**NYC Watershed Stream Management Program**
**Local Flood Analysis (LFA) Program Rules**

**July 23, 2014; Revised October 25, 2024**

## A. Program Background

Following Tropical Storms Irene and Lee in 2011, the New York City (NYC) Department of Environmental Protection (DEP) and West of Hudson watershed stakeholders developed a framework for funding a Flood Hazard Mitigation (FHM) Program in the NYC West of Hudson watershed. Under this initiative, DEP funds local Stream Management Program (SMP) partners and the Catskill Watershed Corporation (CWC) to support the analysis of flood conditions, the identification of hazard mitigation projects, and the implementation of community-scale projects that reduce flood hazards and impacts, protect water quality and public safety, and promote community resiliency. The FHM 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" or LFA. These program rules (Section C) define the process for municipalities to apply for funding to complete an LFA. These program rules (Section D) also define the process for municipalities to seek funding from the SMP to implement community-scale LFA Projects. CWC also administers a Local Flood Hazard Mitigation Implementation Program (LFHMIP) to fund and support LFA Project implementation; the LFHMIP is governed by its own set of program rules.

## B. Definitions

a. LFA Applicant (Section C). A town or village located wholly or partially in the NYC West of Hudson Watershed and listed in Appendix B.

b. Project Applicant (Section D). A town, village, county, or governmental entity located wholly or partially in the NYC West of Hudson Watershed.

c. Flood Advisory Committee (FAC). A body appointed by a municipality to represent the municipality's interests in FHM, to engage in the LFA 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 FAC and may define the role of the FAC specifically for its needs. Multiple municipalities may, at their discretion, coordinate to form a single FAC. The FAC, or equivalent, shall include advisors from county Soil and Water Conservation Districts (SWCDs), Cornell Cooperative Extension of Ulster County (CCEUC), CWC, and DEP.

d. LFA. An analysis that meets the intent defined in Section C (1) (below) and the objectives described in the model LFA Scope of Services (attached as Appendix A).

e. LFA Projects. Projects recommended in LFAs that have been selected for funding through the SMP.

f. LFA Project Sponsor. Person or entity responsible for the implementation of an LFA Project that has been selected for funding through the SMP.

g. LFA Study Area. The area of focus for the LFA as determined by the FAC in consultation with SMP Partners and DEP upon review of stream process up and downstream of the eligible area pursuant to goals of optimizing mitigation benefits and community resiliency.

h. Population Centers. Population Centers are defined in the 1997 Watershed Memorandum of Agreement (MOA) as "Designated Areas (Villages, Hamlets and Village Extensions)". See Appendix B, Section A for these areas.

i. Qualified Consultant. An engineering firm with demonstrated experience in hydraulic modeling with HEC-RAS, community-based flood mitigation planning, and benefit/cost analysis of FHM alternatives.

j. SMIP. Stream Management Implementation Program is the grant program administered through local SMP Partners that includes funding for the development of LFAs and funding of community scale LFA Projects..

k. SMP Partners. Includes the following local entities that contract with the DEP to implement the SMP at the basin-scale: Delaware County SWCD, Sullivan County SWCD, Greene County SWCD, Ulster County SWCD and CCEUC.

l. Subsequent Areas. Locations outside of Population Centers that have shown to have a significant flood inundation risk where opportunities may exist for reducing flood elevations primarily through channel and floodplain enhancements and resizing of public infrastructure. These areas have shown to meet criteria set forth in Section C 5(b) and are listed in Appendix B, Section B. For an area not listed in Appendix B, Section B to be eligible for an LFA, the area must meet the criteria specified in Section C 5(b).

## C. LFA – Engineering Analysis and Feasibility Study

### 1. LFA Intent

DEP contract funding is available to support the community-based evaluation of flood risks and the identification of effective FHM projects through the development of LFAs in eligible areas within the NYC West of Hudson watershed. The intent of the LFA is to help West of Hudson watershed communities with the following:

- Confirm there is a significant inundation flood hazard through engineering analysis;

- Use the engineering analysis to develop a range of FHM alternatives that have 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 potential solution/alternative and compare different solutions for the purpose of determining and prioritizing the most practical and sustainable outcome.

Recommended LFA Projects may be eligible for FHM funding through the SMP, CWC's LFHMIP, or the NYC Funded Flood Buyout Program. Rules governing FHM project priorities and eligibility are distinct for each of these funding sources.

## 2. 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 a Memorandum of Understanding (MOU) with their local SMP Partner to collaborate and seek guidance on stream management issues;
b. The municipality has designated an FAC or equivalent official representative body of the municipality (e.g., the town or village board) to oversee the LFA process with a Qualified Consultant;
c. The municipality has agreed to use the attached LFA Scope of Services (Appendix A) to select a proposal for which they will request funding, or officially authorize the local SMP Partner to do so on their behalf.
d. The areas scoped for the LFA process must be listed in Appendix B or meet criteria specified in Section 5(b).

## 3. Contracting for the LFA

LFA consulting services may be contracted in one of two ways:

a. Municipality-led:

i. Municipalities (or group of municipalities working together) issue a Request for Proposals for the LFA Scope of Services (see Section 6) to secure a consultant for some or all eligible areas.
ii. Upon consultant selection, the municipality (or group of municipalities) applies to their local SMP Partner through the SMIP for LFA funding to hire their Qualified Consultant, using the consultant's technical and cost proposals as Scope and Budget in the application.
iii. The application is reviewed by the local SMP Partner and its designated SMIP committee for technical merit, cost and consultant qualifications.
iv. If approved, the municipality enters into a contract with the local SMP Partner.

v. The municipality then contracts with the Qualified Consultant, determines the order of priority in which it will address its eligible areas, and issues task orders to the Qualified Consultant to initiate the LFA process for each eligible area.
vi. The municipal FAC oversees the LFA process for the municipality.
vii. The municipality submits vendor invoices to the local SMP Partner for reimbursement. Payment procedures, including invoicing and deliverable requirements, follow the procurement process as established by the local SMP Partner and consistent with DEP contract requirements.

b. SMP Partner-led (the process outlined below need not follow strictly in the sequence outlined).

i. The municipality (or municipalities) passes a resolution designating the local SMP Partner as administrator of the LFA on behalf of a municipality (or group of municipalities).
ii. The local SMP Partner agrees to accept sponsorship and issue the Request for Proposals for LFA Scope of Services.
iii. The municipal board appoints a FAC or its equivalent to coordinate the LFA process for the municipality (or group of municipalities).
iv. The FAC 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 the local SMP Partner through their SMIP for LFA funding for their selected Qualified Consultant, using the consultant's technical and cost proposals as Scope and Budget in the application.
vi. The application is reviewed by the local SMP Partner and its designated SMIP committee for technical merit, cost, and consultant qualifications.
vii. Upon approval, the municipality (or municipalities) authorizes (by resolution) the local SMP Partner to enter into contract with the selected Qualified Consultant.
viii. The local SMP Partner contracts with the Qualified 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 local SMP Partner for completion of the LFA; if there is no SMIP contract, then the municipality shall enter into an LFA MOU with the SMP Partner.

4. Deliverables and Invoicing Process

a. Where the municipality contracts directly with a Qualified Consultant for the LFA, the funding for the LFA will be transmitted through a contract between the local SMP Partner and the municipality (or municipalities).

b. Payment procedures will follow the procurement process as established by each SMP Partner and consistent with DEP contract requirements.

c. Payments will be made by reimbursement; interim payments can be made, contingent on basin-specific rules and SMP Partner contracts.

d. Deliverables are as defined in the consultant scope of services, which must closely follow the model LFA Scope of Services provided Appendix A.

5. LFA Funding Award Process

a. Municipalities meeting the eligibility requirements will be invited to apply for funding to conduct LFAs in eligible areas. Funding for a new LFA or the revision of an existing LFA should be prioritized, based upon existing funding, by the SMP Partners. The SMP Partner will then make the formal award by letter to the municipality.

b. Subsequent Areas listed in Appendix B, Section B are eligible. Any area not listed must satisfy the criteria below to be eligible.

To be eligible for LFA funding, the proposed area must meet the criteria defined in either (a) or (b), or at least two of (c, d, e, f, g, h) below:

a. Any Repetitive Loss Area[1] (RLA) defined by a municipality;
b. Areas identified in CWC's Cluster Septic Program[2] where inundation flooding has previously occurred or is expected to occur during the 1% annual chance event (100-yr) based upon current flood mapping;
c. An assemblage of three (3) or more Repetitive Loss[3] (RL) properties;
d. An assemblage of five (5) or more distinct properties, each with at least one (1) submitted flood insurance claim within the past thirty (30) years;
e. Areas within a community that contain a critical community facility[4] ;
f. Critical transportation corridors[5] ;
g. Locations where inadequate road/stream-crossings[6] may cause at-grade flooding of structures;
h. Facilities/campuses, or campgrounds that:
    i. Have experienced prior flood damage or are likely to incur flood damage during the 1% annual chance (100-yr) event or less (based upon current flood maps) and;
    ii. Become occasional "population centers", defined as having greater than 100 people onsite for two (2) or more consecutive weeks.

A municipality must lead the LFA process for facilities/campuses or campgrounds.

[1]***Repetitive Loss Area (RLA)*** *is a municipally-defined portion(s) of the community that includes buildings on FEMA's RL list and any nearby properties that are subject to the same*

*or similar flooding conditions. Existing examples include: Town of Shandaken RLA Analysis (2019 Town of Shandaken Flood Mitigation Plan, Appendix A) and Village of Walton RLA map (Repetitive Loss Area.pdf).*

*[2] **CWC Cluster Septic communities** not previously included in an LFA study area include: Kelly Corners, Stratton Falls Trailer Court, Delhi Trailer/Mobile Home (Delaware Co.), Lanesville, Jewett Center (Greene Co.), Woodland Valley Road, Traver Hollow Road, Shokan (Ulster Co.), Neversink (Sullivan Co.).*

*[3] **Repetitive Loss (RL) property** is any insurable building for which two (2) or more claims of more than $1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978.*

*[4] **Critical Community Facility** is a public facility such as a firehouse, hospital, school, town hall, highway garage, shelter, post office, public drinking water treatment or distribution facility, or wastewater treatment plant or collection system that if rendered inoperable would result in significant disruption of community services and everyday life.*

*[5] **Critical Transportation Corridors** are areas identified in a local, county, or state plan, study, or strategy, where it has been determined the corridor is vulnerable to flooding and if inoperable, would result in significant disruption of community services and everyday life. An example is: Ulster County Critical Transportation Infrastructure Vulnerability Assessment.*

*[6] **Inadequate Road/Stream Crossings** are locations where flooding has previously caused or is expected to cause (based upon current flood maps) at-grade flooding of five (5) or more habitable, or other structures which may contain contents that pose a threat to water quality (garage, material storage, etc.) during the 0.2% annual chance (500-yr) flood, or less.*

c. 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.

6. LFA Scope of Services

The attached LFA Scope of Services (Appendix A) is the template for a Request for Proposals that shall be issued to seek Qualified Consultants for developing new LFAs or revising existing LFAs. The work may be undertaken in phases (Phase 1, an engineering analysis and Phase 2, a feasibility analysis/plan). For an LFA revision, the attached LFA Scope of Services should be modified as needed to address specific revisions and the rationale for them. The LFA Scope of Services cannot be modified without the written approval of the SMP Partner and DEP.

## D. SMIP Rules for Funding LFA Projects

1. Program Funding

Funds for implementing LFA Projects will be allocated by local SMP Partners through the SMIP. The SMIP is the established mechanism for awarding DEP contract funding to local communities for implementing priority SMP projects, including dedicated funding for FHM 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 from the affected town, village, or hamlet. Towns/villages may apply on behalf of Not-for-Profit organizations.

3. Project Eligibility Requirements

Town, village, and county governments, and governmental entities, such as public school districts, are eligible to apply for LFA Project funding when the following criteria are met:

a. Located wholly in the Watershed;

b. Located in a town/village that has completed an LFA, and the project is a recommendation (or a part of a multi-phased project that is recommended) in that LFA.

c. Approved by the town or village;

d. Located in a town/village has completed a Community Assistance Visit (CAV) or Community Assistance Contact (CAC) with the New York State Department of Environmental Conservation (DEC) within five (5) years of the date of application. This requirement can be waived if the DEC indicates, in writing, by no fault of the town/village, the CAV or CAC was unable to be completed as required, and provides assurance it will be completed within the next eighteen (18) months.

e. Located in a town/village is in good standing with the National Flood Insurance Program (NFIP).

4. Eligible LFA Projects include:

Projects that are recommended in an LFA and are shown to have a measurable off-site flood reduction benefit, or is a component of a larger LFA Project that has a measurable flood reduction benefit. LFA Project applicants must recognize that LFAs are planning-level studies. As such, a proposed LFA Project, as it progresses through the design process, may not provide the anticipated flood reduction benefit(s) as described in the LFA. SMP Partners and DEP must agree that eligible LFA Projects in (a),(b),(c), and (d)

below, show a measurable off-site flood reduction benefit(s) through the 60% design phase. 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 water surface elevations;

b. Design and construction of projects that positively address hydraulic constrictions. Examples include increasing the size of undersized culverts to provide up/downstream flood reduction benefits at habitable structures (Section C (5)(b)(g), or decrease community vulnerability (Section C (5)(b)(f).

c. Design and construction of floodplain enhancement, restoration, and reconnection projects;

d. Design and construction of the restoration of naturally stable stream channel dimensions and sediment transport processes;

e. Facilitation, preparation, and submission of Letters of Map Revisions (LOMRs), Letters of Map Amendments (LOMAs), or other changes that revise or replace effective FEMA Flood Insurance Rate Maps (FIRMs).

5. Ineligible LFA 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 that replace public infrastructure without providing off-site flood reduction benefits to residential/commercial structures or critical facilities;

e. Projects consisting of routine annual maintenance;

f. Projects that can be fully funded under state and/or federal programs;

g. Replacement of privately owned bridges, culverts or roads.

6. Application Process and Evaluations:

Applications will be accepted and evaluated according to the process defined locally by the respective basin-specific SMP Partners.

7. Contracting Requirements:

The Applicant or local SMP Partner shall enter into subcontracts (agreements) with consultants for the implementation of LFA Projects under their individual contracting requirements. These additional requirements apply:

a. SMIP Agreement
   i. Applicants, with their SMIP Agreement, must submit a resolution passed by the appropriate governing body authorizing a designated representative to enter into the SMIP Agreement.
   ii. Project funding may be reallocated if a funding award does not result in a signed SMIP Agreement after one (1) year, or if no action on a signed SMIP Agreement is taken after two (2) years. Extension can be made by mutual written agreement between the parties for one (1) year. In cases where funding is rescinded, the SMP Partner or municipality will notify the Applicant in writing that the funding has been rescinded.
   iii. SMIP Agreements shall contain a schedule and milestones for design of the LFA Project (where applicable).
   iv. Applicants shall abide by their respective SMP Partner procurement policy.

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 Partner and DEP.
   iii. Work, including design, shall not commence until subcontracts are approved by DEP, the SMP Partner and the Applicant (where applicable).
   Prior to the final payment on any project, the SMP Partner or Applicant shall provide the SMP Partner and DEP with a site inspection and a project close-out report.
   iv. 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. Applicants shall perform all restoration project design tasks in a manner that is consistent with the design procedures established under the NYCDEP Stream Mananagement Program Design Submission Standards.

c. Upon completion of construction, the affected community will initiate the LOMR process, if warranted, within twelve (12) months.

d. Applicants shall provide written notice to the appropriate SMP Partner of substantial completion (general construction prior to contractor leaving site) of all LFA Projects so that the appropriate SMP Partner and DEP, and any other entity determined to be necessary, can inspect the work and provide comments prior to final completion.

e. The SMP Partner and DEP must approve the completion (general construction, plantings, as-built survey and reporting) of all LFA Projects prior to the release of any retainage amounts held under funding provided by DEP.

f. Applicants shall coordinate and comply with all statutory and regulatory requirements applicable to an LFA 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 (LFA)

## Request for Proposals

October 2024, Revised Version

# 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 (FHM) – the work of reducing the impacts from flooding - supports the social, economic and environmental interests of communities in the West of Hudson NYC Watershed (WOH) and the water supply protection mission of the New York City Department of Environmental Protection (DEP).

Following Tropical Storms Irene and Lee in 2011, a framework was developed for funding flood hazard mitigation in the WOH. Under this initiative, Stream Management Programs[1] in the WOH and the Catskill Watershed Corporation support 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 feasible FHM projects articulated in a plan and 2) project design and implementation.

The first step is called a Local Flood Analysis, or LFA. Phase 1 in the LFA process is a flood engineering analysis which 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. Phase 2 is a planning effort associated with this analysis (that complements past mitigation planning efforts) by further defining future projects and the prioritization of those projects. This feasibility analysis results in an LFAPlan that articulates projects that have the most potential to provide community scale flood reduction benefits.

Upon completion of the LFA process (engineering analysis and subsequent feasibility analysis/plan), funding for design and construction of priority projects can be sought. Communities eligible for funding to conduct an LFA include those identified in the original

[1] DEP and local contacts for the Stream Management Program 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, 3130 State Route 28, Shokan, NY, 12481. Tel. 845 688-3047, Leslie Zucker, Program Coordinator; Ulster County Soil and Water Conservation District, Address, Highland, NY, 12528. Tel. 845 883-7162, Jake Wedemeyer, Executive Director
- Schoharie Watershed Program – Greene County Soil and Water Conservation District, 907 County Office Building, Cairo, NY, 12413 Tel. 518 622-3620. Joel Dubois, Executive Director
- Rondout Neversink Stream Program, Sullivan County Soil and Water Conservation District, 273 Main St. Grahamsville, NY, 12740. Tel. 845 985-2581, Stacie Howell, Program Coordinator
- NYC DEP Stream Management Program, 71 Smith Ave, Kingston, NY 12401. Tel. 845 340-7850, David Burns, SMP Coordinator

hamlet, village and village extension parcel boundaries developed for the 1997 Watershed Memorandum of Agreement as well additional areas where a significant flood risk has been shown to exist. Prioritized efforts in these areas will focus limited program resources on the majority of the WOH population centers. Study limits within each eligible LFA study area will be determined by the potential flood mitigation strategies being analyzed by the consultant, and capture the entirety of the 500-yr floodplain.

There are various types of hazards caused by flooding, for example, inundation, erosion and debris are three that are the most common in this region. The LFA process is intended to principally address inundation hazards in population centers, such as villages and hamlets. The DEP Stream Management Program (SMP) partners will provide funds for the cost of hiring consultants to perform the LFA or to revise or update a completed LFA. SMP Partners will also provide technical, administrative, coordination and outreach support and guidance to communities undertaking this effort. Municipalities are required to form Flood Advisory Committees /Commissions (FAC) to advise and assist this process on behalf of their community(ies). The local representatives to the FAC must be appointed by the town/village board. A municipal board can appoint itself as the FAC, but an attempt should be made to provide continuity through election cycles.

Once municipally-supported projects, or other actions, are shown through the LFA process to mitigate impacts from flooding, and are subsequently recommended in the LFA, they are eligible for implementation funding from the Stream Management Program's Implementation Grants Program (SMIP) and the CWC's Local Flood Hazard Mitigation Implementation Program, in addition to federal and state grant funding. The LFA will identify the best funding opportunities for each recommended LFA Project. Projects must undergo both Phase 1 and 2 components of the LFA as one of the eligibility requirements for local flood hazard mitigation implementation funding. Only the town/village board, or their designees, can decide which projects to seek funding to implement.

**Assistance for LFA Process:**

The attached LFA Scope of Services template has been developed to provide the framework for the LFA process. It defines the activities and deliverables expected of Qualified 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 LFA 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 hazard mitigation planning activities or prior LFA studies, may satisfy some of the elements contained within the template scope.

For more information, please contact the appropriate Stream Management Program leader in your county listed above.

**DRAFT TEMPLATE SCOPE OF SERVICES**
**FOR LOCAL FLOOD ANALYSIS (LFA) 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 Qualified Consultant to complete the LFA. It is required that town/village board establishes a Flood Advisory Committee (FAC) to advise and assist in this process, and that the FAC will serve the town/village board. The town/village board can appoint itself to serve as the FAC).

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# PHASE 1 – FLOOD ENGINEERING ANALYSIS

## *Task 1 – Project Management, Coordination, and Meetings*

In this Phase, the town/village 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 Qualified 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 LFA process, a town/village board will designate a FAC to assist and advise in the LFA process. The FAC may be the town/village board, or a new group including local officials, local and county planning board and soil and water conservation district members, floodplain administrators, county emergency services/hazard mitigation coordinators, DEP, CWC, regulatory agencies, residents and businesses, and the general public. The FAC should be structured in a manner to provide continuity through election cycles. The Qualified Consultant will meet and collaborate with the town/village board and, if separately established, the appointed FAC. The Qualified Consultant will engage and communicate with these project stakeholders in support of the overall process which will include explaining the flood engineering analysis to be undertaken and its results. The Qualified 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. Where possible the process should be integrated with similar or on-going efforts, such as the updating of multi-jurisdictional hazard mitigation plans, and state or local resiliency planning. The Qualified Consultant will prioritize recommendations based upon feasibility, benefits versus cost, community scale flood benefit, and town/village support.

1.3 Educational Materials. As requested by the town/village board, and/or their designees, the Qualified Consultant will prepare general and technical educational materials, as well as participate and contribute to ongoing education and outreach efforts regarding the LFA

process. At a minimum, this shall include assisting with disseminating information to the general public in advance of each public meeting or at key junctures in the LFA process.

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 and other stakeholders 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 LFA 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 town/village board ___ *(indicate number)* FAC meetings. These meetings may be in-person or remote.

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 and outreach support activities and materials as determined by the town/village board, and/or their designees. This shall include outreach to residents and members of the community to ensure robust public engagement throughout the LFA process.

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)* FAC meetings
- Compile and distribute meeting minutes
- Periodic project updates to the client
- Educational and outreach 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 LFA 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 (FIS), Flood Insurance Rate Maps (FIRMs), and HEC-RAS modeling;
d. Depth grids available from the FEMA FIS 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 DEP;
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;
k. If applicable, the community's flood hazard mitigation plan, the prior LFA study report, and any data produced as a result for the community and pertinent information on recently-completed mitigation projects.

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 LFA Study 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 stormwater 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, fuel tanks, roadway contaminants, streambank and bed erosion, and other sources as appropriate to the study 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 stream corridor 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" model[2]. 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, culverts, 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 and infrastructure 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 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, structure relocation, elevation, wet and dry floodproofing of buildings);
b. Flood Damage Prevention and Planning - Actions that lower flood elevations or prevent future losses (such as channel modification, floodplain reclamation or enhancement, and adoption or amendment of land use regulations, building codes or flood damage prevention regulations);
c. Natural Resource Protection - Actions that minimize 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 impacts from flooding (such as replacement or retrofit of bridges and culverts, protection of utilities and other critical infrastructure);
e. Emergency Services – Actions that protect people and property during and immediately following a flood event;
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, floodplain administrators, municipal officials, realtors, contractors, and property owners about how to protect themselves, and community assets from flooding and associated losses.

Consult with the local hazard mitigation plan(s) as needed to ensure consistency with the specified goals and potential actions listed.

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, retrofits, or removal 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 (WSEs), horizontal 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 collective measures.

4.4 Evaluate the feasibility of mitigation measures identified in task 4.2 and 4.3. Alternatives shall be evaluated based on community scale 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 flood prone areas. Evaluation and recommendations shall include wet/dry floodproofing, elevation, relocation, removal of derelict structures from the floodway, 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 structures and assets;

- Alternatives analysis, including feasibility;
- Narrative and mapping of hydraulic modeling, including a summary of model output relative to forecast reductions in horizontal flood extent, depth of flooding, and WSEs;
- 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 an electronic copy of the draft plan for review by the town/village board, and/or their appointed designees and funding agencies.

5.3 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 mitigation alternatives to proceed to Phase 2.

5.4 Modify and revise the flood mitigation plan based on review comments and provide the final plan as an electronic document.

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 - Implentation Plan*

6.1 Working with town/village board and/or 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 beneficial.

6.2 Using the most current version of the FEMA BCA toolkit, determine the Benefit Cost Ratio (BCR) of the mitigation alternatives advanced from Phase 1. 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. 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 BCR of greater than 1.0, identify funding sources for mitigation actions such as FEMA's Building Resilient Infrastructure and Communities (BRIC), Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance (FMA), Severe Repetitive Loss (SRL), Stream Management Implementation Program (SMIP), and CWC's Local Flood Hazard Mitigation Implementation Program (LFHMIP); 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 with BCRs 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), SMIP, and LFHMIP.

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 and/or their designees.

6.6 In close coordination with the town/village board, and/or their designees, prepare a plan that includes and documents the results of Tasks 6.1 through 6.5. Specifically, the LFA 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 (referred to as LFA recommendations);
- Recommendations for future analysis, including hydrologic assessment and/or two-dimensional (2D) hydraulic modeling; and

- List of reference and resource materials.

Task 6 Deliverables

- Final LFA delivered to the town/village board, and/or their designees and funding agencies. The LFA document shall be in electronic format, with bookmarks for all sections included in the table of contents.

## 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 Within the LFA Study Area. identify and map flood-damaged properties and infrastructure (i.e. roads, bridges, utilities, etc.), including those located outside of the Special Flood Hazard Area, Repetitive Loss properties (RLs), and Severe Repetitive Loss properties (SRLs).

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 municipality to adopt the LFA if desired.

P2.7 Utilization of 2D hydraulic modeling to obtain a higher degree of accuracy and level of detail compared to existing modeling for complex locations. These locations include alluvial fans and areas with multiple flooding sources and flow paths in existing LFA Study Areas. On a case-by-case basis, the use of 2D hydraulic modeling from the onset may be prudent for locations where no prior LFA has been completed.

Appendix B
List of Eligible Areas*
*As amended October 25, 2024

## List of Eligible LFA Study Areas

A. Population Centers identified by the MOA.

| County | Town | Villages | Hamlets |
|---|---|---|---|
| **Delaware** | Andes | 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 |
| | 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 |

*Village of Andes dissolved in 2003

B. Subsequent Areas where LFAs have been or can be completed that meet criteria in Section C(5)(b) identified by SMP Partners and DEP.

C.

| County | Town | Subsequent Area |
|---|---|---|
| **Delaware** | Andes | Andes |
| | Middletown | Kelly Corners |
| **Greene** | Jewett | South Jewett |
| | Hunter | Lanesville |
| **Schoharie** | Conesville | Manorkill |
| **Ulster** | Shandaken | Oliverea, Woodland Valley |
| | Olive | Shokan |
| | Woodstock | Willow |
| | Denning | Frost Valley |

October 2024, Revised Version