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OVERVIEW

Extreme weather events and mounting natural hazards cause social, environmental, and infrastructure damages and losses. Municipalities, regional planning organizations, states, and federal agencies will need to increase their resiliency and adapt to these conditions if they are to avoid damages today and into the future. For communities in the Hudson Valley, this need is strikingly evident. Recent devastating events such as Tropical Storm Irene and Superstorm Sandy have reinforced this urgency and compelled leading communities to

proactively plan and mitigate potential risks. Ultimately, this type of leadership will reduce the exposure and vulnerability of citizens, infrastructure, and ecosystems, and will serve as a model for communities across the Hudson Valley, New York State, and the country.

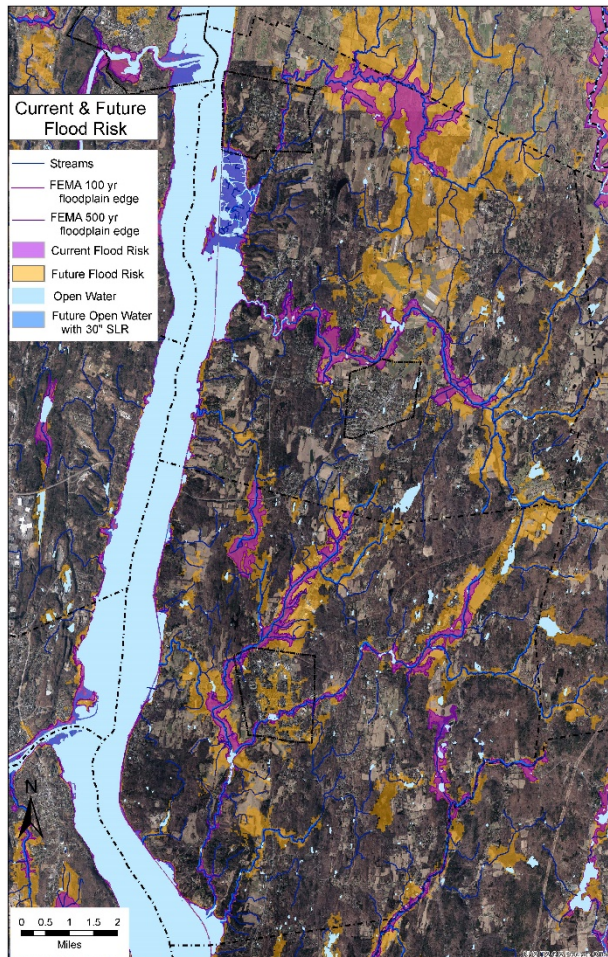


Figure 1. Current and future flood risk for the study areas including the Towns and Villages of Red Hook and Rhinebeck.

communities. This integrated planning process offers participating communities the opportunity to identify specific next steps for local policies, planning, and assets related to climate resilience. The purpose of this facilitated, multi-community workshop was to guide

In the summer of 2019, The Nature Conservancy and the Hudson River Watershed Alliance approached municipal officials in the Towns and Villages of Red Hook and Rhinebeck to discuss and identify resilience needs relative to infrastructure, habitat restoration, and community resilience. A strategy was developed to incorporate recommendations from an existing planning and code review tool completed in 2018 with assistance from Cornell Cooperative Extension Dutchess County (NYS Climate Smart Communities Climate Smart Resiliency Planning Tool, see below) with a process that identifies community assets and areas of risk and proposes initial adaptation strategies.

The Community Resilience Building (CRB) Workshop is a unique “anywhere at any scale” community-driven process (www.CommunityResilienceBuilding.com) that provides an appropriate platform to engage elected officials, municipal staff, and other key stakeholders from participating



implementation of priority adaptation actions across the Town of Red Hook, Village of Red Hook, Town of Rhinebeck, and Village of Rhinebeck, with a focus on reducing the impacts of flooding (Figure 1).

The workshop’s central objectives were to:

- Define extreme weather and articulate local natural and climate-related hazards
- Identify existing and future vulnerabilities and strengths
- Develop prioritized actions for the municipalities and broader stakeholder networks
- Identify opportunities for the community to advance actions to reduce risk and increase resilience.

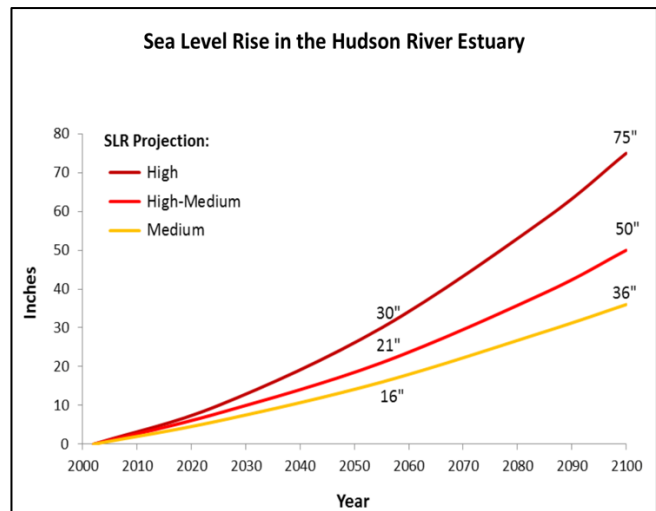


Figure 2. Projected sea level rise scenarios for the Hudson River Estuary.

A Community Resilience Building Workshop was held with representatives from all four municipalities on February 13, 2020 at the Red Hook Community Center.

This report provides an overview of the top hazards, the current community strengths and concerns, and the suggested actions to improve resilience to natural and climate-related hazards in the communities today and in the future. The summary of findings will benefit from further comments, feedback, and updates from workshop attendees and additional stakeholders alike. The participation of all those concerned in the communities will help continue and expand collective leadership on hazards and community resilience.

PROJECTED FUTURE CONDITIONS

Current climate and environmental conditions are projected to change in ways that will profoundly influence current interactions with natural resources. This includes the magnitude and intensity of storms and drought, rising sea level in the Hudson River and tidal tributaries, and other changes. Various platforms are available to better understand and evaluate how different climate change scenarios are likely to impact Hudson Valley communities, including:

- The Nature Conservancy’s [Natural Resource Navigator](#)
- Scenic Hudson’s [Sea Level Rise Mapper](#)
- Columbia University’s [Hudson River Flood Decision Support Tool](#)
- New York State [Climate Change Science Clearinghouse](#).



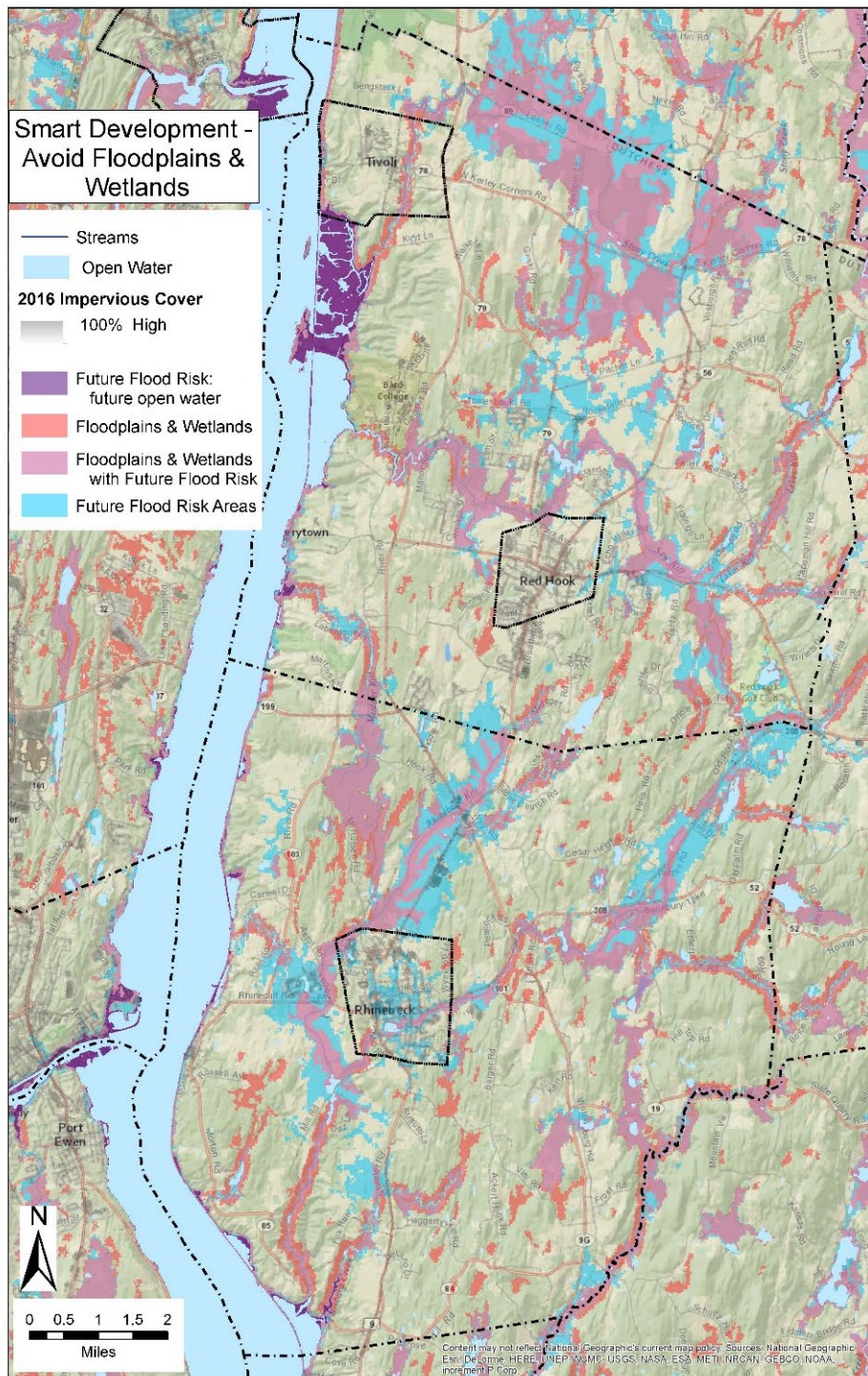


Figure 3. Projected future flood risk areas (blue shaded area) throughout the Towns and Villages of Red Hook and Rhinebeck. Pink shaded areas represent possible areas of future floodplains and wetlands as a result of higher flood levels. Development activities in areas where the blue and pink shaded areas overlap should be carefully considered and evaluated before construction is allowed to begin.



As these and other tools clearly indicate, there are many possible scenarios that could manifest themselves over the course of this century. The numerous factors, both global and local, that influence these outcomes make the extent of these scenarios difficult to predict. Thus, it is important to plan for a range of scenarios as evidenced by [NY's Community Risk and Resiliency Act](#).

For the purpose of adaptation planning, general trends and rough estimates can be employed. For example, riverfront communities in the Mid-Hudson region should be preparing for a *minimum* of 3-6 feet of mean sea level rise by 2100. All communities in the Hudson Valley should consider the potential ramifications of:

- Increased severity and frequency of big storms, including
 - More winter precipitation (if rain, then more flooding, if snow, then 10” of snow or more per storm)
 - More flooding due to increased precipitation and increased development and impervious surfaces
- Hotter summers
- Increased frequency and length of heat waves and droughts
- Shorter, milder winters.

Details on the ranges of projected future conditions are available through the [New York State Water Resources Institute](#) and through the previously referenced tools (Figures 1-3 and Table 1).

Table 1. Community assets (Infrastructure, Environment, and Social) at risk with various sea level rise scenarios and current 100-year storm in the Towns of Red Hook and Rhinebeck, as modeled by the Hudson River Flood Decision Support Tool. The output was produced using Columbia University’s Center for International Earth Science Information Network Hudson River Flood Decision Support Tool 2.0. This tool only evaluates to the Town level, not to the village or hamlet levels.

Impact Scenarios for Towns of Rhinebeck and Red Hook						
Type of Impact	18" of SLR with current 100 YR Storm		30" of SLR with current 100 YR Storm		48" of SLR with current 100 YR Storm	
	Town of Red Hook	Town of Rhinebeck	Town of Red Hook	Town of Rhinebeck	Town of Red Hook	Town of Rhinebeck
<i>Infrastructure</i>						
Total Damaged Buildings	1	5	2	6	3	6
Bridges		4		5		5
Roads (linear miles)	1	1	1	1	1	1
Rails (linear miles)	5	8	6	8	6	8
Railroad Passenger Stations		1		1		1
<i>Environment</i>						
Inundated Land Area (Acres)	520	171	529	173	533	173
Inundated Impervious Surface Area (Acres)	1	3	2	3	2	3
Inundated NWI and Tidal Wetlands (Acres)	878	163	880	163	881	163
<i>Social</i>						
Social Vulnerability Index of Impacted Census Blocks (Index Score is unitless)	4	4	4	4	4	4
Social Vulnerability Index of Entire Municipality	3	4	3	4	3	4



CLIMATE SMART RESILIENCY PLANNING TOOL RECOMMENDATIONS

Cornell Cooperative Extension Dutchess County worked with the Town of Red Hook and Village of Red Hook in 2018 to complete a [Climate Smart Resiliency Planning Tool \(CSRPT\)](#). The CSRPT, an action of the [NYS Climate Smart Communities \(CSC\) Certification](#) program, reviews a municipality’s existing plans and ordinances to identify opportunities to help the community work toward becoming more resilient. The municipality receives a copy of the finished tool, as well as a recommendations document to use as a roadmap to move forward with resiliency projects. Cornell Cooperative Extension Dutchess County will be working with the Town of Rhinebeck and Village of Rhinebeck to complete the resiliency planning tool in 2020.

The resiliency planning tool is comprised of the following six sections. The first section is a list of all the relevant plans and ordinances that were considered throughout the tool. Section 2 examines how well the municipality addresses climate vulnerabilities and assesses climate risk. Section 3 looks at how the municipality includes the public in resiliency discussions and informs them about how to be more climate resilient. Section 4 assesses the degree to which the plans are integrated with one another. Section 5 examines the municipality’s preparedness level for climate events and recovery procedures. Finally, Section 6 looks at how well the municipality attempts to mitigate climate hazards.

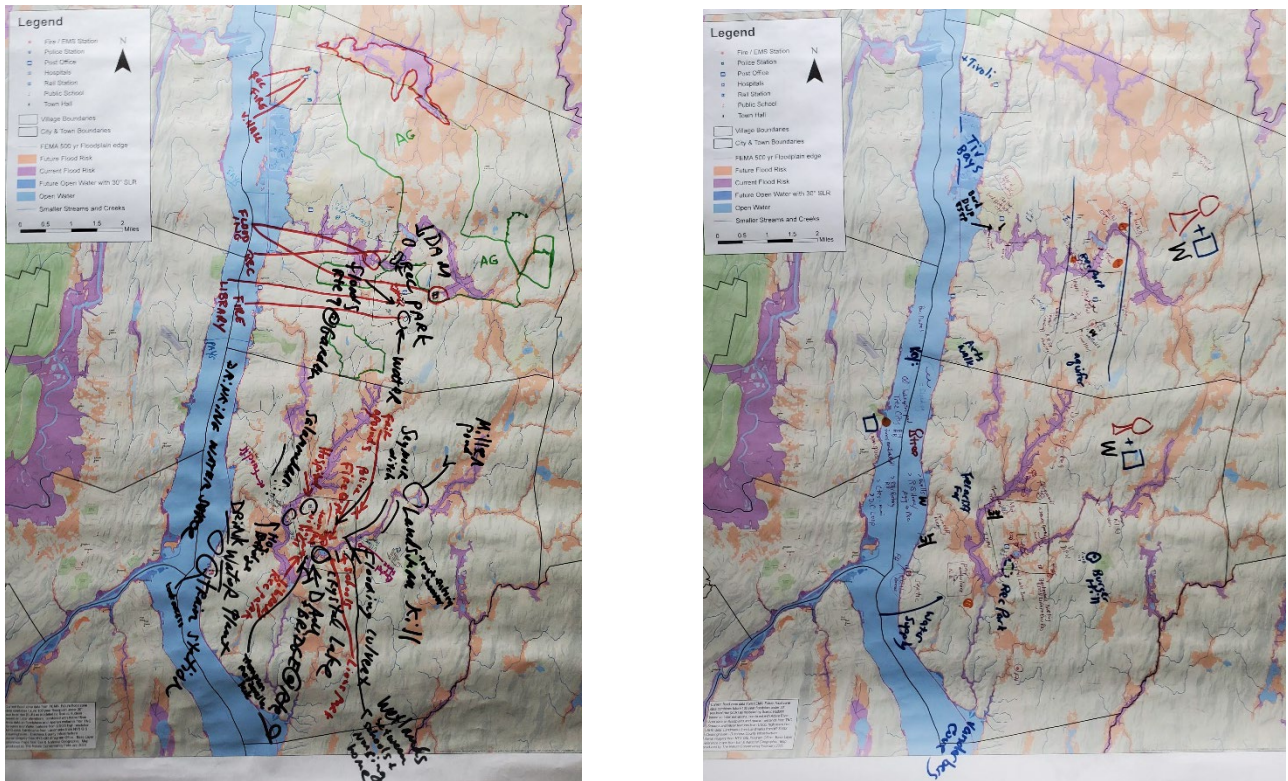


Figure 4. Maps showing the location of identified assets were developed by each sub-group during the Community Resilience Building workshop.



Recommendations shared with both municipalities include:

- Create a Resiliency Plan and include community visioning, a full vulnerability assessment, content from various other plans, and strategies to reduce vulnerability.
- Complete a full Climate Vulnerability Assessment, based on the criteria in Climate Smart Communities Pledge Element 7 Action.
- Consider creating maps of vulnerabilities in relationship to risks, including vulnerable populations, natural resources, cultural resources, landslides, sea-level rise.
- Improve public outreach on storm preparedness. Add links to municipal websites to direct residents and businesses to Dutchess County's web page on storm preparedness and other resources.
- Update Comprehensive Plan with Sustainability Elements. Integrate plans and initiatives such as the Complete Streets initiative and Saw Kill Watershed Assessment (2018), address flood hazards, and identify strategies to mitigate flood risk.
- Collaborate on an Emergency Response Plan and Evacuation Plan.

Some of the recommendations shared with the Town of Red Hook are highlighted below:

- Publicize the availability of floodplain information to property owners, businesses, insurance, agents, real estate agents, and lenders through trainings or other means.
- Consider incorporating the Planning for Resilient Connected Natural Areas and Habitats (2014) report into a Natural Resources Inventory.
- Update the Town's local Climate Action Plan (2012).

Some of the recommendations shared with the Village of Red Hook are highlighted below:

- Involve the public in more opportunities to identify historic storm effects, including storm-surge elevations, flood-prone streets, or property loss.
- Consider developing a public outreach plan for climate outreach and engagement



Figure 5. Michelle Gluck of Cornell Cooperative Extension Dutchess County shared findings from Climate Smart Community Resilience Tools during the workshop. ©E. Vail, HRWA 2020.



COMMUNITY RESILIENCE BUILDING WORKSHOP SUMMARY OF FINDINGS

Top Hazards

During the core team meetings that took place prior to the workshop and at the start of the Community Resilience Building workshop, workshop participants confirmed their top natural climate hazards as the following:

1. **Sea level rise and storm surge:** Projected rises in future mean sea levels, combined with severe coastal storms such as Superstorm Sandy, capable of producing storm surge and coastal flooding.
2. **Inland flooding:** Inland flooding caused by intense precipitation, storms and subsequent runoff from rain or snow.
3. **Drought and wildfires:** Higher peak temperatures in summer with sporadic precipitation events which may stress municipal and private resources, especially public water supplies and private wells. The threat of wildfires was brought up as an additional hazard, related to drought and dry conditions.

The above hazards have a growing impact on residents and businesses in the Towns and Villages of Red Hook and Rhinebeck, all located in Dutchess County. During the Community Resilience Building Workshop, participants were asked to identify environmental, infrastructural, and social assets in their communities; determine whether those assets are strengths, vulnerabilities or both; and identify and prioritize actions. These assets and actions were identified by a diverse mix of participants from both municipalities. The following sections summarize the results of this process.

Key Assets and Areas of Concern

Numerous environmental, infrastructural, and social assets were identified, which have been grouped in several categories.

There were four major areas of concern related to **environmental assets**:

- **Waterbodies and wetlands**, including the Hudson River, Landsmankill, Saw Kill, Stony Creek, Rhinebeck Kill, Crystal Lake, and Sepasco Lake.
- **Open space**, including agriculture, forests, and street trees in the Villages of Red Hook and Rhinebeck.
- **Parks and recreational facilities**, including public parks, private parks (Ferncliff Forest, Poets' Walk, Burger Hill, etc.), and boating access on the Hudson River. These spaces are strengths, but they may be vulnerable to flooding impacts.
- **Wildlife**, including beavers, salamanders, and pollinators. Beaver dams may pose a risk for infrastructure, as water is impounded in new locations.



There were seven major areas of concern related to **infrastructural assets**:

- **Drinking water infrastructure** for all four municipalities, including treatment plants, distribution systems, pump stations, water towers, and private and municipal wells.
- **Wastewater infrastructure**, including sewage treatment plants in the Village of Red Hook, Village of Tivoli, Village of Rhinebeck, and Bard College; Vanderburg Cove sewer district; pump stations; conveyance systems; and private septic systems.
- **Transportation infrastructure**, including the Amtrak railroad and several roads, culverts, and bridges that are vulnerable to flooding.
- **Dams** that could reduce flooding by drawing down ponded water ahead of events, but that may exacerbate flooding if they are at risk for failure.
- **Municipal facilities**, such as town and village halls, Department of Public Works garages, highway departments, fire houses, public buildings, and ambulance centers.
- **Electric infrastructure**, including substations and Red Hook's solar Community Solar Array (CSA).
- **Stormwater infrastructure** to improve drainage, including catch basins and culverts in urbanized areas.



Figure 6. Participants discussed a wide array of community assets during the workshop, and most were associated with infrastructure elements. © E. Vail, HRWA 2020.

There were three major areas of concern related to **social assets**:

- **Emergency Management Planning**, including shelters, emergency services, evacuation planning, etc.
- Protecting **vulnerable populations**, including residents of nursing homes, senior housing, private facilities, and specific at-risk neighborhoods.
- **Communications in case of emergency**, including statewide and municipal alert systems.

Current Vulnerabilities

Most of the environmental assets identified by workshop participants were characterized as strengths that are vulnerable to the three hazard categories of sea level rise/storm surge, inland flooding, and drought. Environmental assets capture community elements such as water resources, open space, and other ecosystem services. In some instances, these resources are also vulnerable to damage from flood waters and storm surge with increasing storm frequency and intensity, and potential susceptibility to drought and wildfires.



Though many environmental assets are contributing to resilience, they may also be vulnerable to climate hazards. Waterbodies across the four municipalities include the Hudson River, Landsmankill, Saw Kill, Stony Creek, Rhinebeck Kill, Crystal Lake, Sepasco Lake, and small streams. Parks and recreational facilities along these waterbodies may be vulnerable to flooding. Groundwater resources and aquifers are vulnerable to heat and drought, along with potential impacts to water quality by floods. Street trees and forested areas are vulnerable strengths that require active management to maintain. Agriculture, particularly small farms or farms located in floodplain areas, are vulnerable community strengths. Beaver dams in several locations have made infrastructure vulnerable to new inundation.

There were many public infrastructure assets identified as vulnerabilities in these municipalities, particularly drinking water and wastewater infrastructure. Vulnerable components of drinking water infrastructure include water treatment plants for Village of Rhinebeck (located in the Town of Rhinebeck) and Bard College, the water tower in Village of Tivoli, pump stations, Town of Red Hook and Village of Red Hook municipal wells, and private wells. Vulnerable wastewater infrastructure includes wastewater treatment plants, conveyance system, pump stations, and septic systems. Stormwater infrastructure such as catch basins in Village of Rhinebeck, Town of Rhinebeck, and Rhinecliff is a vulnerability, especially if not sized appropriately. A number of dams and culverts were identified as vulnerable to flooding, with impacts on roads and public transportation. Rail transportation, especially the Amtrak railroad lines along the Hudson River and the train station in Rhinecliff, are at risk for coastal flooding through sea level rise or storm surge. Municipal facilities such as Department of Public Works garages, Rhinebeck highway department facilities, Red Hook village hall, public schools, and ambulance centers may have limited access or be impacted during floods. Northern Dutchess Hospital and various public and private ambulance centers are vulnerable strengths. Central Hudson utility substations for electric were also identified as vulnerable strengths.

Social vulnerabilities include vulnerable populations and facilities, such as Astor Home for Children, nursing homes, Red Hook Senior Housing, mobile home parks, Red Hook Residential Center, Thompson House (Northern Dutchess Residential Health Care Facility), Daytop Village, Wells Manor, and Bard College. Public libraries, public and private transportation, and access to resources like grocery stores were also highlighted.

Current Strengths

Many environmental assets serve as both vulnerabilities and strengths, but the greatest strengths among the environmental assets are associated with open space. Parks such as Ferncliff Forest, Burger Hill, and Poets' Walk need maintenance to continue to be strong community assets. Forested areas and street trees help improve resiliency, while also requiring active management. Recent land acquisition to protect the Town of Red Hook's drinking water supply improves the system's vulnerability to climate hazards and potential development. Tivoli Bay and South Bay on the Hudson River are tidal wetlands that can help protect against coastal flooding. There are also a number of plans or local laws that are



strengths, including Local Waterfront Revitalization Plans, zoning, wetland laws, and burn bans. These plans and policies should be reviewed and updated if necessary.

While there are many drinking water and wastewater assets that are vulnerable, several were also identified as strengths. These include the Village of Red Hook's wellfield and existing water towers. Other drinking water infrastructure components were flagged as vulnerable strengths. The Village of Rhinebeck's wastewater treatment plant is a strength, as it has backup power generators to continue operation in case of power outage and the intake pipes were recently improved to protect against the impacts of sea level rise. Facilities like public buildings, community centers, transfer stations, and recycling centers are strengths, but may require backup power generators or emergency planning to maintain these assets during or after extreme weather events. Electric infrastructure including substations, an underground transmission line, and Town of Red Hook's solar CSA were all strengths, with some vulnerability for certain facilities.

There were more assets identified as strengths in the social category than any other, indicators of an integrated community network of private and public resources. These include fire departments, Northern Dutchess EMT, police stations, schools, libraries, churches, and community centers. Community organizations like American Legion and Rotary Club also contribute to social strength. Existing emergency plans are a strength, though these plans could be updated. They include town and village emergency evacuation plans, along with Bard College's Emergency Plan. Strong communications systems are already in place, including Red Hook's Town Emergency Alert System, Bard College's Emergency Alert System, and New York State's NY Alerts. Raising public awareness of these systems and getting more people to sign up would increase this strength, as would adding this type of system in Rhinebeck.

Top Recommendations to Improve Resilience

Highest Environmental Priorities:

The highest environmental priorities included protecting waterbodies, agriculture, open space, and recreation.

- The Hudson River serves as the drinking water source for the Village and Town of Rhinebeck, in addition to being an important site for recreation in all communities. The Town and Village of Rhinebeck should continue meeting with the Hudson 7 intermunicipal council to work collectively on issues related to source water protection for the Hudson River. Planning, including emergency response planning, Dutchess County's hazard mitigation plan, and revisiting the Local Waterfront Revitalization Plan would be valuable. A study of river flooding impacts could help identify locations that are vulnerable to coastal flooding, along with erosion issues or opportunities to improve drainage along the Hudson River.



- There is public boating access on the Hudson River at Tivoli and Rhinecliff, and private boating access at Barrytown. The Village of Tivoli was recently awarded a grant to stabilize the shoreline and erosion issues present near the launch. At Rhinecliff, which is a small but popular launch site, consider design work to adapt to sea level rise. The private boat club at Barrytown is subject to coastal and inland flooding. Bulkhead improvements should be made and maintained.
- Crystal Lake in the Village of Rhinebeck includes the pond and a recreational area. There is a need for improved stormwater management to mitigate drainage into the lake. There is an ongoing study of stormwater runoff and dam control, along with a project with Marist College to better understand conditions at this site. Riparian plantings around the lake could also improve resilience.
- Streams in general were flagged as high priority, particularly for culvert studies and replacement/rightsizing in the short term. Specific streams include the Landsmankill, Rhinebeck Kill, Saw Kill, and Stony Creek. The Saw Kill was the subject of a recent flood study; recommendations from the study should be implemented, such as protecting floodplains and surrounding areas, updating zoning, creating larger buffers, and replacing culverts. A culvert replacement project on the Stony Creek in Town of Red Hook is underway. Other actions to protect the Stony Creek include updating zoning, protecting buffers, and replacing infrastructure.



Figure 7. Discussion of environment concerns in the area were prevalent and thoroughly considered. © E. Vail, HRWA 2020.

- Protecting farms and open space, especially farms in floodplains, is a key concern. Planning should be conducted with farmers to better understand and communicate vulnerabilities and what locations may be most at risk. There may be opportunities for education, improving riparian buffers, or other practices to mitigate issues such as erosion. To increase resilience to drought, work with farmers to identify and implement best management practices to reduce risk. The Town of Red Hook has a zoned agricultural district that is at risk of flooding, and recommended actions in this area include improving stormwater management, fencing to keep animals out of streams, and working with farmers on best practices, such as protecting buffers, absorbing floods, and

reducing erosion. For small farms in Rhinebeck, work to map existing farms, communicate with farmers, and assess vulnerability.

- Municipal planning and local laws can also contribute to resilience. Adopt and enforce zoning and wetland laws to protect natural resources.

Highest Infrastructural Priorities:



Infrastructural assets included drinking water infrastructure, wastewater infrastructure, culverts, dams, transportation, and electric. The highest priorities in all areas of concern include the following:

- Drinking water infrastructure included many different components across the municipalities. In general, water conveyance systems need better mapping, and there are active projects to redo water lines.
- In Red Hook, a valve connects Town and Village drinking water supplies in case of emergency. This valve needs to be upgraded to a pump station and needs a backup power generator. The Village of Red Hook wellfield in Town of Red Hook is a strength, but the water supply needs to be protected. The Town of Red Hook's drinking water pump station is vulnerable to flooding but will be protected by new land acquisition. The pump station's access road is currently a dirt road that is impacted by flooding and should be improved. In the Town of Rhinebeck, the Hilee Road drinking water pump station serves 30 homes and is highly susceptible to brush fire. It is a priority to work on an irrigation system and vegetation management. The Village of Tivoli's water tower is vulnerable and needs to be redone.
- The Village of Rhinebeck drinking water treatment plant is located adjacent to the Hudson River, where it withdraws drinking water. This facility serves the Village of Rhinebeck, Hamlet of Rhinecliff, The Gardens, nursing homes and schools . Flood assessments have been done, and the facility has a backup generator and recently modified intake pipes to protect against sea level rise. While the most critical work has been done to protect infrastructure from flooding, additional work could still be done. Access routes to the plant should be improved. A backup supply of drinking water should be considered in case of emergency. The water treatment plant lagoon in the Town of Rhinebeck is also vulnerable, and funding needs to be identified to change the process. In addition, the Hilee Road tank structure needs mixer to reinforce the quality and sustainability of the resource.
- A number of wastewater infrastructure components were highlighted. The Village of Red Hook's sewage treatment plant is currently private but is about to transition to a public system to serve the business district. In addition to ongoing maintenance, identify locations of inflow/infiltration (I/I) and test water quality in the Saw Kill to see if the facility is having water quality impacts to the stream. Village of Tivoli's sewage treatment plant is owned by Dutchess County and is high priority. The wastewater treatment plant in the Village of Rhinebeck serves most of the Village and some of the Town of Rhinebeck. The facility has backup generators run by the Village, which should be maintained. This facility is old, and planning is necessary for upgrades and expansion.
- Inventory and assess Village of Rhinebeck culverts, including identifying locations and potential funding sources to make repairs.
- Priority dams include Mill Pond dam at the Town of Red Hook recreational park and Asher Dam at Crystal Lake, owned by the Village of Rhinebeck. Create flow management plans and continue to work with Marist College to refine a flood warning system for the Landsmankill at Crystal Lake.



- Amtrak’s train lines are along the Hudson River, and their vulnerability to coastal flooding impacts multiple communities. Build a community coalition to have discussions with Amtrak about raising the tracks and other actions to reduce the impact of flooding. The train station in Rhinecliff is also vulnerable to Hudson River flooding, and cars parked in the parking lot have been flooded. Upgrades should be made to improve parking and access.
- Route 9 is a state road with known flooding problems at several locations. Coordinate with New York State Department of Transportation on strategies and funding. In general, it would be helpful to better understand tributary flooding with culvert studies at locations where Route 9 crosses over streams to inventory drainage blocks. Garden Street in the Village of Red Hook is a location that regularly floods, and the section of Route 9 near Hannaford in Red Hook was also flagged. In the Village of Rhinebeck, Crystal Lake’s dam and where the Landsmankill crosses under Route 9 is a concern. The dam was redone after Hurricane Irene, and the municipality will need to work with NYS Department of Transportation on the bridge that’s downstream. There is a need for monitoring, drawing down the lake in case of a storm, funding to approach this problem, and flood zone planning at this site.
- Mount Rudsen Road in the Town of Rhinebeck needs an assessment to determine the best strategy to reduce flood risk.
- The Village of Rhinebeck and Town of Rhinebeck need funding and mapping of catch basins to understand their stormwater systems. In the Village of Rhinebeck, ongoing construction on water mains represents an opportunity to rethink the stormwater system and consider the use of green infrastructure and dry wells. In Red Hook’s Forest Park and Liden Acres neighborhoods, the stormwater system needs to be re-sized with more capacity, to be able to handle larger storms.
- Central Hudson utility substations may require elevation or relocation. In Rhinebeck, consider a municipality demand action plan with Central Hudson.
- Public buildings and community centers are strengths and provide a place for people to go in case of emergencies. They will need backup generators to ensure that this function can be maintained during power outages.

Highest Social Priorities:

Actions related to social assets were associated with support institutions, emergency communication and management facilities, and municipal programming. The following represent the highest priorities identified by workshop participants:

- Red Hook has a Town Emergency Alert System to share information with the public. Increase awareness and the number of people who have signed up for emails and text alerts. Consider a municipal alert system in Rhinebeck.
- Cell phone towers in the Town and Village of Rhinebeck are a strength but need to be maintained to maintain communications in case of an emergency.
- Fire departments are strengths but need to be maintained. Hillside Fire Department and Rhinebeck Fire Department have backup power generators, which increases their resilience. For the Rhinebeck Fire Department, consider long-term relocation of equipment and the building. Rhinecliff Fire Department has a backup generator, but



the facility is old and needs maintenance. Village of Red Hook Fire Department has access issues during floods. Maintain Village of Tivoli Fire Department.

- Emergency evacuation plans need to be updated, including evacuation routes for public and private transportation in all four municipalities.
- Emergency shelters are strengths but may require new access routes in case of inland flooding. Bard College and Rhinebeck High School will also require access route alternatives when the primary routes are flooded. Creating emergency shelter plans for public schools, town halls, village halls, and Bard College is high priority, including a new access route for Rhinebeck High School.
- The Red Hook Community Center, while privately owned, plays an important community function. It would benefit from an emergency shelter plan and a backup power generator. The facility itself has some flood vulnerability. Maintain nearby open space, and study nearby culvert to understand flood risk.
- Village of Rhinebeck schools (elementary, middle, and high school) are strengths, and should be maintained. There are backup power generators at the middle and high school, but not at elementary school. The elementary school is surrounded by wetlands, which can cause access issues. The high school experienced some flooding during Hurricane Irene.
- Northern Dutchess Hospital in the Village of Rhinebeck is a strength that needs to be maintained. It does not experience flooding and has a backup generator for power.
- Nursing homes in the Town of Rhinebeck include Brookmead Community Center and Ferncliff. Improve road access and evacuation routes for these facilities, including evacuating to cooling centers and water sources in case of extreme heat and drought. Consider a relocation plan and floodplain management. Access to these facilities has been cut off during extreme storms.

Medium Environmental Priorities:

- The Landsmankill in the Town and Village of Rhinebeck is vulnerable to inland flooding. Continue working with Marist College to understand conditions for proactive planning.
- Beavers in the Town of Rhinebeck are building dams that may put infrastructure at risk for flooding. Continue work to monitor and evaluate, removing beavers when necessary and identifying solutions.
- Enforce existing aquifer protection ordinances to maintain groundwater resources.
- Town recreational parks in Red Hook and Rhinebeck are vulnerable to inland flooding. For both parks, manage stream buffers and use of pesticides. For Rhinebeck's park, work with the Village and Town of Rhinebeck to maintain the wetland complex's health. For Red Hook's park, create or implement the Saw Kill's management plan, improve drainage infrastructure, and consider permeable parking lots.
- Lion's Club Mini Park in the Village of Rhinebeck is a vulnerable strength. Consider more water-absorbing vegetation in the park, along with shore stabilization and improved stormwater management.



- Large forested areas are vulnerable strengths. Create a forest management plan or inventory to maintain these resources. This is important for all three climate hazards that were the focus of this workshop (coastal flooding, inland flooding, and drought). Educate residents on burn bans to protect forests from wildfires.
- Maintain street trees in the Villages of Red Hook and Rhinebeck. While street trees are a strength, they are also vulnerable to climate change. The Village of Rhinebeck recently completed a street tree inventory and found that they will need more diversity of trees to adapt to a new climate. Sick and aging trees need to be managed, so they do not damage infrastructure during extreme weather events. Next steps include an analysis of current conditions, grants to do tree work, and continue the work of the street tree committee.

Medium Infrastructural Priorities:

- Assess and right size bridges and culverts in the Town of Rhinebeck and Town of Red Hook. Specific locations mentioned in Rhinebeck include crossings at Miller Road, Fox Hollow, White School House, Cove Road, and behind the hospital. Red Hook has a list of 10 priority culverts to address from a previous study. The Route 308 and Grossmore crossing in the Village of Rhinebeck would benefit from floodplain management. Work with New York State and Dutchess County to fortify bridges, including the Crystal Lake bridge and Landsmankill bridge, which has washed out. Bridges may need to be rebuilt and elevated. The Kingston Rhinecliff Bridge over the Hudson River was identified as a strength.
- Consider a stormwater management plan for drainage, and talk with Dutchess County Soil and Water Conservation District about opportunities for MS4s (municipal separate stormwater systems).
- Three privately-owned dams were highlighted in the Town of Rhinebeck: Miller Pond, Cooper Dam, and Mill Road Dam. Consider advanced lowering of impounded water prior to a storm. Cooper Dam would benefit from floodplain management and improved riparian buffer areas. Conduct a feasibility study for Mill Road Dam, with removal as a potential long-term action.
- Both private and public wells may be vulnerable to climate hazards. For private wells, conduct public education campaigns. The Town of Red Hook’s private wells will be protected with new land acquisition, but they will need to improve access during floods. Currently, the access route is a dirt road. The Village of Red Hook needs a backup power generator for drinking water supply. The water towers in the Town of Red Hook, Village of Red Hook, and Town of Rhinebeck need ongoing maintenance, and sufficient capacity to store water during droughts.
- Conduct a microgrid feasibility study for the Central Hudson substation in the Town of Rhinebeck.
- There are multiple ambulance centers in the municipalities, including privately owned facilities. The Village of Rhinebeck will need a long-term relocation plan, but in the short term, store equipment elsewhere in cases of a storm.
- Town and village halls are strengths, and operations will need to be maintained in case of an extreme event. Access to Village Hall in Red Hook could be prevented by road



flooding. Rhinebeck Town Hall and Rhinebeck Village Hall both have backup generators for power.

- Town and Village of Red Hook highway department are strengths that should be maintained. The Village of Rhinebeck highway department is located along the Landsmankill, and flood problems should be evaluated; vegetated stream buffers are being considered for this site as well. The building will need to be updated over time. The Town of Rhinebeck facility is also vulnerable to some flooding. For both facilities, relocate equipment to higher ground and improve stream buffers to improve resilience.
- Department of Public Works garages are vulnerable to inland flooding, especially the Village of Rhinebeck's facility. Consider consolidating garages and restoring floodplains.
- Public schools have mixed vulnerability. Rhinebeck's elementary school should consider a long-term plan for relocation. There is potential for school consolidation to impact the Mill Road School. Conduct a study to determine flood mitigation options at public schools.
- The Rhinecliff train station includes a mix of public and private assets. The parking lot is particularly vulnerable. The Town of Rhinebeck will need to negotiate with Amtrak to identify strategies. It would be beneficial to meet with affected communities, Amtrak, CSX, and county legislators to start this conversation.
- Rhinecliff's stormwater system in the Town of Rhinebeck needs a feasibility study. There are also drainage issues in the Village of Rhinebeck at the business district's main intersection on Route 9. New York State and the Village of Rhinebeck are currently in discussions over responsibility, and they will evaluate drainage options and green infrastructure opportunities to reduce stormwater runoff.
- In general, the municipal wastewater conveyance systems are vulnerable to inland flooding. Stream erosion has puts pipes at risk, and there is a need for better mapping to understand impacts to systems. The Vanderburg Cove Sewer District in the Town of Rhinebeck needs upgrades and will need funding for improvements. Wastewater treatment plants in the Village Red Hook, Village of Rhinebeck, and Bard College should be maintained, and water flows could be better understood.

Medium Social Priorities:

- NY Alerts is New York State's system for communicating public notifications. Increase residents' awareness of this system, and increase sign-ups for notifications.
- The Village of Red Hook Library is located near Garden Street, and vulnerable to inland flooding. Improve access during floods.
- In the Red Hook school district, access to the elementary school should be improved. The high school is an emergency shelter. Ensure there is backup power and flood vulnerability is reduced. The Deveraux School in Red Hook is a private school that is vulnerable. Consider relocation plan, along with emergency and evacuation plans.
- Red Hook's privately-owned senior housing, Wells Manor senior housing in Village of Red Hook, and the Thompson House (Northern Dutchess Residential Health Care Facility) in Town of Rhinebeck could benefit from maintenance, relocation plans, and



floodplain management. The Rhinebeck at Home aging in place program in the Town and Village of Rhinebeck is a strength to support older residents.

- The Astor Home for Children in the Village of Rhinebeck is not directly vulnerable to flooding, but there have been access issues. Maintain and ensure there is a backup power generator and emergency/evacuation plan. Undertake a flood inventory study, relocation plan, and floodplain management to identify strategies.

Other actions were identified related to the municipal assets but were deemed low priority and therefore are not included in this report.



WORKSHOP PARTICIPANTS

First Name	Last Name	Municipality/Affiliation	Title
Brian	Baccomo	Village of Rhinebeck	Chief Waste Water Treatment Plant Operator
Gary	Bassett	Village of Rhinebeck	Mayor
Carolyn	Bernitt	Rhinebeck Chamber of Commerce	Executive Director
Vanessa	Bertozzi	Village of Rhinebeck	Village Climate Smart Community Coordinator
Randy	Clum	Bard College	Director, Building & Grounds
Lindsey	Drew	Bard College	
Peter	Dunn	Village of Rhinebeck	Officer in Charge
Kyle	Eighmy	Village of Rhinebeck	Fire Chief
John	Fenton	Village of Rhinebeck	Building Inspector, Zoning Enforcement Officer, Superintendent of Public Works
Michael	Gersho	Marist College	
John	Gomez	Bard College	Director Security
Joel	Herm	Rhinebeck	
Laurie	Husted	Town of Red Hook	Sustainability Groups/ Comm.
Dawn	Jardine	Public Library	Director
Tracey	Ledder	Delaware Engineering	
Connie	Lown	Village of Rhinebeck	Secretary of Village Tree Commission
Arica	McCarthy	Tighe & Bond	Planner
Victor	Narjal	Town of Red Hook	Water/Power Utility
Emily	Poole	Marist College	
Courtney	Schneeberger	Delaware Engineering	
Elizabeth	Spinzia	Town of Rhinebeck	Supervisor
Rickie	Stokes	Rhinebeck Highway Department	
Sheldon	Tieder	Rhinebeck School District	Facilities Director, Rhinebeck Fire Department EMT
Michael	Trimble	Rhinebeck Planning Board	
Michelle	Turck	Town of Rhinebeck	Zoning Board



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ACKNOWLEDGMENTS

Special thanks to the Town of Red Hook, Village of Red Hook, Town of Rhinebeck, and Village of Rhinebeck for their willingness to embrace this process, and to the municipalities for providing the facilities to convene the group.

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RECOMMENDED REPORT CITATION

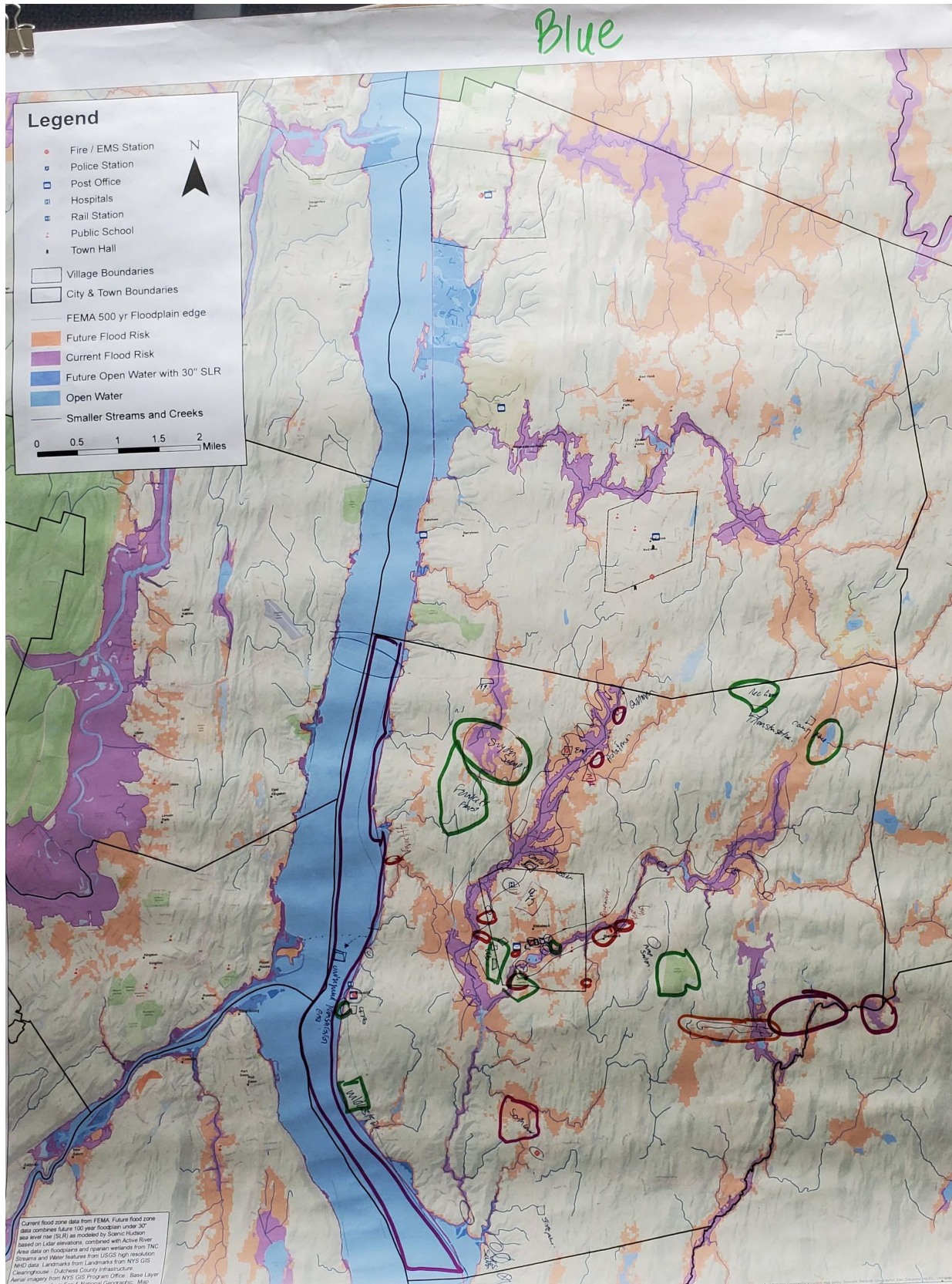
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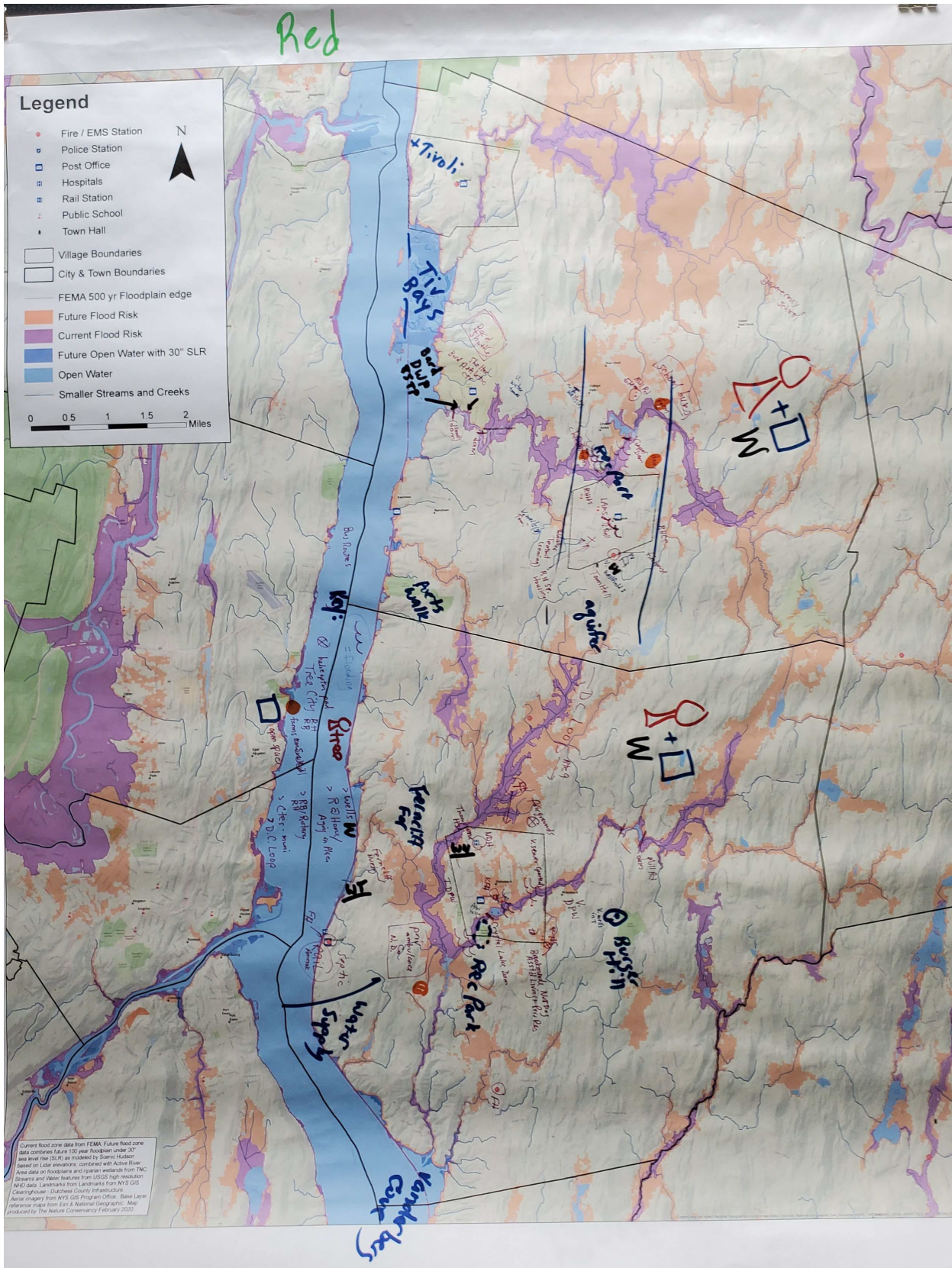


APPENDIX I: CRB Workshop Asset Identification Maps





Town of Red Hook, Village of Red Hook, Town of Rhinebeck, & Village of Rhinebeck
Summary of Findings - March 2020



Town of Red Hook, Village of Red Hook, Town of Rhinebeck, & Village of Rhinebeck
 Summary of Findings - March 2020

**APPENDIX 2: Climate Smart Community Resilience Tool Recommendations:
Town of Red Hook**



Town of Red Hook Climate Smart Resiliency Planning

Prepared by Michelle Gluck, Cornell Cooperative Extension Dutchess County

The Climate Smart Resiliency Planning Tool (CSRP) is a checklist to identify gaps in a community's planning process.

The Climate Smart Resiliency Planning Tool was used to evaluate opportunities for the Town of Red Hook to improve resilience to flooding and climate change. The Planning Tool reviews many long- and short- term aspects of storm and climate change preparedness by reviewing Town and County planning documents, municipal codes, activities and management.

Documents were reviewed, and municipal staff members were consulted in the process of completing the assessment. The assessment and recommendations have been shared through meeting discussions with the Town Supervisor, Planning Consultants, Conservation Advisory Council, and Disaster Preparedness Committee and presented at the January 23, 2018 Town Board meeting.

Municipal staff engaged in the Town of Red Hook Climate Smart Planning assessment:

Robert McKeon, Town Supervisor

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Jen Cavanaugh, Consultant and Conservation Advisory Council Member

Laurie Husted, Bard Chief Sustainability Officer and Conservation Advisory Council Chair

Hai-Ping Yeh, Disaster Preparedness Committee Chair

Eleanor Troy, Disaster Preparedness Committee

Perry Sheldon, Disaster Preparedness Committee and Director of Facilities and Operations for Red Hook Central School District

The completed assessment and recommendations highlight areas of opportunity for the Town of Red Hook to integrate flood and climate change preparedness into its municipal operations and planning.

Areas of Strength

- The Town has a very active Conservation Advisory Council (CAC). The CAC could prove to be a valuable asset in implementing CSRP recommendations.
- The Town has a collaborative relationship with Bard College. This provides resources and potential for partnership on resiliency related initiatives.
- The Town has active committees and working groups, which could act as vehicles to implement CSRP recommendations (i.e. Disaster Preparedness, Senior Services, Zoning Review, LWRP, Complete Streets, Agriculture and Open Space, Economic Development)

- The Town of Red Hook and Villages of Tivoli and Red Hook have inter-municipal working groups including a task force and shared services group. This provides as a strength in resource sharing.
- The Town has a Community Preservation Fund which can be used to purchase and preserve open space lands in conjunction with resiliency planning (flood mitigation, etc).
- The Saw Kill Watershed Community is an active community organization that could provide assistance in implementing recommendations involving flooding within the Saw Kill Watershed.
- Town of Red Hook is part of the Greenway Compact Program of Dutchess County. This could be a resource and guide for funding implementation of CSRP recommendations.
- The Town has taken the Climate Smart Communities Program Pledge and is pursuing CSC Certification. Becoming Certified would provide the Town with an advantage in available CSC Program funding for implementing CSRP recommendations. For more information on the CSC Program and the actions listed in this document, visit the CSC portal: <https://climatesmart.ny.gov/>.

Areas of Opportunity

- The Town has recently reinvigorated its Disaster Preparedness Committee. The Committee is working to update the Town’s Disaster Preparedness Plan.
- The Saw Kill Watershed and Flood Mitigation Assessment recently completed by Fuss & O’Neill could help achieve recommendations and prioritize flood mitigation projects.
- The Town recently updated its website. This provides an opportunity to add content related to climate smart resiliency planning.
- There is interest in conducting outreach to residents to sign up for weather alert systems through existing mailings (such as tax form mailings).
- The Town is actively pursuing to update their Local Waterfront Revitalization Program¹ (LWRP) plan and Comprehensive Plan. These are opportunities to incorporate CSRP recommendations.
- The Town has many senior residents and is pursuing ways to keep track of vulnerable populations and ensuring that there is a plan of action if power outages occur.
 - The Town has identified that vulnerable populations include a migrant worker population, the majority of whom are Spanish speaking.
- The Town experiences repetitive flooding due to extreme rain events and would like to keep better track of these areas as well as track storm damage due to downed trees.
- Accessibility to aid residents during and after an extreme weather event is a concern and challenge of the Town. CSRP recommendations could provide a solution for this challenge.
- The Town has interest in creating a Resiliency Plan. This summary could inform its content.
- Completion of the CSRP (**CSC PE7 Action: Climate Smart Resiliency Planning (6 pts)**), counts towards Climate Smart Communities Program (CSC) Certification, which the Town is actively pursuing with assistance from CCEDC staff. For more information on the CSC Program and the actions listed in this document, visit the CSC portal: <https://climatesmart.ny.gov/>. CSC Certification is one of the 10 High Impact Actions of the NYSERDA Clean Energy Communities Program (CEC), which the Town is also actively pursuing.

¹ <https://www.dos.ny.gov/opd/programs/lwrp.html>

Recommendations

The following opportunities emerged under each of the sections of the CSRP assessment.

Section 2- Vulnerability and Risk Assessment

- Create a Resiliency Plan and include;
 - Community visioning
 - A full Climate Vulnerability Assessment
 - Content from various other plans, reports, assessments and initiatives such as the Saw Kill Watershed and Flood Mitigation Assessment.
 - Climate change trends and predictions
 - Environmental/social/economic consequences of failure to address natural hazards.
 - Riverine and waterfront flooding concerns and floodplain/stormwater management.
 - Maintain a list of properties that have been flood damaged. The Saw Kill Watershed and Flood Mitigation Assessment could help inform this list. The Community Preservation Plan also lists 1000 properties that have value for water protection, some of which may experience flooding.
 - Strategies to reduce vulnerability through non-structural measures where possible.
 - Identification of areas of significant public investment, water dependent uses, and critical infrastructure that require structural protection because options for relocation, elevation, or employment of non-structural measures are not feasible.
- Complete a full Climate Vulnerability Assessment **CSC PE7 Action: Climate Vulnerability Assessment (4-16 pts.) *CSC Grant Funding Available.** Include;
 - Identification of climate hazards, past events, and details such as magnitude of consequences, operations disruptions, operating costs, number of persons affected.
 - Information from the Hazard Mitigation Plan (municipal annex) Section 9.3.4 Hazard Risk/Vulnerabilities and Ranking.
 - Future estimates of losses that may result from hazards using the Department of State's Asset Inventory Worksheet and Risk Assessment Tool² to identify vulnerabilities.
 - Categorized adaptation strategies prioritized by cost, type, administration, geography, feasibility, timing of implementation, efficacy, and co-benefits. **CSC PE7 Action: Climate Adaptation Strategies (2-8 pts.)**
- Consider creating maps of vulnerabilities in relationship to risks; vulnerable populations, natural resources, cultural resources, landslides, sea-level rise. The Town could work with Dutchess County to complete these maps.
- Ensure staff capacity for using vulnerability assessment (like FEMA's HAZUS-MH) and risk-mapping tools (like flood insurance rate maps). If it is beyond the Town's capacity, look to Dutchess County staff who have the capacity to use these resources.
- Compare the Town build-out analysis to projected sea-level rise scenarios.
- Work with The Nature Conservancy through their Community Resilience Building process³.

² <https://stormrecovery.ny.gov/community-regions/hudson-valley-and-westchester>

³ www.communityresiliencebuilding.com/crbworkshopguide

- Use all available authorities to restrict or prohibit any activities, development or other actions in erosion hazard areas, in order to minimize damage to property, and to prevent the exacerbation of erosion hazards.
- Adopt the projections of sea-level rise from the State Sea Level Rise Task Force report.

Section 3- Public Outreach and Engagement

- Involve the public in more opportunities (public surveys/stakeholder meetings) to identify historic storm effects including storm-surge elevations, flood-prone streets, or property loss.
- Install publicly visible high water mark signs along the Saw Kill. Consider involving local artists.
- Publicize the availability of floodplain information to property owners, businesses, insurance agents, real estate agents, and lenders through trainings on Parcel Access, or other means such as webpages, brochures, or educational trainings.
 - Collaborate with the Saw Kill Watershed Community
 - Provide property owners with guidelines to retrofit existing development for flood risks. Consider providing a “new homeowner” package to share this and related information.
- Conduct public outreach on the natural and beneficial functions of floodplains, wetlands, and green infrastructure and other flood mitigation practices through webpage content, brochures, educational programs, public art, and increased signage.
- Improve public outreach on storm preparedness (including: expected inundation areas, evacuation routes, bus pick-up locations, severe weather shelter locations, pet shelters). Use the Town’s website to conduct outreach to residents and businesses by adding a link to directing residents and businesses to Dutchess County’s webpage on storm-preparedness⁴, brochures and newsletters, community meetings, television, radio or on social media pages. **CSC PE9 Action: Social Media (3 pts.)**
- Add a link to the Town’s website directing residents to Dutchess County’s webpages⁵ on developing personal and family evacuation plans, at-home emergency kits, emergency supplies, evacuation kits (FEMA’s Ready.gov checklist), and ASPCA’s disaster preparedness steps for domesticated animals. Other public outreach on these topics could be conducted through social media pages, brochures, community newsletters, etc. **CSC PE9 Action: Social Media (3 pts.)**
- Employ multilingual and culturally sensitive approaches when providing outreach to residents.
- Consider developing a public outreach plan on climate outreach and engagement comprised of the elements above. **CSC PE9 Action: Climate Change Education and Engagement (4-8 pts.).**

Section 4- Integration of Municipal Plans

- Update Comprehensive Plan with Sustainability Elements. **CSC PE6 Action: Comprehensive Plan with Sustainability Elements (3-21 pts.) *CSC Grant Funding Available.**
 - Reference and integrate plans and initiatives such as the Complete Streets initiative and Saw Kill Watershed Assessment (2018).
 - Involve emergency managers, floodplain manager, and public works officials.
 - Incorporate resilience within the mission, vision, and goals.

⁴ <http://www.co.dutchess.ny.us/QuickLinks/17006.htm>

⁵ <http://www.co.dutchess.ny.us/QuickLinks/17006.htm>

- Address flood hazards in plan; including making recommendations to reduce hazard vulnerability through land-use planning.
 - Identify flood-prone areas and discourage development in those areas as well as require strategies to reduce flood damage to buildings.
 - Include strategies to reduce stormwater runoff from roads, driveways and parking lots (i.e. green infrastructure techniques to help prevent flooding.)
- Emphasize non-structural pre-disaster mitigation measures such as acquiring flood-prone lands and adopting No Adverse Impact floodplain regulations.
- Identify strategies to determine whether to relocate structures that have been repeatedly flooded. Include an equitable approach for community involvement in relocation decisions and potential funding sources.
- Plan for costs associated with inspection and enforcement of building and zoning codes.
- Ensure codes are updated to promote more flood resistant buildings.
- Consider incorporating the Planning for Resilient Connected Natural Areas and Habitats (2014) report into a Natural Resources Inventory.
 - Identify floodplain management as a priority
 - Include guidance to manage open space so that it provides flood protection.
 - Coordinate plan with the New York State Open Space Plan.
 - Include guidance to control invasive plant species, especially near riparian buffers and shorelines of the Saw Kill and Hudson River.
- Consider creating a Stormwater Management Plan.
 - Provide a procedure for coordinating with neighboring jurisdictions to explore a watershed-wide approach to stormwater management.
 - Describe municipal responsibilities for inspection and maintenance of facilities.
 - Include green infrastructure and low impact development strategies and regulations.
 - Tree protection ordinances, impervious cover limits, riparian buffers, vegetated drainage channels, cluster development
 - Implement green infrastructure installation projects at strategic locations to relieve stress on combined sewers during heavy rain events.
- Consider creating a Capital Improvements Plan and include;
 - Flood risk, coastal hazards and sea-level rise projections into risk assessments over the expected service life of proposed infrastructure projects and municipal infrastructure.
 - Integration of existing plans, studies, reports, and technical information.
 - Identifying threats of coastal storms, erosion, sea-level rise, and other climate hazards.
 - Identifying the vulnerability of wildlife and habitat to coastal hazards.

Section 5- Disaster Preparedness and Recovery

- Become a Storm Ready Community⁶
- Create an Emergency Response and Short-term Recovery Plan.
 - Include a hierarchy of authority during emergencies and identify first responders.
 - Include a list of contacts for operators of municipal facilities.

⁶ National Weather Service “Storm Ready” Program <https://www.weather.gov/stormready/>

- Include steps for emergency protective measures (sandbagging, erecting warning devices, search and rescue).
- Include organizational framework to conduct preliminary damage assessments.
- Ensure that best available projections concerning frequency and severity of extreme storm events are incorporated.
- Include guidance on coordination and communication among critical stakeholders such as community organizations, local businesses, local health departments, utilities, and local government leaders.
- Identify a designated emergency operations center and designated storm shelters that are located outside of flood-hazard areas; designed to withstand high winds; and have an elevated back-up power source.
- Create an Evacuation Plan. **CSC PE7 Action: Early Warning Systems and Evacuation Plans (under review⁷)**.
 - Clearly define responsibilities for municipal evacuation
 - Identify a time frame to evacuate residents from storm hazard areas
 - Identify flood prone locations on evacuation routes and identify more than one route.
 - Provide consideration that neighboring jurisdictions could be evacuating concurrently.
 - Identify evacuation options for populations that rely on public transportation.
 - Identify conditions for which a traffic lane reversal would be implemented.
 - Identify local and state evacuation assistance programs for the following special needs; hospitals, nursing homes, prisons, residents without personal transportation, elderly, disabled, schools.
- Maintain and promote a special needs registry for vulnerable populations.
- Encourage agricultural and other landowners to implement pre-disaster mitigation measures
 - Store hay bales and equipment in areas less likely to be flooded
 - Install ponds or swales to capture storm water
 - Plant vegetation and use land management practices to improve capability of the soil on land to retain water.
- Inform residents of the NY-Alert Program.
- Establish a volunteer community emergency response team.
- Establish an adequate heat-warning system and cooling-center program for vulnerable populations. **PE7 Action: Cooling Centers (under review)**. *CSC Grant Funding Available
- Create a Continuity of Operations Plan including guidance on post-disaster waste management.
- Define procedures to conduct habitability and substantial damage assessments
- Store FEMA elevation certificates outside of flood-hazard areas.
- Consider developing a Long-Term Recovery Plan. This plan could:
 - Identify redevelopment opportunities outside of flood-hazard areas.
 - Employ advisory flood maps to define post-disaster redevelopment building elevations.
 - Identify opportunities to retrofit or relocate existing structures in hazard-prone areas.
 - Utilize risk and vulnerability mapping to determine the location of future development.
 - Identify clear lines of coordination to transition from short-term to long-term recovery.

⁷ Definition of "Under Review": These actions are currently being revised by the Climate Smart Communities interagency team and will be uploaded to the portal within the next few weeks.

- Include organizational framework for coordination and use of state, federal and NGO resources to provide maximum benefit to the disaster area.
- Include provisions to reduce greenhouse gas emissions from reconstructed areas through energy efficiency, use of renewable energy and smart growth principles.
- Establish a temporary post-disaster building moratorium, if possessing the authority to do so.

Section 6- Hazard Mitigation Implementation

- Update the Town’s local Climate Action Plan (2012). **CSC PE2 Action: Government Operations Climate Action Plan (12-16 pts.) or Community Climate Action Plan (16pts.)**.
- Continue to have community officials complete post-flood stream intervention training. For more information, including upcoming scheduled trainings, visit the DEC’s webpage⁸.
- Continue to support land-acquisition programs to purchase land-conservation easements in hazard-prone areas. **CSC PE7 Action: Restoration of Floodplains and Riparian Buffers (2 pts.)**.
- Continue to engage in sustainable wetland or shoreline restoration, including non-structural and ecologically enhanced methods such as controlling invasive plant species along the Saw Kill. **CSC PE7 Action: Restoration of Floodplains and Riparian Buffers (1-10 pts.) or PE7 Action: Nature-based Shoreline Protection (under review)**.

Additional Recommendations

- Ensure all plans have a recommended update frequency, even if it is just a goal for when the plan should be updated or reviewed and not an official, mandated update frequency

Potential Funding Sources

- NYSDEC Climate Smart Communities Grant Program: <https://www.dec.ny.gov/energy/109181.html>
- NYSDEC Grant Applications: <https://www.dec.ny.gov/pubs/grants.html>
- NYSDEC Hudson River Estuary Program Grants: <https://www.dec.ny.gov/lands/5091.html>
- FEMA Hazard Mitigation Grant Program: <https://www.fema.gov/hazard-mitigation-grant-program>
- FEMA Pre-disaster Mitigation Grant Program: <https://www.fema.gov/pre-disaster-mitigation-grant-program>
- FEMA Flood Mitigation Assistance Grant Program: <https://www.fema.gov/flood-mitigation-assistance-grant-program>
- HUD Community Development Block Grants: https://www.hud.gov/program_offices/comm_planning/communitydevelopment/programs
- NYS Department of State Grants (including Local Waterfront Revitalization Program): <https://www.dos.ny.gov/funding/>
- NYS Greenway Compact Program Grants: <https://hudsongreenway.ny.gov/grants-funding>
- NYSDEC Environmental Protection Fund Grants: <http://www.dec.ny.gov/pubs/grants.html>

⁸ <https://www.dec.ny.gov/lands/86450.html>

**APPENDIX 3: Climate Smart Community Resilience Tool
Recommendations: Village of Red Hook**



Village of Red Hook Climate Smart Resiliency Planning

Prepared by Michelle Gluck, Cornell Cooperative Extension Dutchess County

The Climate Smart Resiliency Planning Tool (CSRP) is a checklist to identify gaps in a community's planning process.

The Climate Smart Resiliency Planning Tool was used to evaluate opportunities for the Village of Red Hook to improve resilience to flooding and climate change. The Planning Tool reviews many long- and short- term aspects of storm and climate change preparedness by reviewing Village, Town, and County planning documents, municipal codes, activities and management. Documents were reviewed, and municipal staff members were consulted in the process of completing the assessment. The assessment and recommendations have been shared through meeting discussions with the Mayor and municipal staff and presented at the January 17th, 2019 Village Board Workshop meeting.

Municipal staff engaged in the Village of Red Hook Climate Smart Planning assessment:

Ed Blundell, Mayor of the Village of Red Hook

Victoria Polidoro, Esq., Village of Red Hook Planning Board Attorney

Brent Kovalchik, Deputy Mayor, Village of Red Hook

Lara Hart, Building Department Secretary, Village of Red Hook

The completed assessment and recommendations highlight areas of opportunity for the Village of Red Hook to integrate flood and climate change preparedness into its municipal operations and planning.

Areas of Strength

- The Village is in close proximity to Bard College and is part of its' initiatives such as the SawKill Watershed Community. This provides resources for partnership on resiliency related initiatives.
- The Town of Red Hook CAC could prove to be a valuable asset in implementing CSRP recommendations for the Town, which the Village may also benefit from.
- The Village has an active Village Green Committee, which attends trainings and helps with implementing the Community Forestry Management Plan. This committee could assist with implementation of CSRP recommendations.
- The Village partners with the Fire and Police Dept. and Senior Services to keep track of vulnerable populations and ensuring that there is a plan of action if power outages occur.
- The Village and Town are collaborating on a Community Solar Project over the Village Water Wells. There are green infrastructure related initiatives as part of this project.

- The Village of Red Hook, Village of Tivoli and Town of Red Hook have inter-municipal working groups including a task force and shared services group. This provides as a strength in resource sharing and communications related to resiliency planning.
- The Town has a Community Preservation Fund which can be used to purchase and preserve open space lands in conjunction with resiliency planning (flood mitigation, etc).
- The Village participates in an intermunicipal Disaster and LWRP committee with Town.
- The Village is part of a “Centers and Green Spaces” plan which identifies priority growth areas and open space preservation areas in the Town of Red Hook.
- The Village of Red Hook is part of the Greenway Compact Program of Dutchess County. This could be a resource and guide for funding implementation of CSRP recommendations.
- The Village is a Tree City, USA 15th year participant and prioritizes street tree maintenance.
- The Village recently completed a NYS Drinking Water project to update pipes and included green infrastructure elements for managing stormwater into the S.W. quadrant as a component.

Areas of Opportunity

- The Village could consider taking the Climate Smart Communities Program Pledge and pursue CSC Certification. Becoming Certified would provide the Village with an advantage in available CSC Program funding for implementing CSRP recommendations. For more information on the CSC Program and actions, visit the CSC portal: <https://climatesmart.ny.gov/>.
- The Village can leverage completion of this CSRP for points towards Climate Smart Communities Program (CSC) certification. **CSC PE7 Action: Climate Smart Resiliency Planning (6 pts)**. For more information on the CSC Program and the actions listed in this document, visit the CSC portal: <https://climatesmart.ny.gov/>. CSC Certification is one of the 10 High Impact Actions of the NYSERDA Clean Energy Communities Program (CEC), which the Village is actively pursuing.
- The Village is seeking ways to encourage residents and nearby college students to utilize the public bus service more often and is interested in innovative ways to advertise the bus service. Public transportation is very important service for disaster situations when residents are stranded, especially for those who do not drive, or who rely on walking or bicycling.
- The Village experiences repetitive flooding due to extreme rain events and would like to keep better track of these areas to mitigate the flooding on Rt. 9. and in a private pond in a residential area by the corner of Market St. and Rt. 9.
- Accessibility to aid residents during and after an extreme weather event is a concern and challenge. CSRP recommendations could provide a solution for this challenge.
- The Village finds staffing capacity a challenge in areas of building/zoning/planning and would benefit from a shared services agreement with the Town of Red Hook and Village of Tivoli to have a Planner and/or Building Inspector shared between the three municipalities. This way there would be less fragmentation between the municipalities and greater depth of knowledge.
- The catch basins along Rt. 9 could use upgrading, and are of concern, with increased rain events. This would involve collaboration between the NYS DOT, the Village and private landowners.
- The Village is involved in a multi stage sewer infrastructure project.
- The Village has interest in a green infrastructure project to be placed on the Village parking lot to manage stormwater and act as a demonstration project, as it is in a high traffic area.

Recommendations

The following opportunities emerged under each of the sections of the CSR assessment.

Section 2- Vulnerability and Risk Assessment

- Create a Resiliency Plan and include;
 - Community visioning
 - A full Climate Vulnerability Assessment
 - Content from various other plans, reports, assessments and initiatives such as the Saw Kill Watershed and Flood Mitigation Assessment.
 - Climate change trends and predictions
 - Environmental/social/economic consequences of failure to address natural hazards.
 - Riverine and waterfront flooding concerns and floodplain/stormwater management.
 - Maintain a list of properties that have been flood damaged. The Saw Kill Watershed and Flood Mitigation Assessment could help inform this list. The Community Preservation Plan also lists 1000 properties that have value for water protection, some of which may experience flooding.
 - Strategies to reduce vulnerability through non-structural measures where possible.
 - Identification of areas of significant public investment, water dependent uses, and critical infrastructure that require structural protection because options for relocation, elevation, or employment of non-structural measures are not feasible.
- Complete a full Climate Vulnerability Assessment **CSC PE7 Action: Climate Vulnerability Assessment (4-16 pts.) *CSC Grant Funding Available.** Include;
 - Identification of climate hazards, past events, and details such as magnitude of consequences, operations disruptions, operating costs, number of persons affected.
 - Information from the Hazard Mitigation Plan (municipal annex) Section 9.3.4 Hazard Risk/Vulnerabilities and Ranking.
 - Future estimates of losses that may result from hazards using the Department of State's Asset Inventory Worksheet and Risk Assessment Tool¹ to identify vulnerabilities.
 - Categorized adaptation strategies prioritized by cost, type, administration, geography, feasibility, timing of implementation, efficacy, and co-benefits. **CSC PE7 Action: Climate Adaptation Strategies (2-8 pts.)**
- Consider creating maps of vulnerabilities in relationship to risks; vulnerable populations, natural resources, cultural resources, landslides, sea-level rise. The Village could work with Dutchess County to complete these maps.
- Ensure staff capacity for using vulnerability assessment (like FEMA's HAZUS-MH) and risk-mapping tools (like flood insurance rate maps). If it is beyond the Town's capacity, look to Dutchess County staff who have the capacity to use these resources.
- Work with The Nature Conservancy through their Community Resilience Building process².

¹ <https://stormrecovery.ny.gov/community-regions/hudson-valley-and-westchester>

² www.communityresiliencebuilding.com/crbworkshopguide

Section 3- Public Outreach and Engagement

- Involve the public in more opportunities (public surveys/stakeholder meetings) to identify historic storm effects including storm-surge elevations, flood-prone streets, or property loss.
- Conduct public outreach on the natural and beneficial functions of floodplains, wetlands, and green infrastructure and other flood mitigation practices through webpage content, brochures, educational programs, public art, and increased signage.
- Improve public outreach on storm preparedness (including: expected inundation areas, evacuation routes, bus pick-up locations, severe weather shelter locations, pet shelters). Use the Village website to conduct outreach to residents and businesses by adding a link directing residents and businesses to Dutchess County’s webpage on storm-preparedness³, brochures and newsletters, community meetings, television, radio or social media pages. **CSC PE9 Action: Social Media (3 pts.)**
- Add a link to the Village website directing residents to Dutchess County’s webpages⁴ on developing personal and family evacuation plans, at-home emergency kits, emergency supplies, evacuation kits (FEMA’s Ready.gov checklist), and ASPCA’s disaster preparedness steps for domesticated animals. **CSC PE9 Action: Social Media (3 pts.)**
- Employ multilingual and culturally sensitive approaches when providing outreach to residents.
- Consider developing a public outreach plan on climate outreach and engagement comprised of the elements above. **CSC PE9 Action: Climate Change Education and Engagement (4-8 pts.).**

Section 4- Integration of Municipal Plans

- Update Comprehensive Plan with Sustainability Elements. **CSC PE6 Action: Comprehensive Plan with Sustainability Elements (3-21 pts.) *CSC Grant Funding Available.**
 - Reference and integrate plans and initiatives such as the Complete Streets initiative and Saw Kill Watershed Assessment (2018).
 - Involve emergency managers, floodplain manager, and public works officials in the process and other community stakeholders. Clearly explain participation techniques.
 - Incorporate resilience within the mission, vision, and goals.
 - Address flood hazards in plan; including making recommendations to reduce hazard vulnerability through land-use planning.
 - Identify flood-prone areas and discourage development in those areas as well as require strategies to reduce flood damage to buildings.
 - Include strategies to reduce stormwater runoff from roads, driveways and parking lots (i.e. green infrastructure techniques to help prevent flooding.)
 - Emphasize non-structural pre-disaster mitigation measures such as acquiring flood-prone lands and adopting No Adverse Impact floodplain regulations.
 - Identify strategies to determine whether to relocate structures that have been repeatedly flooded. Include an equitable approach for community involvement in relocation decisions and potential funding sources.
 - Identify safer growth areas in the Town. Include recommendations and policy updates to encourage development in such areas.

³ <http://www.co.dutchess.ny.us/QuickLinks/17006.htm>

⁴ <http://www.co.dutchess.ny.us/QuickLinks/17006.htm>

- Plan for costs associated with inspection and enforcement of building and zoning codes.
- Ensure codes are updated to promote more flood resistant buildings.
- Consider creating a Stormwater Management Plan.
 - Provide a procedure for coordinating with neighboring jurisdictions to explore a watershed-wide approach to stormwater management.
 - Include elements to protect the Village’s drinking water source (aquifer).
 - Describe municipal responsibilities for inspection and maintenance of facilities.
 - Include green infrastructure and low impact development strategies and regulations.
 - Tree protection ordinances, impervious cover limits, riparian buffers, vegetated drainage channels, cluster development
 - Implement green infrastructure installation projects at strategic locations to relieve stress on combined sewers during heavy rain events.
- Consider creating a Capital Improvements Plan and include;
 - Integration of existing plans, studies, reports, and technical information.
 - Identifying threats of coastal storms, erosion, sea-level rise, and other climate hazards.

Section 5- Disaster Preparedness and Recovery

- Become a Storm Ready Community⁵
- Create an Emergency Response and Short-term Recovery Plan in collaboration with the Town of Red Hook
 - Include a hierarchy of authority during emergencies and identify first responders.
 - Include a list of contacts for operators of municipal facilities.
 - Include steps for emergency protective measures (sandbagging, erecting warning devices, search and rescue).
 - Include organizational framework to conduct preliminary damage assessments.
 - Ensure that best available projections concerning frequency and severity of extreme storm events are incorporated.
 - Include guidance on coordination and communication among critical stakeholders such as local organizations, businesses, health departments, utilities, and municipal leaders.
 - Identify a designated emergency operations center and designated storm shelters that are located outside of flood-hazard areas; designed to withstand high winds; and have an elevated back-up power source.
- Collaborate with the Town on creating an Evacuation Plan. **CSC PE7 Action: Early Warning Systems and Evacuation Plans (under review⁶).**
 - Clearly define responsibilities for municipal evacuation
 - Identify a time frame to evacuate residents from storm hazard areas
 - Identify flood prone locations on evacuation routes and identify more than one route.
 - Provide consideration that neighboring jurisdictions could be evacuating concurrently.
 - Identify evacuation options for populations that rely on public transportation.
 - Identify conditions for which a traffic lane reversal would be implemented.

⁵ National Weather Service “Storm Ready” Program <https://www.weather.gov/stormready/>

⁶ Definition of "Under Review": These actions are currently being revised by the Climate Smart Communities interagency team and will be uploaded to the portal within the next few weeks.

- Identify local and state evacuation assistance programs for the following special needs; hospitals, nursing homes, prisons, residents without personal transportation, elderly, disabled, schools.
- Maintain and promote a special needs registry for vulnerable populations.
- Encourage agricultural and other landowners to implement pre-disaster mitigation measures
 - Install ponds or swales to capture storm water
 - Plant vegetation and use land management practices to improve capability of the soil on land to retain water.
- Inform residents of the NY-Alert Program.
- Establish a volunteer community emergency response team.
- Establish an adequate heat-warning system and cooling-center program for vulnerable populations. **PE7 Action: Cooling Centers (under review).** *CSC Grant Funding Available
- Create a Continuity of Operations Plan including guidance on post-disaster waste management.
- Define procedures to conduct habitability and substantial damage assessments
- Store FEMA elevation certificates outside of flood-hazard areas.
- Consider developing a Long-Term Recovery Plan. This plan could:
 - Employ advisory flood maps to define post-disaster redevelopment building elevations.
 - Identify opportunities to retrofit or relocate existing structures in hazard-prone areas.
 - Utilize risk and vulnerability mapping to determine the location of future development.
 - Identify clear lines of coordination to transition from short-term to long-term recovery.
 - Include organizational framework for coordination and use of state, federal and NGO resources to provide maximum benefit to the disaster area.
 - Include provisions to reduce greenhouse gas emissions from reconstructed areas through energy efficiency, use of renewable energy and smart growth principles.
- Establish a temporary post-disaster building moratorium, if possessing the authority to do so.

Section 6- Hazard Mitigation Implementation

- Pursue Climate Smart Community Program Certification.
- Collaborate with the Town to update the Climate Action Plan (2012). **CSC PE2 Action: Government Operations Climate Action Plan (12-16 pts.) or Community Climate Action Plan (16pts.).**
- Have community officials complete post-flood stream intervention training. For more information, including upcoming scheduled trainings, visit the DEC's webpage⁷.
- Continue to support land-acquisition programs to purchase land-conservation easements in hazard-prone areas. **CSC PE7 Action: Restoration of Floodplains and Riparian Buffers (2 pts.).**
- Engage in sustainable ecological restoration, including methods such as controlling invasive plant species along the Saw Kill. **CSC PE7 Action: Restoration of Floodplains and Riparian Buffers (1-10 pts.) or PE7 Action: Nature-based Shoreline Protection (under review).**

⁷ <https://www.dec.ny.gov/lands/86450.html>

Additional Recommendations

- Ensure all plans have a recommended update frequency, even if it is just a goal for when the plan should be updated or reviewed and not an official, mandated update frequency

Potential Funding Sources

- NYSDEC Climate Smart Communities Grant Program:
<https://www.dec.ny.gov/energy/109181.html>
- NYSDEC Grant Applications: <https://www.dec.ny.gov/pubs/grants.html>
- NYSDEC Hudson River Estuary Program Grants: <https://www.dec.ny.gov/lands/5091.html>
- FEMA Hazard Mitigation Grant Program: <https://www.fema.gov/hazard-mitigation-grant-program>
- FEMA Pre-disaster Mitigation Grant Program: <https://www.fema.gov/pre-disaster-mitigation-grant-program>
- FEMA Flood Mitigation Assistance Grant Program: <https://www.fema.gov/flood-mitigation-assistance-grant-program>
- HUD Community Development Block Grants:
https://www.hud.gov/program_offices/comm_planning/communitydevelopment/programs
- NYS Department of State Grants (including Local Waterfront Revitalization Program):
<https://www.dos.ny.gov/funding/>
- NYS Greenway Compact Program Grants:
<https://hudsongreenway.ny.gov/grants-funding>
- NYSDEC Environmental Protection Fund Grants:
<http://www.dec.ny.gov/pubs/grants.html>

APPENDIX 4: State and Federal Resources



FINANCING WATERFRONT RESILIENCE



Hudson River Estuary Program

2019 New York State and federal resources for communities

New York State and federal agencies offer over \$150 million in assistance to municipalities and non-profit organizations to build waterfront resilience and adapt to flooding, sea-level rise and other climate risks.

This document provides an overview of these assistance programs, how to apply and local examples, *with a focus on the Hudson Valley region*. Eligible activities include municipal planning, resilient infrastructure and structures, emergency management, economic revitalization, public outreach, and natural solutions like sustainable shorelines, green infrastructure and floodplain protection. A summary table of all resources, organized by agency, areas of assistance, funding amounts and deadlines, can be found at the end of this document. [Sign up for our Climate Resilience newsletter](#) to receive the latest funding announcements. Programs covered in this document are:

- **NYS Department of Environmental Conservation (DEC):** Hudson River Estuary Stewardship Planning Grants, Climate Smart Communities Grants, Water Quality Improvements Program, Non-Agricultural Nonpoint Source Planning Grant and Trees for Tribes
- **Department of State (DOS):** Local Waterfront Revitalization Program and Brownfield Opportunity Area
- **Environmental Facilities Corporation (EFC):** Green Innovation Grant Program, Wastewater Infrastructure Engineering Planning, Clean Water and Drinking Water Revolving State Funds
- **Federal Emergency Management Agency (FEMA):** Hazard Mitigation Assistance, Public Assistance and Community Rating System
- **Additional assistance programs**
 - **New York State Energy Research and Development Authority (NYSERDA):** Clean Energy Communities Program
 - **NYS Office of Parks, Recreation and Historic Preservation (OPRHP):** Parks, Preservation and Heritage Grants and Recreational Trails Grants
 - **US Housing and Urban Development (HUD)** Community Block Grant Program
 - **Empire State Development (ESD)** Grant Program
 - **Hudson River Greenway** Communities Grant Program
 - **Open Space Funding Options**



View of flooded road in Stony Point following Hurricane Sandy in 2012 (L. Konopko)

LOCAL EXAMPLE: CONSOLIDATED FUNDING APPLICATION



Kingston received a \$1.2 million grant for a public-private intermunicipal partnership to design and build a one mile promenade along the Hudson River. The promenade will feature green infrastructure and offer public access and recreation and keep open space along the waterfront. The funds were awarded from the Department of State's Local Waterfront Revitalization Program through a CFA application.

[NYS Consolidated Funding Application](#)

New York State's Consolidated Funding Application (CFA) allows communities to design comprehensive projects and with one application, apply to multiple state funding sources. Communities may not apply to federal programs such as FEMA through the CFA. You can download [the 2019 CFA Available Resources \(PDF\)](#) online.

Overview of Financial Assistance Programs

Below is a summary of financial assistance programs identified by their funding categories related to flood resilience.



Municipal planning



Public outreach



Resilient infrastructure



Economic revitalization



Emergency management



Natural solutions (e.g., sustainable shorelines, green infrastructure + floodplain protection)

CFA = grants included in the NYS Consolidated Funding Application

New York State Department of Environmental Conservation (NYS DEC)

The NYS DEC is a state agency focused on the conservation, enhancement, and enjoyment of environmental resources.



Hudson River Estuary Program Local Stewardship Planning Grant

The Estuary Program provides funding (\$350,000) to help communities and local organizations advance four categories of local projects and programs through planning, feasibility studies, and/or design. Award amounts range from \$10,500 to \$50,000 with 15% match required. All prospective applicants must register in advance in the [New York State Grants Gateway](#) where they can also search and download the full RFA by searching for 'Hudson River Estuary.' Funding for the grants is provided by the New York State Environmental Protection Fund (EPF). Eligible planning categories:

- Adapt land uses and decision-making to factor in climate change, flooding, heat, drought, and sea-level rise projections in Hudson River shoreline communities
- Improve water infrastructure to make it more resilient to flooding and/or sea-level rise
- Create a natural resources inventory, open space inventory/index, open space plan, open space funding feasibility study, conservation overlay zone, or connectivity plan
- Develop a watershed and/or source water management plan

Contact: HREPGGrants@dec.ny.gov

Deadline: 3:00 pm, July 10, 2019

LOCAL EXAMPLE: LOCAL STEWARDSHIP PLANNING GRANT



The Village of Catskill received \$68,000 in Local Stewardship grants in 2016 to analyze their wastewater treatment plant and zoning codes to look for opportunities to address flooding and sea-level rise.

Climate Smart Communities (CSC) Grants

The [Climate Smart Community](#) (CSC) program offers grants (\$11.7M) to support municipal projects that implement certain CSC actions and help them become certified in the program. 50% match required.

Adaptation implementation projects fund \$10,000 and \$2 million and include, but are not limited to the following:

- Increasing or preserving natural resilience, such as construction of living shorelines and other nature-based landscape features to decrease vulnerability to the effects of climate change and to improve or facilitate conservation, management, and/or restoration of natural floodplain areas and/or wetland systems.
- Flood-risk reduction, including, but not limited to, strategic relocation or retrofit of climate-vulnerable critical municipal facilities or infrastructure to reduce future climate-change induced risks to those facilities.
- Replacing or right-sizing flow barriers, including, but not limited to, right-sizing bridges or culverts, or improving flow barriers to facilitate emergency response or protection of population centers, critical facilities, infrastructure, and/or natural resources, based on assessment of projected future conditions.
- Extreme-heat preparation, including, but not limited to, establishment of cooling centers, construction of permanent shade structures, and implementation of other cooling features or programs.
- Emergency preparedness, including, but not limited to, establishment of emergency warning systems or implementation of emergency preparedness and/or response programs (excluding radio communications).

Certification projects fund \$10,000 to \$100,000 to complete the following and additional actions:

- PE2 Action: Government Operations Climate Action Plan
- PE2 Action: Community Climate Action Plan
- PE6 Action: Comprehensive Plan with Sustainability Elements
- PE6 Action: Complete Streets Policy
- PE6 Action: Planning and Infrastructure for Bicycling and Walking (planning only)
- PE6 Action: Natural Resources Inventory
- PE7 Action: Climate Vulnerability Assessment
- PE7 Action: Climate-Smart Resiliency Planning
- PE7 Action: Climate Adaptation Strategies
- PE7 Action: Heat Emergency Plan

Contact: Climatechange@dec.ny.gov, 518-402-8448

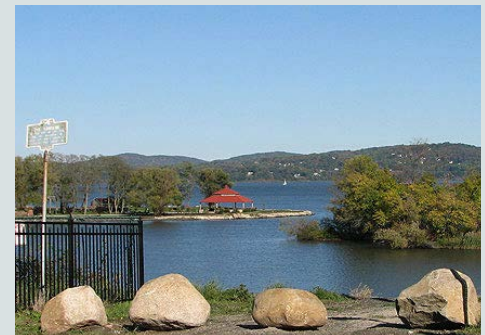
Deadline: 4:00 pm, July 26, 2019, CFA

Water Quality Improvement Project (WQIP)

The WQIP program (\$70M) is a competitive, reimbursement grant program that directs funds from the New York State Environmental Protection Fund to projects that reduce polluted runoff, improve water quality and restore habitat in New York's waterbodies. Eligible activities include:

- **Wastewater Treatment Improvement**, \$1-10M max award depending on project type, 25% match for high priority projects, or 60% for secondary priority projects, contact Robert Wither, (518) 402-8123, Robert.Wither@dec.ny.gov

LOCAL EXAMPLE: CLIMATE SMART COMMUNITIES GRANT



The Village of Haverstraw received a \$100,000 Climate Smart Communities grant in 2018 to update and incorporate climate resilience into their Comprehensive Plan.

- Wastewater Effluent Disinfection, \$1M max award, 25% match
- Projects to upgrade municipal systems to meet discharge requirements for Combined Sewer Overflow (CSO) or Sanitary Sewer Overflow (SSO), \$5-10M max award, 25% match
- Watershed Plan Implementation, \$5-10M max award, 25% match
- Municipal Systems to Serve Multiple Properties with Inadequate On-site Septic Systems, \$5-10M max award, 25% match
- Other Wastewater Treatment Improvements, \$5-10M max award, 60% match
- **Non-Agricultural Nonpoint Source Abatement and Control**, \$500,000-\$3M max award depending on project type, 25% match, see contacts by project type:
 - Decentralized Wastewater Treatment Facilities for Failing On-Site Treatment Systems, \$3M max award, 25% match, contact Ken Kosinski, (518) 402-8086, Ken.Kosinski@dec.ny.gov
 - Green Infrastructure Practice and Stormwater Retrofits, \$1M max award, 25% match, contact Ryan Waldron, (518) 402-8244, Ryan.Waldron@dec.ny.gov
 - Streambank Stabilization and Riparian Buffers, \$1M max award, 25% match, contact Lauren Townley, (518)402-8283, Lauren.Townley@dec.ny.gov
 - Beach Restoration, \$1M max award, 25% match, contact Karen Stainbrook, (518) 402-8095
 - Culvert Repair and Replacement, \$1M max award, 25% match, contact Lauren Townley, (518) 402-8283, Lauren.Townley@dec.ny.gov
- **Aquatic Connectivity Restoration**, \$250,000 max award, 25% match, contact Corbin Gosier, 518-402-8872, Corbin.Gosier@dec.ny.gov
- **Land Acquisition for Source Water Protection**, \$4M max award, 25% match, contact Kristin Martinez, (518) 402-8086, Kristin.Martinez@dec.ny.gov
- **Municipal Separate Storm Sewer Systems (MS4s)**, \$500,000-600,000 max award depending on project type, 25% match, contact Ethan Sullivan, (518) 402-1382, Ethan.Sullivan@dec.ny.gov
 - Mapping of stormwater systems, \$500,000 max award, 25% match
 - Vacuum truck purchase, \$600,000 max award, 25% match

Contact: User.Water@dec.ny.gov

Deadline: 4:00 pm, July 26, 2019, CFA

[Non-Agricultural Nonpoint Source Planning Grant Program](#)

The DEC will fund planning (\$1M) for decentralized wastewater treatment facilities, green infrastructure practice/stormwater retrofits, streambank stabilization, beach restoration and culvert repair and replacement. \$30,000 award maximum, 10% match.

Contact: Lauren Townley, 518-402-8283, Lauren.Townley@dec.ny.gov

Deadline: 4:00 pm, July 26, 2019, CFA

[Trees for Tribes](#)

Do you own or manage land along a stream? You can apply for free native plants to help reduce erosion and improve habitat along your stream! The [Hudson Estuary Trees for Tribes](#) Program offers free native trees and shrubs for planting along the tributary streams in the [Hudson River Estuary watershed](#). Our staff can help you with a planting plan and work with your volunteers.

Contact: Beth Roessler, NYS DEC, 845-256-2253, HudsonEstuaryTFT@dec.ny.gov

Deadline: Apply by March 1, 2019 for Spring plantings, August 1, 2019 for Fall plantings



Department of State (DOS)

The DOS is a planning agency that focuses on economic revitalization and resilient, livable communities.



Local Waterfront Revitalization Program (LWRP)

The [Local Waterfront Revitalization Program](#) (LWRP) provides technical assistance and grants (\$15M) on a reimbursement basis to villages, towns, cities, and counties located along New York's coasts or designated inland waterways, to prepare or implement strategies for community and waterfront revitalization. Funds require a 25% match (15% for environmental justice communities) and the grant categories currently are:

- Preparing or updating a Local Waterfront Revitalization Program (LWRP)
- Preparing an LWRP Component, including a Watershed Management Plan
- Updating an LWRP to Mitigate Future Physical Climate Risks
- Implementing a Local Waterfront Revitalization Program or a completed LWRP Component

Contact: NYS DOS, Office of Planning, Development & Community Infrastructure, opd@dos.ny.gov

Deadline: 4:00 pm, July 26, 2019, CFA

LOCAL EXAMPLE: LOCAL WATERFRONT REVITALIZATION PROGRAM



The Village of Piermont received a \$35,000 grant in 2015 to update its Local Waterfront Revitalization Plan, first written in 1992, to include strategies from the Task Force's final Resilience Roadmap Report.

Brownfield Opportunity Area (BOA)

The [Brownfield Opportunity Area](#) (BOA) program takes a neighborhood-wide approach to contaminated lands and provides grants (\$2M) that support communities to comprehensively assess existing economic and environmental conditions associated with brownfield blight and impacted areas, identify and prioritize community supported redevelopment opportunities, and attract public and private investment. Project awards up to \$300,000 with 10% required match, and option to request up to 25% of funds upfront. Eligible activities are:

- BOA nomination: a study that includes a community vision, goals and strategies for revitalization of an area affected by a concentration of known or suspected brownfields
- Pre-development activities in a State-designated BOA:
 - Development and implementation of marketing strategies;
 - Development of plans and specifications;
 - Real estate services;
 - Building conditions studies;
 - Infrastructure analyses;
 - Zoning and regulatory updates;
 - Environmental, housing and economic studies, analyses and reports; and
 - Public outreach.

Contact: NYS DOS, Office of Planning, Development & Community Infrastructure, opd@dos.ny.gov

Deadline: 4:00 pm, July 26, 2019, CFA

Environmental Facility Corporation (EFC)

The EFC is a state agency that assists public and private entities to comply with federal and state environmental quality standards through technical assistance, low cost financing, and green innovation grants.



Green Innovation Grant Program (GIGP)

The Green Innovation Grant Program (GIGP, \$15M) funds projects across New York State that utilize unique stormwater infrastructure design and create cutting-edge green technologies. 10% to 60% match required. GIGP funds highly-visible projects that are directly attributable to the improvement or protection of water quality and integral to the success of the following specific green infrastructure practices:

- Bioretention
- Downspout disconnection
- Establishment or Restoration of Floodplains, Riparian buffers, Streams or Wetlands
- Green roofs and green walls
- Permeable pavements
- Stormwater Harvesting and Reuse, e.g. Rain Barrel and Cistern Projects
- Stormwater Street Trees / Urban Forestry Programs Designed to Manage Stormwater

Contact: Brian Hahn, 518-402-6924, GIGP@efc.ny.gov

Deadline: 4:00 pm, July 26, 2019, CFA

Wastewater Infrastructure Engineering Planning Grant (WIEP)

The EFC, in cooperation with NYS DEC, offers WIEPG grants (\$3 million) for engineering and consulting services to produce engineering reports to construct or improve municipal wastewater systems. Funding level is based on population size and the municipality must provide a 20% match. The final engineering report can be implemented using EFC or other financing sources.

- \$30,000 max award for communities with a population of 50,000 or less
- \$50,000 max award for communities with a population of 50,000 or more
- \$100,000 max award for inflow and infiltration projects based on an Order on Consent or SPDES Permit Compliance Schedule

Contact: Susan Van Patten, NYS DEC, 518-402-8267, CFAWater@qw.dec.state.ny.us

Deadline: 4:00 pm, July 26, 2019, CFA

Clean Water (CWSRF) and Drinking Water State Revolving Funds (DWSRF)

The EFC provides various forms of project finance for water-quality protection projects through the [Clean Water State Revolving Fund \(CWSRF\)](#) and the [Drinking Water State Revolving Fund \(DWSRF\)](#). A variety of publicly-owned water quality improvement projects are eligible for financing, including point source projects such as wastewater treatment facilities, and nonpoint source projects such as stormwater management projects and landfill closures, as well as certain habitat restoration and protection projects in national estuary program areas. Short and long-term loans are available at no interest and low interest rates. Clean Water applicants may apply for [Integrated Solutions Construction grant](#) (\$8M) to support green infrastructure by funding 50% of construction costs.

LOCAL EXAMPLE: WASTEWATER INFRASTRUCTURE ENGINEERING PLANNING



The City of Kingston received a \$25,000 grant to examine long-term adaptive planning for their wastewater treatment plant. They will implement the plan using low interest loans from the CWSRF.

Contact for Clean Water: Dwight Brown, EFC, 518-402-7396, CWSRInfo@efc.ny.gov

Contact for Drinking Water: Michael Montysko, DOH, 518-402-7650, bpwsp@health.ny.gov

Contact for Integrated Solutions Construction grant: Dwight Brown, EFC, 518-402-7396, ISC@efc.ny.gov

Deadline: Open enrollment

Federal Emergency Management Agency (FEMA)

FEMA is a national agency that administers programs providing flood insurance, hazard mitigation assistance, and public assistance grants.



Hazard Mitigation Assistance

FEMA currently provide three types of hazard mitigation assistance (HMA):

- [Hazard Mitigation Grant Program \(HMGP\)](#) assists in implementing long-term hazard mitigation measures. HMGP funds are triggered by a declared disaster and funneled to individual municipalities through the NYS Division of Homeland Security and Emergency Services (DHSES).
- [Pre-Disaster Mitigation \(PDM\)](#) provides funds on an annual basis for hazard mitigation planning and projects.
- [Flood Mitigation Assistance \(FMA\)](#) provides funds on an annual basis for projects to reduce or eliminate risk of flood damage to buildings that are insured under the National Flood Insurance Program (NFIP).

Public Assistance Grant Program

Through the Public Assistance (PA) Program, FEMA provides supplemental Federal disaster grant assistance for debris removal, emergency protective measures, and the repair, replacement, or restoration of disaster-damaged, publicly-owned facilities, and the facilities of certain private Non-Profit (PNP) organizations. The PA Program also encourages protection of these damaged facilities from future events by providing assistance for hazard mitigation measures during the recovery process. 25% match required.

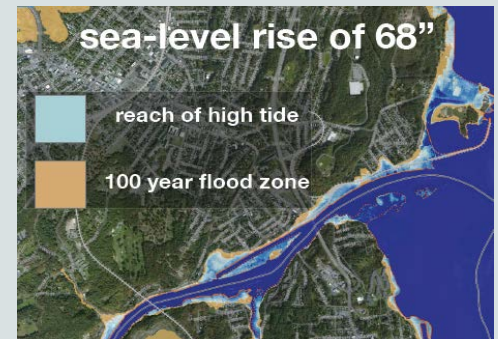
Contact: FEMA grants are administered by NYS Division of Homeland Security and Emergency Services (DHSES). Visit their website for current grant opportunities: <http://www.dhSES.ny.gov/grants/>

Community Rating System (CRS)

FEMA also administers the National Flood Insurance Program (NFIP) and the related Community Rating System (CRS), which allows municipalities to reduce flood insurance rates for all policyholders by instating community-scale projects and policies regarding flood resilience.

Contact: 317-848-2898, nfipcrs@iso.com

LOCAL EXAMPLE: HAZARD MITIGATION GRANT



Kingston applied for a \$5 million grant from Hurricanes Irene and Sandy Relief Funds to implement Task Force recommendations for riparian buffers, buyouts, the adaptation and fortification of infrastructure, and the purchase emergency generators for pumping stations. The City is awaiting notification of the application's status.

LOCAL EXAMPLE: COMMUNITY RATING SYSTEM



The Village of Scarsdale is Class 8 certified in the Community Rating System (CRS), which means the village residents receive a 10% discount on flood insurance. The Village of Hyde Park is currently seeking CRS certification.

New York State Energy Research and Development Authority (NYSERDA)

NYSERDA is a state authority dedicated to promoting energy efficiency and renewable energy sources.



Clean Energy Communities (CEC) Program

Municipalities that complete four of 10 priority actions will be considered Clean Energy Communities (CEC). Locally based outreach and implementation coordinators will provide free, on-demand technical assistance, including step-by-step guidance, case studies, and template contracts to help municipalities implement the Climate Smart Communities and Clean Energy Communities programs.

Contact: cec@nyserda.ny.gov or Europa McGovern, Mid-Hudson CEC Coordinator, 845-564-4075, emcgovern@hudsonvalleyrc.org

NYS Office of Parks, Recreation & Historic Preservation (OPRHP)

THE NYS OPRHP is a state agency dedicated to preserving and enhancing parks, historic assets and heritage areas.



Grant Program for Parks, Preservation and Heritage

The OPRHP is providing grants (\$19.5M) for acquisition, planning, development, and improvement of parks, historic properties, and heritage areas. Project awards up to \$600,000 with 50% required match, or 25% match for projects that are in a high-poverty district.

Contact: Erin Drost, (845) 889-3866, erin.drost@parks.ny.gov

Deadline: 4:00 pm, July 26, 2019, CFA

Recreational Trails Program

The OPRHP is providing grants (\$1.9M) for design, right-of-way and construction of recreational trails. Project awards up to \$250,000 with 20% required match.

Contact: Erin Drost, (845) 889-3866, erin.drost@parks.ny.gov

Deadline: 4:00 pm, July 26, 2019, CFA

US Department of Housing and Urban Development (HUD)

HUD is a federal agency aimed to support sustainable, inclusive and affordable communities.



Community Development Block Grant Program (CDBG)

HUD is offering competitive grants (\$20M) for development projects in small communities and counties.

LOCAL EXAMPLE: PARK DEVELOPMENT



The Village of Freeport received a \$250,000 Parks grant to replace over 1,000 feet of bulkhead at Waterfront Park to reduce soil erosion and improve public safety and recreational access.

- Resilient drinking water, clean water and stormwater infrastructure projects may be applied for under Category 1: Public Infrastructure, \$750,000 max, \$900,000 for joint applicants, no match required
- Construction and renovation projects may be applied for under Category 2: Public Facilities, \$300,000 max
- Risk assessment and engineering projects may be applied for under Category 4: Community Planning, \$50,000 per project, 5% match

Contact: 518-474-2057, HCR_CFA@nyshcr.org

Deadline: 4:00 PM, July 26, 2019, CFA

Empire State Development (ESD)

ESD is the New York state agency focused on economic development.



Empire State Development Grant Funds

The ESD is offering grant funds (\$150M) in the 2019 consolidated funding application. Infrastructure investment that can foster new economic development is eligible under Category 1: Strategic Community Development Investment (grant funds cover up to 25% of project soft costs).

Contact: 845-567-4882, nys-midhudson@esd.ny.gov

Deadline: 4:00 pm, July 26, 2019, CFA

NYS Hudson River Valley Greenway

The Greenway is state agency focused on using regional collaboration to conserve and enhance the natural, scenic and historic resources of the unique Hudson River Valley.



Greenway Communities Grant Program

Financial assistance for planning (\$5,000 to \$10,000 per project, more if multiple municipalities involved) is available to designated “Greenway Communities” within the Greenway Area. Projects funded under this program include those that relate to community planning, economic development, natural resource protection, cultural resource protection, scenic resource protection, and open space protection. Greenway Compact communities are eligible for greater funds to develop, approve, and implement a regional compact strategy consistent with the Greenway criteria and the Greenway act.

Contact: 518-473-3835, grants@hudsongreenway.ny.gov

Deadline: September 6 and November 8, 2019

LOCAL EXAMPLE: GREENWAY COMMUNITIES GRANT



The Village of Ossining received a \$15,000 grant to create a Waterfront Recreational Resource Plan to identify ways to promote water-related uses on their 3 miles of Hudson River waterfront, and to outline strategies to increase public access, catalog existing recreational assets, and engage stakeholders to determine demand for possible upgrades.

Open Space Funding Options



Preserving land as open space in floodplains and in coastal areas is an important aspect of flood resilience recommendations. Here are several options for municipalities looking to preserve open space in their community:

- The municipality can advocate to have their land included in the [NYS Open Space Plan](#) that is updated every 5 years. This helps the community to show that the land has value outside of traditional development and is a good way to prepare for purchase of the land for open space. The State receives annual funding to purchase lands specifically mentioned in the plan. Municipalities can also seek grant funds to write or update their own Open Space Plan and include floodplain protection as one of the important values that open space provides.
- The municipality can work with a local or regional land trust, like the [Walkkill Valley Land Trust](#) or the [Open Space Institute](#) to purchase the land using easements if it has scenic, ecological and/or agricultural value. Then, the community may be able to work with the land trust to make the property more valuable as floodplain protection.
- The municipality can purchase the land for open space by taking on debt (bonds) or instigating a tax levy. One example of a relevant tax levy is called a Real Estate Transfer Tax, which has been passable by local law since NYS passed the Hudson Valley Community Preservation Act of 2007. This tax is applied to mortgages on local real estate and is used to create a conservation fund for the community, which can be used to preserve open space.

LOCAL EXAMPLE: REAL ESTATE TRANSFER TAX



The Town of Warwick passed a 0.75% Real Estate Transfer Tax and the Town of Red Hook a 2% tax to create a conservation fund to help provide financial support for their Open Space Plans.

Summary table of all funding assistance programs

Agency	Assistance Program	Categories	Grant amount, match	Deadline, CFA
DEC	✓ Estuary Program		\$10,500-\$50,000, 15%	7/10/19
	✓ CSC		\$10,000-\$2M, 50%	7/26/19 ☑CFA
	✓ WQIP		\$1-10M, 25-60%	7/26/19 ☑CFA
	✓ NANS Planning		≤\$30,000, 10%	7/26/19 ☑CFA
	✓ T4T		N/A	3/1, 8/1/19
DOS	✓ LWRP		No max, 15-25%	7/26/19 ☑CFA
	✓ BOA		≤\$300,000, 10%	7/26/19 ☑CFA
EFC	✓ GIGP		No max, 10-60%	7/26/19 ☑CFA
	✓ WIEP		\$30,000-100,000, 20%	Open
	✓ CWRSEF / DWRSEF		N/A	7/26/19 ☑CFA
FEMA	✓ HMA		N/A	Natural disaster trigger
	✓ PA		25%	Open
	✓ CRS		N/A	Open
ADDITIONAL	✓ NYSERDA CEC		N/A	Open
	✓ OPRHP Parks		≤\$600,000, 25-50%	7/26/19 ☑CFA
	✓ OPRHP Rec Trails		\$250,000, 20%	7/26/19 ☑CFA
	✓ HUD CBDG		\$50,000 - \$900,000, 0-5%	7/26/19 ☑CFA
	✓ ESD		75% for soft costs	7/26/19 ☑CFA
	✓ Greenway		\$5,000 - \$10,000+	9/6, 11/8/19
	✓ Open Space		N/A	N/A

CONTACT INFORMATION

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