and summarize model output relative to each potential mitigation alternative to include changes in water surface elevations, extent of inundation, and depth of flooding. 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 Evaluate the feasibility of mitigation measures identified in task 4.2 and 4.3. Alternatives shall be evaluated based on tangible benefits, project goals, impacts, regulatory requirements, and costs associated with design and construction. Provide recommendations for implementation of feasible alternatives.
- 4.5 Identify potential impacts associated with mitigation alternatives, including the potential for downstream impacts caused by greater flood conveyance and the effect on sediment transport.
- 4.6 For areas where flood protection through structural modifications is 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.
- 4.7 Develop preliminary cost opinions for mitigation alternatives.
- 4.8 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)
- Technical memorandum describing analysis, mitigation alternatives, recommendations
- Inundation mapping

Task 5 -Flood Engineering Analysis Report

- 5.1 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 areas and flood-prone;

- 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;
 - Implementation plan and prioritization of mitigation actions;
 - Recommendations for future analysis; and
 - List of reference and resource materials.
- 5.2 Provide paper and electronic (pdf) copies of the draft plan for review by the Town/Village Board, and/or their appointed designees and funding agencies.
- 5.2.1 Meet with the Town/Village Board, and/or their designees, to present draft findings and implementation plan and recommendations to the Town/Village Board for review, revision, and approval for certain projects to proceed to Phase 2.
- 5.3 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
- Preparation and attendance at a Town/Village Board meeting
- Final Flood Engineering Analysis Report

Phase 2–Feasibility Analysis

In this Phase, 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/Village Board. Phase 2 will culminate with a plan for implementing the projects which are deemed viable.

Task 6 - Local Flood Hazard Mitigation Feasibility Analysis and Plan

- 6.1 Working with Town/Village Board and their designees 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 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.

6.3 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 Identify likely funding sources for the feasible mitigation alternatives.

For recommendations with a potential benefit-cost ratio of greater than 1.0 using the FEMA BCA toolkit, identify funding sources for mitigation actions such as FEMA's Pre-Disaster Mitigation (PDM), Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance (FMA), Repetitive Flood Claims (RFC), Severe Repetitive Loss (SRL), 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 recommendations benefit-cost ratios less than 1.0, identify relevant funding sources including, for example the following programs administered by the U.S. Army Corps of Engineers: Small Flood Damage Reduction Projects (Section 205 of Flood Control Act), Emergency Streambank and Shoreline Protection (Section 14), and Clearing and Snagging Projects (Section 208), Stream Management Implementation Program, and CWC Flood Hazard Mitigation Implementation Program. Also identify recommendations that may fit the "5% Initiative Project" class under HMGP (projects that are difficult to conduct a benefit-cost analysis but meet the goals and objectives of local hazard mitigation plans).

6.5 Update of the implementation plan and prioritization of mitigation actions based on 6.1-6.4. Present update to the Town/Village Board.

6.6 In close coordination with the Town/Village 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

- Final Local Flood Hazard Mitigation Plan delivered to the Town/Village Board, and/or their designees and funding agencies.

POTENTIAL SUPPLEMENTAL TASKS

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

Appendix B
List of Population Centers and Map

List of Eligible Population Centers

County	Town	Villages	Hamlets
Delaware	Andes		Tremperskill, Lake Delaware
	Bovina		Bovina Center, Bovina
	Delhi	Delhi	Fraser
	Hamden		Hamden, Delancey
	Kortright		Bloomville
	Meredith		Meredith
	Middletown	Margaretville, Fleischmanns	Dunraven, New Kingston, Halcottsville, Arkville, Covesville
	Roxbury		Roxbury, Roxbury Run, Grand Gorge
	Stamford	Stamford, Hobart	South Kortright
	Tompkins		Trout Creek
	Walton	Walton	
Greene	Ashland		Ashland, East Ashland
	Halcott		Halcott Center
	Hunter	Hunter, Tannersville	Haines Falls, Onteora Park
	Jewett		Jewett, East Jewett
	Prattsville		Prattsville
	Lexington		Lexington, West Kill
	Windham		Windham, Hensonville, Maplecrest,
Schoharie	Conesville		Conesville, West Conesville
Sullivan	Neversink		Neversink, Grahamsville, Curry, Unionville, Claryville
Ulster	Denning		Sundown, Denning
	Hurley		Glenford
	Olive		West Shokan, Boiceville, Ashokan
	Shandaken		Big Indian, Shandaken/Allaben, Pine Hill, Chichester, Phoenicia, Mount Tremper