

SECTION 6. MITIGATION STRATEGY

The Planning Partnership reviewed the risk assessment for this HMP to identify and develop mitigation actions for Rockland County that will reduce potential exposure and losses associated with identified hazards of concern. This section includes the following:

- Background and past mitigation accomplishments
- General mitigation planning approach
- Problems and solutions
- Review and update of mitigation goals and objectives
- Mitigation strategy development and update

Hazard mitigation reduces the potential impacts of, and costs associated with, emergency and disaster-related events.

Mitigation actions address a range of impacts, including impacts on the population, property, the economy, and the environment. These actions can include activities such as revisions to land-use planning, training and education, and structural and nonstructural safety measures.

6.1 BACKGROUND AND PAST MITIGATION ACCOMPLISHMENTS

A review of past mitigation activities provides a foundation for understanding the mitigation goals, objectives, and activities outlined in this plan update. The County, through previous and ongoing hazard mitigation activities, has demonstrated that it is proactive in protecting its physical assets and citizens against losses from natural hazards. Highlights are presented in Table 6-1.

Table 6-1. Mitigation Accomplishments in Rockland County

Department	Mitigation Accomplishments
Countywide	<ul style="list-style-type: none"> • The County facilitated the development of the original Rockland County Multi-Jurisdictional Hazard Mitigation Plan (HMP). The current planning process represents the regulatory five-year plan update process, which includes the participation of 23 jurisdictions in the County, along with key County and regional stakeholders. • All municipalities participating in this HMP update participate in the National Flood Insurance Program (NFIP), which requires the adoption of the Federal Emergency Management Agency (FEMA) floodplain mapping and certain minimum standards for building within the floodplain. • The County and its municipalities have implemented mitigation actions to protect critical facilities and community lifelines throughout Rockland County. These actions and others were identified in the 2018 HMP. • In 2020, the County and local municipalities responded to and worked to mitigate the impacts of the coronavirus pandemic through education of the public, enforcement of local and state social distancing and masking measures, and establishment of best practices to slow the spread of COVID-19.
Rockland County Soil & Water Conservation District (SWCD)	<ul style="list-style-type: none"> • SWCD assesses culverts and bridges for flood risk and aquatic passability (the ability for migratory fish to swim into and out of structure). Since 2014, over 400 culverts and bridges have been assessed in the Cedar Pond Brook, Minisceongo Creek and Sparkill Creek subwatersheds (spanning the Towns of Haverstraw, Stony Point, Clarkstown, Orangetown and Ramapo). • In 2016, SWCD completed a pilot study for the Town of Stony Point. 135 culverts and bridges were assessed and made into an inventory document. The goal is to create a town level management plan to help reduce flood risk and increase conservation efforts across waterways and neighboring communities. • Annually, SWCD allocates funds to conceptual design plans and construction of rain gardens, bioswales and other green infrastructure features across the County. These features aid with groundwater recharge, flooding control, and beautification of public spaces. Interpretive signage is also placed at each site to educate visitors of the benefits of green infrastructure.

Department	Mitigation Accomplishments
Rockland County Open Space Acquisition Program	<ul style="list-style-type: none"> Between 1999 and 2010, 31 individual properties were acquired, preserving 1,204 acres of land. A total of \$23,300,000 in County funds were expended and \$11,576,000 in state grants and partnerships with land trusts and local municipalities were leveraged. The Open Space Acquisition Program has successfully provided access to the Hudson River (27 acres), preserved steep slopes (500 acres), protected wetlands (350 acres), and preserved a valuable historic resource (0.5 acres). The remaining acreage includes floodplains, scenic vistas, and properties to provide access to other parklands. These parcels are scattered throughout the five Towns in the County and offer a variety of recreational opportunities. In September 2019, County Executive Ed Day and the County Legislature approved Resolution No. 406 of 2019 authorizing the creation of a 2020 Capital Project to include \$30,000,000 to acquire open space properties through the County’s Open Space Acquisition Program.
Stormwater Consortium of Rockland County	<ul style="list-style-type: none"> The Stormwater Consortium of Rockland County was formed between Cornell Cooperative Extension and the towns and villages of Rockland County to collaborate and share resources on stormwater management. The consortium consists of all 23 towns and villages in Rockland County who must abide by the NYSDEC stormwater permit. Since the last HMP, municipalities focused on reducing and/or eliminating flooding related to stormwater by cleaning retention ponds, installing berms, installing larger drainage pipes along roadways, and replacing damaged drainage pipes. Flood mitigation and resilience reports were completed for the Saddle River Watershed (June 2022) and Ramapo River Watershed (March 2023). These were completed for NYSDEC to determine floodprone areas and identify potential flood mitigation considerations.

6.2 GENERAL MITIGATION PLANNING APPROACH

The overall approach used to update the County and local hazard mitigation strategies is based on FEMA and New York State regulations and guidance regarding local mitigation plan development:

- DMA 2000 implementation regulations, specifically 44 Code of Federal Regulations (CFR) 201.6 (local mitigation planning).
- FEMA *Local Mitigation Planning Handbook*, May 2023.
- FEMA *Local Mitigation Plan Review Guide*, April 2022.
- FEMA *Integrating Hazard Mitigation into Local Planning*, March 1, 2013.
- FEMA *Plan Integration: Linking Local Planning Efforts*, July 2015.
- FEMA *Mitigation Planning How-To Guide #3, Identifying Mitigation Actions and Implementing Strategies* (FEMA 386-3), April 2003.
- FEMA *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards*, January 2013.
- NYS DHSES *New York State Hazard Mitigation Planning Standards*, 2022.
- NYS DHSES *New York State Hazard Mitigation Planning Standards Guide*, 2017.

The mitigation strategy update approach is further detailed in the remaining subsections of this section.

6.3 PROBLEM AND SOLUTIONS IDENTIFICATION

An exercise to identify problems and solutions was completed via online survey by the participating jurisdictions. Participants were asked to do the following for each of the ranked hazards of concern for the 2024 HMP update:

- Identify a problem caused by each hazard.
- Identify potential solutions to each problem.
- For each solution, describe anticipated costs, benefits, funding sources, and project feasibility.

The results were used by the participants to help identify capabilities and potential mitigation actions.

6.4 REVIEW AND UPDATE OF MITIGATION GOALS AND OBJECTIVES

According to CFR 201.6(c)(3)(i): “The hazard mitigation strategy shall include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.”

The Steering Committee reviewed the 2018 goals and objectives and made revisions for the 2024 update based on the risk assessment results, discussions, research, and input from the Steering Committee, existing authorities, policies, programs, resources, stakeholders, and the public. For the purposes of this plan, goals and objectives are defined as follows:

- **Goals** are general guidelines that explain what is to be achieved. They are usually broad, long-term, policy-type statements and represent global visions. Goals help define the benefits that the plan is trying to achieve. The success of the plan, once implemented, should be measured by the degree to which its goals have been met (that is, by the actual benefits in terms of hazard mitigation).
- **Objectives** are short-term aims that form a strategy or course of action to meet a goal. Unlike goals, objectives are stand-alone measurements of the effectiveness of a mitigation action. The objectives also are used to help establish priorities.

The review of goals and objectives from the 2018 HMP considered hazard events and losses since the 2018 plan, the updated hazard profiles and vulnerability assessment developed for this update, the goals and objectives established in the New York State 2019 HMP, Rockland County and local risk management plans, and direct input on how the County and municipalities need to move forward to best manage their hazard risk. As a result of this review, the goals and objectives for the 2024 update were updated to those in Table 6-2 and Table 6-3. Amendments to the goals and objectives express the Planning Partnership’s interests in integrating this plan with other planning mechanisms and supporting mitigation through the protection of natural systems.

Table 6-2. Rockland County 2024 HMP Goals

Goal Number	Goal
1	Protect life from natural and man-made hazards through planning, preparation, mitigation, and integration.
2	Protect existing and future property including critical facilities, community lifelines, infrastructure, public, and private structures.
3	Increase hazard risk and mitigation education and awareness programs for government agencies, private sector businesses, non-profit organizations, residents, and property owners.
4	Preserve and restore natural systems through sustainable, cost-effective, and resilient mitigation projects and programs.
5	Build emergency management capabilities through continuity of operations before, during, and after hazard events.
6	Promote and encourage sustainability practices to reduce or eliminate impacts from natural and man-made hazard events.
7	Integrate the hazard mitigation plan to ensure consistency with existing and future planning documents, regulatory programs, codes, ordinances, and state and federal hazard mitigation strategies.

Table 6-3. Rockland County 2024 HMP Objectives

Objective Number	Objective
1	Enhance early notification systems and communication infrastructure to provide adequate warning and information regarding all hazards
2	Review, strengthen and enforce existing building codes, ordinances, and safety procedures to increase the resilience of construction to the impacts of hazards.
3	Identify and implement cost-effective structural and property protection projects to reduce the impacts from flooding, including acquisition, elevation, and relocation projects.
4	Develop and distribute public awareness materials about natural hazard risks, preparedness, and mitigation.
5	Ensure continuity of government operations, emergency services, and essential facilities and adequate supplies for emergency response services at the local level during and immediately after hazard events.
6	Strengthen communication and cooperation between public agencies, citizens, non-profit groups, and businesses to implement mitigation activities effectively.
7	Maintain and encourage ongoing relationships between state agencies and partners to play an active and vital role in preservation and restoration of vulnerable natural systems.
8	Pursue mitigation actions that will preserve or restore the environment’s natural abilities to absorb the impacts of natural and man-made hazards.
9	Encourage smart growth, neighborhood revitalization and economic development with an awareness of the existence and location of natural hazard areas to mitigate impacts of hazards on life, property, and the economy, while exploring sustainable development measures and preserving quality of life and existing community and neighborhood character.
10	Improve hazard data through participation in studies, research, and mapping to enhance information related to the impacts of hazards and related risks, vulnerability, and losses.
11	Continue to participate in state, regional, and local programs and efforts that focus on practices that support or enhance resiliency.

6.5 MITIGATION STRATEGY DEVELOPMENT AND UPDATE

As required by FEMA, the County and other participating jurisdictions completed a comprehensive evaluation of the mitigation strategies and actions from the 2018 HMP and reported on the status of each. Their updates may be found in each jurisdictional annex (Volume II). In addition, the County and other participating jurisdictions were provided the opportunity to include new strategies or actions in the 2024 HMP. New actions were prioritized to ensure they are cost-effective, environmentally sound, and technically feasible using the methodology outlined below.

6.5.1 Update of Municipal Mitigation Strategies

For each mitigation action identified in the 2018 HMP, jurisdictions were asked to provide a status (*No Progress, In Progress, Ongoing Capability, Discontinue, or Completed*) and comments. They were requested to quantify the extent of progress and provide reasons for the level of progress or why actions were being discontinued. Each jurisdictional annex in Volume II provides a table identifying the jurisdiction’s prior mitigation strategy, the status of each action, and its disposition within the updated strategy.

Local mitigation actions identified as Completed or Discontinued are not included in the updated strategies. Actions identified as No Progress or In Progress, as well as certain actions/initiatives identified as Ongoing Capability, have been carried forward to the updated mitigation strategies. Municipalities were asked to provide further details on these projects to better define the work, identify benefits and costs, and improve implementation.

As potential new mitigation actions became evident during the plan update process—through public and stakeholder outreach or the updated risk assessment—jurisdictions were made aware of these through direct communication (local meetings, email, phone), at Steering Committee and Planning Partnership meetings, or via the draft jurisdictional annex development.

Throughout the planning process, the planning consultant worked directly with each community by phone or email to assist with the development and update of their annex and include mitigation strategies. The focus was on well-defined, implementable projects with a careful consideration of benefits (risk reduction, losses avoided), costs, and possible funding sources (including mitigation grant programs).

6.5.2 Identification and Analysis of Mitigation Techniques

Concerted efforts were made to ensure that participating jurisdictions develop updated mitigation strategies that cover the range of mitigation action types described in recent FEMA planning guidance (*FEMA’s Local Mitigation Planning Handbook* [May 2023]), specifically:

- **Local Plans and Regulations**—These actions include government authorities, policies or codes that influence the way land and buildings are being developed and built.
- **Structure and Infrastructure Projects**—These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure.
- **Natural Systems Protection and Nature-Based Solutions**—These actions can include green infrastructure and low impact development, nature-based solutions, Engineering with Nature (an initiative of the U.S. Army Corps of Engineers), and bioengineering to incorporate natural features or processes into the built environment.
- **Education and Awareness Programs**—These actions keep residents informed about potential natural disasters. Many are eligible for funding through the FEMA Hazard Mitigation Assistance (HMA) program (FEMA 2023).

6.5.3 2024 HMP Mitigation Action Plan

Problem Statements

To support development of the mitigation strategy, each participating jurisdiction’s annex provides a summary of hazard vulnerabilities identified during the plan update process by local representatives, the updated risk assessment, or review of county and local plans and reports.

In December 2023, the Planning Partnership participated in a mitigation strategy development workshop, supplemented by emails and phone calls between jurisdictions and the contract consultant. The workshop helped participating jurisdictions to develop focused problem statements based on the impacts of natural hazards in their communities. Each problem statement provides a detailed description of a problem area, problem impacts, past damage, loss of service, etc. Where possible, the problem statements list the street address of affected properties, adjacent streets, water bodies, well-known nearby structures, and existing conditions of the site (topography, terrain, hydrology). These problem statements form a bridge between the hazard risk assessment, which quantifies impacts on each community, and the development of actionable mitigation strategies.

As discussed in the hazard profiles in Section 4.3, the long-term effects of climate change are expected to exacerbate the impacts of weather-related hazards, including flood, severe summer weather, severe winter

weather, and tornado. Participating jurisdictions are working to evaluate the long-term implications of these climate change-sensitive hazards and to incorporate appropriate planning and capital improvement updates in their local mitigation strategies and integration actions.

Solutions

The local mitigation strategies focus on clearly defined, readily implementable actions that meet the definition of mitigation. Broadly defined solutions were eliminated unless accompanied by concrete actions, projects, or initiatives. Some continuous or ongoing activities that represent programs that are fully integrated into the normal operational and administrative framework of the community have been removed from the updated mitigation strategy and included in the capabilities section of each annex.

Each plan participant considered a comprehensive range of mitigation actions to reduce the effects of hazards. Some of these are previous actions carried forward for this plan update. These actions are dependent upon available funding (grants and local match availability) and may be modified or omitted based on the occurrence of new hazard events and changes in municipal priorities.

Throughout the course of the plan update process, additional regional and county-level mitigation actions were identified by the following processes:

- Review of the results and findings of the updated risk assessment
- Review of available regional and county plans reports and studies
- Direct input from county departments and other county and regional agencies
- Input received through the public and stakeholder outreach process

To assist with the development of mitigation actions, municipalities were provided with the following:

- 2024 HMP goals and objectives
- 2018 HMP mitigation strategies
- Risk assessment results
- Outcome of the problem and solutions exercise
- Mitigation catalog
- Stakeholder and public input (e.g., citizen and stakeholder survey results)
- FEMA resources

6.5.4 Mitigation Best Practices

Catalogs of hazard mitigation best practices were developed that present a broad range of alternatives to be considered for use in Rockland County, in compliance with 44 CFR 201.6(c)(3)(ii). One catalog was developed for each natural hazard of concern evaluated in this plan. The catalogs, included in Appendix F (Mitigation Strategy Supplementary Data), present alternatives that are categorized in two ways:

- By who would have responsibility for implementation:
 - Individuals—personal scale
 - Businesses—corporate scale
 - Government—government scale
- By what the alternatives would do:
 - Manipulate the hazard
 - Reduce exposure to the hazard
 - Reduce vulnerability to the hazard
 - Build local capacity to respond to or be prepared for the hazard

The alternatives include actions that will mitigate current risk from hazards and actions that will help reduce risk from changes in the impacts of these hazards resulting from climate change. Hazard mitigation actions recommended in this plan were selected from among the alternatives presented in the catalogs. The catalogs provide a baseline of mitigation alternatives that are backed by a planning process, are consistent with the established goals and objectives, and are within the capabilities of the planning partners to implement. Some of these actions may not be feasible based on the selection criteria identified for this plan. The purpose of the catalogs was to provide a list of what could be considered to reduce risk from natural hazards within the planning area. Actions in the catalog that are not included for the partnership's action plan were not selected for one or more of the following reasons:

- The action is not feasible.
- The action is already being implemented.
- There is an apparently more cost-effective alternative.
- The action does not have public or political support.

6.5.5 Mitigation Strategy Evaluation and Prioritization

Actions could be prioritized by ranking them as high, medium or low importance. The plan must clearly define each of these terms. Actions may also be prioritized by start date or other methods. Prioritization may change over time as community characteristics, risks and available resources shift. The evaluation and prioritization process helps the Planning Partnership weigh the advantages and disadvantages of different actions (FEMA 2023). Each mitigation strategy was prioritized using the following criteria:

- Life Safety—How effective will the action be at protecting lives and preventing injuries? Will the proposed action adversely affect one segment of the population?
- Property Protection—How significant will the action be at eliminating or reducing damage to structures and infrastructure? Does it help to manage development in the floodplain or other high-risk areas?
- Cost-Effectiveness—Are the costs to implement the project or initiative commensurate with the benefits achieved?
- Political—Is there overall public support for the action? Is there the political will to support it? Is the action at odds with development pressures?
- Legal—Does the jurisdiction have the authority to implement the action?
- Fiscal—Can the action be funded under existing program budgets (i.e., is it currently budgeted for)? Or would it require a new budget authorization or funding from another source such as grants?
- Environmental—What are the potential environmental impacts of the action? Will it comply with environmental regulations? Are there co-benefits of this action?
- Social Vulnerability—Does the action benefit socially vulnerable populations and underserved communities? Additional considerations can include the SVI index and other appropriate measures of social vulnerability.
- Administrative—Does the jurisdiction have the personnel and administrative capabilities to implement the action and maintain it or will outside help be necessary?
- Hazards of Concern—Does the action address one or more of the jurisdiction's high-ranked hazards?
- Climate Change—Does the action address the effects of climate change on future hazard occurrence and impacts?

- **Timeline**—Can the action be completed in less than 5 years (within the planning horizon of the HMP)?
- **Community Lifelines**—Does this project benefit community lifelines?
- **Other Objectives**—Does the action advance other local objectives, such as capital improvements, economic development, environmental quality, or open-space preservation? Does it support the policies of other plans and programs?

For each mitigation action, the jurisdictions were asked to assign one of the following numeric scores for each evaluation criterion:

- 1 = Highly effective or feasible
- 0 = Neutral
- -1 = Ineffective or not feasible

Jurisdictions were asked to provide a summary of the rationale behind the numeric rankings assigned, as applicable. The numerical results were totaled to assist each jurisdiction in selecting mitigation actions for the updated plan.

As the initial step in the prioritization process, actions that had a numerical value between 0 and 4 were prioritized as low; actions with numerical values between 5 and 9 were categorized as medium; and actions with numerical values between 10 and 14 were categorized as high. These attributes are included in the mitigation strategy table and for FEMA-eligible projects in the mitigation worksheets in Volume II.

For the plan update, there has been an effort to develop more clearly defined and action-oriented mitigation strategies. These local strategies include actions that are seen by the community as the most effective approaches to advance their local mitigation goals and objectives within their capabilities. In addition, each jurisdiction was asked to develop problem statements. With this process, participating jurisdictions were able to develop action-oriented and achievable mitigation strategies.

6.5.6 Benefit-Cost Review

Under Section 201.6.c.3iii of 44 CFR, cost-effectiveness is one of the criteria that must be applied during the evaluation and prioritization of actions included in the mitigation strategy. A qualitative benefit-cost review was used in the prioritization of actions for this this plan update. For all actions identified in the local strategies, jurisdictions have identified the associated costs and benefits:

- **Costs** include the total estimated project cost. This can include administrative, construction (engineering, design, and permitting), and maintenance costs.
- **Benefits** are the savings from losses avoided attributed to project implementation. These can include life safety, structure and infrastructure damage, loss of service or function, and economic and environmental damage and losses.

Where quantitative estimates of costs and/or benefits were not available, qualitative ratings were assigned using the definitions shown in Table 6-4. Using this approach, projects with positive benefit versus cost ratios (such as high over high, high over medium, medium over low, etc.) are considered cost-beneficial and are prioritized accordingly.

Table 6-4 Qualitative Cost and Benefit Ratings

Costs	
High	Existing funding levels are not adequate to cover the costs of the proposed project, and implementation would require an increase in revenue through an alternative source (e.g., bonds, grants, and fee increases).
Medium	The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
Low	The project could be funded under the existing budget. The project is part of or can be part of an existing, ongoing program.
Benefits	
High	Project will have an immediate impact on the reduction of risk exposure to life and property.
Medium	Project will have a long-term impact on the reduction of risk exposure to life and property or will provide an immediate reduction in the risk exposure to property.
Low	Long-term benefits of the project are difficult to quantify in the short-term.

For some of the mitigation actions identified in this HMP, the Planning Partnership may seek financial assistance under FEMA’s HMGP or HMA programs. The qualitative benefit/cost review does not include the level of detail required by FEMA for project grant eligibility under HMA grant programs. When funding applications for these projects are prepared, detailed analyses will be performed using the FEMA BCA model process. For projects not seeking financial assistance from grant programs that require this sort of analysis, the Planning Partnership reserves the right to define “benefits” according to parameters that meet its needs and the goals and objectives of this HMP. The Planning Partnership is committed to implementing mitigation strategies with benefits that exceed costs.