This document was developed by the NYRCR Broome Planning Committee as part of the NY Rising Community Reconstruction (NYRCR) Program within the Governor’s Office of Storm Recovery. The NYRCR Program is supported by NYS Homes and Community Renewal, NYS Department of State, and NYS Department of Transportation. The document was prepared by the following consulting firms: Parsons Transportation Group of New York, Inc.; VHB Engineering, Surveying, and Landscape Architecture, PC; M.J. Engineering and Land Surveying, PC; PLACE alliance; and Arch Street Communications, Inc.
Foreword

Introduction

In the span of approximately one year, beginning in August 2011, the State of New York experienced three extreme weather events. Hurricane Irene, Tropical Storm Lee, and Superstorm Sandy wreaked havoc on the lives of New Yorkers and their communities. These tragic disasters signaled that New Yorkers are living in a new reality defined by rising sea levels and extreme weather events that will occur with increased frequency and power. They also signaled that we need to rebuild our communities in a way that will mitigate against future risks and build increased resilience.

To meet these pressing needs, Governor Andrew M. Cuomo led the charge to develop an innovative, community-driven planning program on a scale unprecedented and with resources unparalleled. The NY Rising Community Reconstruction (NYCR) Program empowers the State’s most impacted communities with the technical expertise needed to develop thorough and implementable reconstruction plans to build physically, socially, and economically resilient and sustainable communities.

Program Overview

The NYCR Program, announced by Governor Cuomo in April of 2013, is a more than $650 million planning and implementation process established to provide rebuilding and resiliency assistance to communities severely damaged by Hurricane Irene, Tropical Storm Lee, and Superstorm Sandy. Drawing on lessons learned from past recovery efforts, the NYCR Program is a unique combination of bottom-up community participation and State-
provided technical expertise. This powerful combination recognizes not only that community members are best positioned to assess the needs and opportunities of the places where they live and work, but also that decisions are best made when they are grounded in rigorous analysis and informed by the latest innovative solutions.

One hundred and two storm-affected localities across the State were originally designated to participate in the NYRCR Program. The State has allocated each locality between $3 million and $25 million to implement eligible projects identified in the NYRCR Plan. The funding for these projects is provided through the U.S. Department of Housing and Urban Development (HUD) Community Development Block Grant – Disaster Recovery (CDBG-DR) program.

Forty-five NYRCR Communities, each comprising one or more of the 102 localities, were created and led by a NYRCR Planning Committee composed of local residents, business owners, and civic leaders. Members of the Planning Committees were identified in consultation with established local leaders, community organizations, and in some cases municipalities. The NYRCR Program sets a new standard for community participation in recovery and resiliency planning, with community members leading the planning process. Across the State, more than 500 New Yorkers represent their communities by serving on Planning Committees. More than 400 Planning Committee Meetings have been held, during which Planning Committee members worked with the State’s NYRCR Program team to develop community reconstruction plans and identify opportunities to make their communities more resilient. All meetings were open to the public. An additional 125-plus Public Engagement Events attracted thousands of community members, who provided feedback on the NYRCR planning process and proposals. The NYRCR Program’s outreach has included communities that are traditionally underrepresented, such as immigrant populations and students. All planning materials are posted on the NYRCR Program’s website (www.stormrecovery.ny.gov/nyrcr), providing several ways for community members and the public to submit feedback on materials in progress.

Throughout the planning process, Planning Committees were supported by staff from the Governor’s Office of Storm Recovery (GOSR), planners from New York State (NYS) Department of State (DOS) and NYS Department of Transportation (DOT), and consultants from world-class planning firms that specialize in engineering, flood mitigation solutions, green infrastructure, and more.

With the January 2014 announcement of the NYRCR Program’s expansion to include 22 new localities, the program comprises over 2.7 million New Yorkers and covers nearly 6,500 square miles, which is equivalent to 14% of the overall State population and 12% of the State’s overall geography.

The NYRCR Program does not end with this NYRCR Plan. Governor Cuomo has allocated over $650 million of funding to the program for implementing projects identified in the NYRCR Plans. NYRCR Communities are also eligible for additional funds through the program’s NY Rising to the Top Competition, which evaluates NYRCR Communities across eight categories, including best use of technology in the planning process, best approach to resilient economic growth, and best use of green infrastructure to bolster resilience. The winning NYRCR Community in each category will be allocated an additional $3 million of implementation funding. The NYRCR Program is also working with both private and public institutions to identify existing funding sources and create new funding opportunities where none existed before.

F1 Five of the 102 localities in the program—Niagara, Herkimer, Oneida, Madison, and Montgomery Counties—are not funded through the CDBG-DR program.
The NYCR Program has successfully coordinated with State and Federal agencies to help guide the development of feasible projects. The program has leveraged the Regional Economic Development Council’s State Agency Review Teams (SARTs), comprised of representatives from dozens of State agencies and authorities, for feedback on projects proposed by NYRCR Communities. The SARTs review projects with an eye toward regulatory and permitting needs, policy objectives, and preexisting agency funding sources. The NYCR Program is continuing to work with the SARTs to streamline the permitting process and ensure shovels are in the ground as quickly as possible.

On the pages that follow, you will see the results of months of thoughtful, diligent work by NYRCR Planning Committees, passionately committed to realizing brighter, more resilient futures for their communities.

The NYCR Plan

This NYCR Plan is an important step toward rebuilding a more resilient community. Each NYCR Planning Committee began the planning process by defining the scope of its planning area, assessing storm damage, and identifying critical issues. Next, the Planning Committee inventoried critical assets in the community and assessed the assets’ exposure to risk. On the basis of this work, the Planning Committee described recovery and resiliency needs and identified opportunities. The Planning Committee then developed a series of comprehensive reconstruction and resiliency strategies, and identified projects and implementation actions to help fulfill those strategies.

The projects and actions set forth in this NYCR Plan are divided into three categories. The order in which the projects and actions are listed in this NYCR Plan does not necessarily indicate the NYCR Community’s prioritization of these projects and actions. Proposed Projects are projects proposed for funding through a NYCR Community’s allocation of CDBG-DR funding. Featured Projects are projects and actions that the Planning Committee has identified as important resiliency recommendations and has analyzed in depth, but has not proposed for funding through the NYCR Program. Additional Resiliency Recommendations are projects and actions that the Planning Committee would like to highlight and that are not categorized as Proposed Projects or Featured Projects. The Proposed Projects and Featured Projects found in this NYCR Plan were voted for inclusion by official voting members of the Planning Committee. Those voting members with conflicts of interest recused themselves from voting on any affected projects, as required by the NYCR Ethics Handbook and Code of Conduct.

NYCR Broome is eligible for up to $18,660,947 in CDBG-DR implementation funds.\(^2\)

While developing projects for inclusion in this NYCR Plan, Planning Committees took into account cost estimates, cost-benefit analyses, the effectiveness of each project in reducing risk to populations and critical assets, feasibility, and community support. Planning Committees also considered the potential likelihood that a project or action would be eligible for CDBG-DR funding. Projects and actions implemented with this source of Federal funding must fall into a Federally-designated eligible activity category, fulfill a national objective (meeting an urgent need, removing slums and blight, or benefiting low to moderate income individuals), and have a tie to the natural disaster to which the funding is linked. These are among the factors that the

\(^2\) The following localities’ allocations comprise the NYCR Community’s total allocation: City of Binghamton - $3 million; Town of Conklin - $3 million; Town of Vestal - $3 million; Town of Union - $3.66 million; Village of Johnson City - $3 million; and Village of Endicott - $3 million.
Governor’s Office of Storm Recovery will consider, in consultation with local municipalities and nonprofit organizations, when determining which projects and actions are best positioned for implementation.

The total cost of Proposed Projects in this NYCR Plan exceeds the NYCR Community’s CDBG-DR allocation to allow for flexibility if some Proposed Projects cannot be implemented due to environmental review, HUD eligibility, technical feasibility, or other factors. Implementation of the projects and actions found in this NYCR Plan are subject to applicable Federal, State, and local laws and regulations, including the Americans with Disabilities Act (ADA). Inclusion of a project or action in this NYCR Plan does not guarantee that a particular project or action will be eligible for CDBG-DR funding or that it will be implemented. The Governor’s Office of Storm Recovery will actively seek to match projects with funding sources.

In the months and years to follow, many of the projects and actions outlined in this NYCR Plan will become a reality helping New York not only to rebuild, but also to build back better.

NYCR Communities

Note: map includes those NYCR Communities funded through the CDBG-DR program, including the NYCR Communities announced in January 2014. Find out more at: StormRecovery.ny.gov/Community-Reconstruction-Program.
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Executive Summary

The New York Rising Community Reconstruction (NYRCR) Broome Plan presents projects to increase resiliency in future flood events. Projects may be eligible for Federal Community Development Block Grant - Disaster Recovery (CDBG-DR) funding, other State or Federal funding, or could be accomplished through other combinations of municipal, nonprofit, or private investment.

A. Overview

The NYRCR Broome Community is composed of six municipalities located in Broome County, NY: the City of Binghamton, Town of Vestal, Town of Union, Town of Conklin, Village of Johnson City, and Village of Endicott. While these municipalities vary greatly in their geographic size, population, and local economy, they all share their borders with the Susquehanna River, and have experienced a similar history of flood damage and loss due to extreme storm events. The NYRCR Broome Community is eligible for up to $18,660,947 million in CDBG-DR implementation funds (City of Binghamton - $3 million; Town of Conklin - $3 million; Town of Vestal - $3 million; Town of Union - $3.66 million; Village of Johnson City - $3 million; and Village of Endicott - $3 million).

Broome County, located in the Southern Tier region of New York State, measures 715 square miles and according the 2010 U.S. Census has a population of 200,600 residents, approximately 68 percent of whom live in the municipalities that make up the NYRCR Broome Community. The Susquehanna River, one of the longest rivers on the east coast, flows across the southern-most portion of Broome County from east to west. The river flows for 464 miles through three states, starting in Upstate New York (Cooperstown), and proceeding west through the Southern Tier, across rural southeastern Pennsylvania, finally terminating in the Chesapeake Bay in Maryland. Since record keeping began nearly 200 years ago, the U.S. Weather Service has reported flooding along the main stem of the Susquehanna River every 15 years on average. This, coupled with localized flash flooding that occurs annually on smaller tributaries, led to the Susquehanna River Basin being identified as one of the most flood-prone watersheds in the country.
B. Summary of Storm Impacts

Hurricane Irene made landfall in New York on August 28, 2011. The National Weather Service located at the Broome County Airport recorded 2.71 inches of rain and a peak wind gust of 45 mph. There was some minor damage in the far eastern part of the County and scattered power outages, but no major impact. Despite its lack of high winds, Hurricane Irene’s rainfall did saturate the soil and cause a moderate rise in the Susquehanna River that contributed to the major flooding from Tropical Storm Lee.

The next severe storm occurred only ten days later when Tropical Storm Lee arrived in New York on September 7, 2011. Up to 12 inches of rain from Tropical Storm Lee led to massive flooding on the Susquehanna River, larger tributaries, streams, and creeks. The river crested up to 4 feet higher than the previous record and for the first time, overtopped levees and floodwalls along the Susquehanna River in Binghamton, Vestal, and Union. BAE Systems’ 27-acre facility on Main Street in Union, which employed 1,400 people, was declared a total loss. Numerous roads were impassible or entirely washed out. Primary transportation routes 17, 81, and 88 were closed during the height of the flooding. Stormwater and sanitary sewer utility systems were overloaded, damaging pump systems or causing total failure. Thousands of people were displaced from their homes; approximately 2,000 people had to be housed in a temporary shelter at the Binghamton University Events Center for up to 15 days. The floods unleashed extensive damage throughout the river valley from Conklin west to Tioga County, including Johnson City’s commercial district, the Town of Vestal’s municipal offices, and the City of Binghamton’s downtown commercial area.

In total, flooding from Hurricane Irene and Tropical Storm Lee destroyed 229 homes, damaged over 9,000 homes, and caused approximately $502.8 million in property damage in Broome County. The NYS Office of Emergency Services used evacuation areas and Census data to estimated that 24,000 people were evacuated in Broome County. Flooding from Tropical Storm Lee is the worst flood of record for the Southern Tier.

C. Summary of Critical Issues

Flooding from Tropical Storm Lee raised critical issues that the NYRCR Broome Plan seeks to address. As part of the public outreach process, community residents, key stakeholders, and Planning Committee members discussed the challenges they faced as a result of flooding associated with Hurricane Irene and Tropical Storm Lee. From this information, the Planning Committee identified critical issues that need to be addressed in order to increase flood resiliency and help the Broome Community build back better.

Communication between public agencies, local residents, and business owners was insufficient to plan for flooding and to aid in storm response and recovery. Shelters must be able to accommodate displaced persons and their pets. Best management practices should be implemented to control flooding in stream corridors adjacent to the Susquehanna River’s tributaries. Critical health and safety infrastructure, including utility systems, flood protection measures, and medical service providers, must have increased resiliency to protect people and property and ensure continuous operation in a disaster. Each community must attract new development to flood-safe areas, to increase the tax base and stability of its neighborhoods. The disaster also illustrated the need for more collaborative regional planning to maximize capacity, capabilities, and resources to address regional watershed issues.
D. Community-Driven Process

Development of the NYRCR Broome Plan was a community-driven process that involved extensive public engagement. During the first public workshop, held on October 15, 2013, residents were asked to talk about the strengths of their communities and their vision for the future. To help inspire and guide the planning process, the Broome NYRCR Planning Committee used this information to develop a vision statement:

“The diverse, urban, suburban, and rural communities of Broome County are working together, regionally, to ensure an economically vibrant, safe future for all residents. The communities recognize the economic, environmental, and social value and challenges associated with the region’s rivers and tributaries. By promoting sound growth, mitigating future damage and transforming these communities through a comprehensive and sustainable approach, the region will reach its full potential for resiliency.”

The public engagement process included a series of seven NYRCR Planning Committee meetings that were highly publicized and open to the public, numerous Committee work sessions, interviews with key stakeholders, and three public engagement events, including the Regional Resiliency Summit. These events provided the opportunity for public input and comment at key milestones throughout the planning process.

The Regional Resiliency Summit was held on November 18, 2013 and brought together almost 140 stakeholders from Broome County, Tioga County, and the Village of Sidney in Delaware County to share information on regional mitigation and floodplain management. Leading experts shared presentations on storm preparedness, changing weather patterns, recovery, and resiliency.

A fourth public engagement event is scheduled to be held before May 12, 2014 to present the final NYRCR Broome Plan and discuss implementation of its proposed projects. As with all public meetings, a wide range of media will be used to inform the community of this event and NYRCR Broome Plan. Media outlets include the NYRCR website, social media, electronic mail, and print advertising.

In addition to advertised public meetings, stakeholders (i.e., residents, public and private agencies, community organizations, and local businesses) were encouraged to provide feedback to the Committee throughout the planning process using the NYRCR website and Facebook page. The Committee Co-Chairs also made numerous public presentations and gave media interviews to publicize the NYRCR Program and the NYCR Broome Plan.

E. A Blueprint for Implementation

Critical issues identified during the planning process became the basis for identifying needs and opportunities to increase resiliency in the Broome Community. These needs, coupled with an assessment of risk to
community assets, were then used by the Committee to develop a series of reconstruction strategies designed to present how to best use community assets, capitalize on opportunities, and resolve critical issues.

Once the Committee identified the resiliency strategies, they developed a list of projects and management measures that should be taken to implement each strategy. These projects were classified as proposed, featured or additional resiliency recommendations. **Proposed Projects** are projects proposed for funding through a NYRCR Community’s allocation of CDBG-DR funding. **Featured Projects** are projects and actions that the Planning Committee has identified as important resiliency recommendations and has analyzed in depth, but has not been proposed for funding through the NYRCR Program. **Additional Resiliency Recommendations** are projects and actions that the Planning Committee would like to highlight and that are not categorized as Proposed Projects or Featured Projects.

Each of the NYRCR Broome Plan’s 12 strategies and their proposed and featured projects are listed below. The projects are not ranked or prioritized.

1. **Expand educational efforts so that people, businesses, and social service providers know beforehand what to expect and how to access assistance during and after a flood or other catastrophic storm event.**
   - United Way of Broome County Infrastructure Resiliency - Proposed.
   - Targeted Disaster Preparedness Education, Broome County - Featured.

2. **Incorporate an educational component related to understanding flooding, its causes, and implications, starting with students at the elementary grade level and including all ages to senior citizens.**
   - Susquehanna River Regional River Initiative - Proposed.
   - National Flood Insurance Program’s Community Rating System Participation, Broome County - Featured.

3. **Prior to storm events, establish neighborhood evacuation routes, and provide information during storms (e.g., extent of flooding, road closures, alternate routes, available shelters) to local residents and businesses.**
   - Powers Road Evacuation Route Flood Protection Study, Town of Conklin - Proposed.
   - Powers Road Evacuation Route Flood Protection Construction, Town of Conklin - Featured.

4. **Encourage participation in the National Flood Insurance Program’s Community Rating System.**
   - National Flood Insurance Program’s Community Rating System Participation, Broome County - Featured.

5. **Create flood-safe developments outside the floodplain.**
   - Susquehanna Street Stormwater Detention, City of Binghamton - Featured.
Progress Parkway / Hardie Road, Town of Conklin - Featured.

Rental Housing Replacement, Town of Union - Featured.

6. Expand flood protection of underdeveloped parcels to spur economic growth.

BAE Systems Floodwall Construction, Town of Union - Featured.

7. Improve stormwater management to mitigate flash flooding.

Susquehanna River Regional River Initiative - Proposed.

Creek Channel Improvements, City of Binghamton - Proposed.

Carlin Creek North Flood Mitigation, Town of Conklin - Proposed.

Carlin Creek South Watershed Improvements Engineering and Design, Town of Conklin - Proposed.

Powers Road Evacuation Route Flood Protection Study, Town of Conklin - Proposed.

Stillwater Road Stormwater, Town of Conklin - Proposed.

Backflow Preventer Program, Village of Endicott - Proposed.

Anna Maria Drive Ditch Stormwater Management, Village of Johnson City - Proposed.

Scatter Site Stream Bank Restoration, Town of Union - Proposed.

Stormwater Outflow Pipe Backflow Prevention, Town of Union - Proposed.

Taft Avenue Sanitary Sewer Basin Flow Metering, Town of Union - Proposed.

Valleyview Drive Drainage Improvements, Town of Union - Proposed.

Doris Avenue and Vestal Parkway Stormwater System Upgrades, Town of Vestal - Proposed.

Hawthorne Street Drainage Improvements, Town of Vestal - Proposed.

Roberts Street Stormwater Pump Station Upgrade, Town of Vestal - Proposed.

Stair Park Stormwater Detention Facility, Town of Vestal - Proposed.

Susquehanna Street Stormwater Detention, City of Binghamton - Featured.

Carlin Creek South Watershed Improvements Construction, Town of Conklin - Featured.

Powers Road Evacuation Route Flood Protection Construction, Town of Conklin - Featured.
8. Increase resiliency of sewer and water supply systems to ensure continued operation of essential health and social services facilities during emergencies.

- Front Street Stormwater Separation, City of Binghamton - Proposed.
- Taft Avenue Sanitary Sewer Basin Flow Metering, Town of Union - Proposed.
- Wastewater Treatment Plant Improvements, Village of Endicott - Proposed.
- Water Supply Interconnection, Village of Endicott and Town of Vestal - Proposed.
- Water Treatment Plant Resiliency Improvements, Village of Johnson City - Proposed.

9. Provide adequate emergency shelters north and south of the Susquehanna River to house displaced residents and their pets.

- Regional Emergency Shelter Feasibility Study, Broome County - Proposed.

10. Ensure the resiliency of operational locations used by public works departments, first responders, and emergency management service providers.

- Community Center Relocation, Town of Conklin - Proposed.
- DPW Complex Resiliency Improvements, Village of Johnson City - Proposed.
11. Improve the resiliency of residential development in flood-prone areas.

- Exchange Street Housing Flood Resistance, City of Binghamton - Featured.
- Argonne Neighborhood and South Endwell Riverfront Trail, Town of Union - Featured.
- Fairmont Park Protective Measures, Town of Union - Featured.


- Scatter Site Stormwater Infrastructure, City of Binghamton - Proposed.
- Scatter Site Sanitary Sewer Pump Station Resiliency, City of Binghamton - Proposed.
- Scatter Site Utility Improvements, Village of Endicott - Proposed.
- Sanitary Sewer Pump Station Resiliency Improvements, Village of Johnson City - Proposed.
- Water Treatment Plant Resiliency Improvements, Village of Johnson City - Proposed.
- DPW Complex Resiliency Improvements, Village of Johnson City - Proposed.
- Roberts Street Stormwater Pump Station Upgrade, Town of Vestal - Proposed.
- United Way of Broome County Infrastructure Resiliency - Proposed.
A. Geographic Scope of NY Rising Community Reconstruction Plan

The NYCR Broome Community consists of six municipalities within Broome County: the City of Binghamton, Town of Vestal, Town of Union, Town of Conklin, Village of Johnson City, and Village of Endicott (see Figure 1.1). With a total population in 2010 of 165,772 persons, the NYCR Broome Community represents approximately 68% of the County’s 2010 total population of 200,600 persons (US Census). It also represents approximately 18% of the County’s 715 square mile land area.

Broome County is located in south-central New York (i.e., the “Southern Tier”), directly north of the border with Pennsylvania. It consists of seven villages, sixteen towns, and the City of Binghamton. In 2010, population within the County ranged from 320 in the northern Village of Lisle to 56,346 in the Town of Union. The City of Binghamton, the county seat, had a population of 47,376 in 2010.

Broome County is bordered by six counties: Chenango, Delaware, Tioga, and Cortland Counties in New York, and Wayne and Susquehanna Counties in Pennsylvania.
Pennsylvania. The Susquehanna River flows across the southern half of Broome County, running through or forming a border of each of the six municipalities in the Broome Community. The Chenango River flows from north to south in the County and joins the Susquehanna River just west of downtown Binghamton.

The Broome Community is a diverse group of municipalities that include urban centers, suburban centers, and rural settings. The municipalities of the Broome Community share borders on the Susquehanna River that runs through the heart of the County. The Broome Community has had a long history of suffering caused by extreme storm events, so much so that the Southern Tier Central Regional Planning and Development Board refers to the Susquehanna-Chemung region of New York as “flood alley”1

The Susquehanna River flows for over 440 miles from its origin at Otsego Lake in Cooperstown, making it the longest river on the American east coast2. With an average daily volume of 22 billion gallons of water, the Susquehanna is the largest contributor of fresh water to the Chesapeake Bay. The river drains 27,500 square miles, including nearly half of the land area of Pennsylvania. It is the outlet for most of the rivers and streams in its 4,500 square mile watershed. The Susquehanna River Basin Commission calls the Susquehanna “one of the most flood-prone watersheds in the nation.”

The Broome Community collaborated to develop the NYRCR Broome Plan. This effort recognizes the interrelationships that communities within the Susquehanna River watershed must consider:

- **Flooding.** Streams and waterways throughout the Susquehanna River watershed contribute to flooding problems. Solutions need to be planned, designed, and implemented on a regional basis to be effective. The municipalities will need to coordinate efforts in order to maximize their impact.

- **Economic Base.** With people living and working in various locations across the Southern Tier, the need to retain and attract employers is a regional issue. Major employers and key commercial properties are located in flood-prone areas, leaving the community’s economic base vulnerable to future storm events. The Broome Community seek to maximize economic development resources by marketing the region, as opposed to expending resources on a single community.

- **Services.** Most medical and social services are provided regionally with little regard to jurisdictional boundaries. Ensuring maintenance of critical facilities and service providers is a vital element of resiliency for all Broome municipalities.

- **Education.** By sharing information among various groups within the Broome Community, residents, businesses, government officials, service providers, etc. will be prepared for future storm events and will increase resiliency throughout the region.

- **Sharing of Resources.** Each municipality within the Broome Community has limited resources to handle the multitude of issues that recent flooding events and storm damage have exposed. Sharing or coordinating resources collaboratively are necessary to implement a comprehensive resiliency plan.
i. Broome County

Due to its geographical location with convenient access to major markets in the Northeast (Boston, New York, Albany, Philadelphia), Broome County has historically been an economic engine and innovator. It is the birthplace of such industrial giants as IBM, Link Simulation and Training, and Endicott Johnson, some of which still have a presence in the community. Other major employers include: Binghamton University, ranked among the nation’s top 50 public universities and referred to as the Harvard of public universities; United Health Services; Broome County government; Lourdes Hospital; New York State government; Broome Developmental Center; and BAE Systems.

Like most of the northeastern USA, the region has a declining manufacturing and population base. Between 1970 and 2010, Broome County lost 21,000 residents but gained 12,800 households as household sizes decreased. According to the 2010 Census, Broome County has a population of approximately 200,600 with a slightly declining trend at 1.3% annually since 1975; however, the suburbs have grown significantly. Population shifted as people moved from a denser arrangement of buildings in Binghamton to larger-lot single-family homes in neighboring suburban and rural communities. As a result of suburbanization, the County now has more single-family homes and mobile homes than in 1970 and fewer multi-family dwellings. Broome County’s homeownership rate continues to lag behind some of the other nearby Southern Tier counties such as Tioga, Chenago, and Chemung but exceeds the State-wide figure. The six communities of the NYRCR Broome Plan had a total population of 137,206 people in 2010, compared to 160,921 persons in 1970.

The developed portions of Broome County’s land use pattern make up slightly less than 50% of the total area. Most of the urban and suburban development has occurred in low-lying areas around the Susquehanna River and its tributaries.

Today, the Greater Binghamton economy, which encompasses Broome County, is the State’s sixth largest, generating nearly $7 billion in economic activity each year. Binghamton University is a major economic force in the County. Current plans call for the number of enrolled students to increase by 2,000 by the year 2017. To keep pace with the growth of enrollment, faculty and staff hiring will add 385 new jobs. Planned construction of a state-of-the-art, $35 million Smart Energy Research and Development Facility will fuel research, teaching and entrepreneurial activity in energy-related disciplines.

To encourage economic growth, Broome County has looked to brownfield areas as potential redevelopment sites. Charles Street Business Park in Binghamton was created with the assistance of Federal and State grants.

<table>
<thead>
<tr>
<th>Location</th>
<th>Land Area (sq. mi.)</th>
<th>Population (April 1, 2010)</th>
<th>Density (pop./sq. mi.)</th>
<th>Housing Units (2010)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broome County</td>
<td>715</td>
<td>200,600</td>
<td>280.6</td>
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</tr>
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<td>Binghamton</td>
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<td>Conklin</td>
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<td>231.0</td>
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<tr>
<td>Union*</td>
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<td>56,346</td>
<td>1,565.2</td>
<td>12,892</td>
</tr>
<tr>
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<td>28,043</td>
<td>533.1</td>
<td>9,432</td>
</tr>
</tbody>
</table>

* The Town of Union’s population includes the population of the Village of Endicott and Village of Johnson City.
for clean-up and planning. Other successes have included the former Ranger-Paracord site in Johnson City, which is now a state-of-the-art printing facility.

**ii. City of Binghamton**

The City of Binghamton is located at the confluence of the Susquehanna and Chenango Rivers. It is the urban hub, County seat, and houses many County, State, and Federal offices and agencies.

According to the U.S. Census, in 2010, the city had a population of 47,376 people, relatively unchanged since 2000. During this same period, the median age declined from 36.7 to 35.8. More than half of the City’s housing units (55.8%) are multi-family dwellings and at 43.8%, the City’s share of single-family dwelling is the lowest of any Broome County municipality.

The American Community Survey estimated in 2012, over 31% of the City’s population lived below the poverty level, a figure well above County and State-wide averages. The City’s median housing value was also the lowest of any Broome County municipality, at $84,500. In 2012, the unemployment rate stood at 10.7%, also the highest of any Broome County municipality.

Suburbanization has moved many jobs and people to outlying communities. However, the City is ideally situated as a regional distribution center for goods manufactured in the area, with important access to the interstate highway system. Interstate I-88 terminates at Binghamton, and I-81 crosses Binghamton with interchanges for I-88 and NY State Route 17 (future I-86).

Binghamton University has a substantial presence in the City, including the University’s Downtown Center on Washington Street, home to the College of Community and Public Affairs. In addition, there are several privately-developed off-campus student apartment buildings downtown. Most recently, plans have been announced for the Southern Tier High-Tech Incubator, a collaboration between Binghamton University and the regional economic development community. The incubator will provide strategic resources for up to 10 new businesses at a time, including cutting-edge laboratories, business development services, core user facilities, interns and cooperative educational opportunities, as well as access to technology transfer and commercialization expertise at Binghamton University.
iii. Town of Conklin

The Town of Conklin is located southeast of the city of Binghamton on the south side of the Susquehanna River. During the 1950s and 1960s, the Town’s population expanded as it became a bedroom community for the City of Binghamton, however the Town’s population has declined and aged since 2000. In 2000, the Town had a population of 5,940 persons, of which 12.2% were aged 65 or older. By 2010, the total population had declined to 5,441, a loss of 8.4%, while 15.5% were aged 65 or older. Destruction of homes during recent flood events has further contributed to Conklin’s population loss, since FEMA buyouts have enabled residents to relocate from flood-damaged properties along the Susquehanna River. Other than the Broome Corporate Park along Broome Corporate Parkway and strip commercial development along State Route 7, Conklin is a rural community with a low unemployment rate (5.4%) and one of the highest median household incomes of any Broome municipality ($55,307).

iv. Town of Union

The Town of Union is located west of the City of Binghamton and north of the Susquehanna River. It includes the Villages of Endicott and Johnson City. Union also has sparsely developed areas to the north and west. Union has had a stable population between 2000 (56,298 persons) and 2010 (56,346 persons). The Town’s share of population aged 65 and over has decreased from 18.9% in 2000 to 18.1% in 2010. The Town’s 14.7% poverty rate in 2012 was below both Broome County and State averages.

v. Village of Endicott

The Village of Endicott, birthplace of IBM, is located within the Town of Union. This Upstate Village is showcased by its beautiful parks, historic buildings, antique carousels and quaint shops. In addition, the Village is home to an annual professional golf tournament. The Village had a 2010 population of 13,392 persons, a 2.9% increase from 2000. The Village’s share of people aged 65 and older has decreased over time (18.8% in 2000 and 15.9% in 2010). Endicott also has the lowest homeownership rate of any Broome County municipality, 42% versus the County figure of 65%. In 2012, the Village had the second-highest unemployment rate of the NYRCR Broome Plan municipalities (9.6%), second lowest median household income ($33,734), and second highest poverty rate (22.3%).
vi. Village of Johnson City

Like Endicott, Johnson City is an incorporated village within the Town of Union and is located just west of the City of Binghamton and north of the Susquehanna River. The Village lost population in the last decade, declining from 15,503 persons in 2000 to 15,174 persons in 2010. In 2000, Johnson City had the second highest concentration of population over 65 (21.6%) of any Broome County municipality. Generally this indicates a higher concentration of potentially vulnerable population, a smaller active workforce, and a reduced purchasing power. Its proportion of people living below the poverty line was third highest of NYCR Broome Plan municipalities at 20.2%. This percentage exceeds the State average (14.9%) and Broome County average (16.5%).

vii. Town of Vestal

The Town of Vestal, home to Binghamton University’s main campus, is a predominantly suburban community located on the south side of the Susquehanna River, west of Binghamton. In 2012, the Town of Vestal was the wealthiest and youngest NYCR Broome Plan municipality ($62,998 median household income and 30.7 year median age, respectively). Its median household income exceeded State and Broome County averages. From 2000 to 2010, the Town’s population grew from 26,567 persons to 28,043 persons, an increase of 5.6%. As a newer, more prosperous suburb, Vestal showed a relatively low rate of impoverished people (5.5%) in 2012, one-third of the County figure of 16.5%. The Town has an extensive commercial sector, including a number of shopping centers that are located near the University and along Vestal Parkway, a major arterial road. The Town is also traversed by the Southern Tier Expressway, which parallels the Susquehanna River and provides good transportation access.

B. Description of Storm Damage

The Broome Community has historically been subject to flooding by the Susquehanna River and its tributary creeks. Flooding in the 1930s gave rise to the National Flood Control Act of 1936, and municipalities implemented flood control plans and built structures to protect the urban centers. The U.S. Army Corps of Engineers (USACE) provided oversight and certification of several flood control measures, while the NYS Department of Conservation (NYS DEC) provided maintenance of levee systems.

Despite these protective measures, portions of the community continued to experience flood losses over the ensuing decades. According to the *Broome County Hazard Mitigation Plan* (2013), the County experienced 132 floods from 1950 to 2012\(^3\). During the period from 1970 to 2011, the County was included in 11 FEMA disaster declarations for severe storm events, some of which were also identified as floods. Factors
contributing to damage from severe storms include poor soils, steep slopes, and an increase in impervious surfaces.

i. Hurricane Irene

Hurricane Irene made landfall in New York on August 28, 2011. The National Weather Service located at the Broome County Airport recorded 2.71 inches of rain and a peak wind gust of 45 mph. There was some minor damage in the far eastern part of the County and scattered power outages, but no major impact. The Broome County Soil and Water Conservation District received no requests for assistance due to Hurricane Irene. Despite its lack of high winds, Hurricane Irene’s rainfall did saturate the soil and cause a moderate rise in the Susquehanna River that contributed to the major flooding from Tropical Storm Lee.

ii. Tropical Storm Lee

The next severe storm occurred ten days later when Tropical Storm Lee arrived in New York on September 7, 2011. Until Tropical Storm Lee in 2011, the Mid-Atlantic United States flood of 2006 was the benchmark for flooding in the Susquehanna Basin⁵, which broke long-standing records in several locations by as much as 4 feet. Along the Susquehanna, there are a series of forecast points used to monitor the elevation of the river and provide some advance warning of flood events. Tropical Storm Lee caused 12 river forecast point records to be broken.

Still saturated from Hurricane Irene, another 6 to 12 inches of rain from Tropical Storm Lee led to massive flooding on small streams, creeks, the Susquehanna River, and its larger tributaries in Broome County⁶. The river crested 1 to 4 feet higher than the previous record and overtopped many of the levees and floodwalls along the Susquehanna in Binghamton, Vestal, and Union for the first time. In the Westover area of the Town of Union, rising river water went over the top of the levee and flooded a shopping center and residential neighborhood. The Argonne and Fairmont Park neighborhoods were inundated with water. In total, flooding severely affected five neighborhoods in the Town of Union and caused considerable damage in 12 others⁷.

BAE System’s 27-acre facility on Main Street in Johnson City, which employed 1,400 people, was

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Timeline of flood-related events in the Broome Community from 2006 to 2013.
declared a total loss. Although the company was forced to shut its Johnson City facility, BAE Systems was able to relocate to Endicott with the help of a $40 million dollar Excelsior Tax credit from New York State. Johnson City’s water department and Department of Public Works facilities were also damaged from inundation of water. The Village of Endicott’s and the Village of Johnson City’s water supply systems were without water for approximately 36 hours, nearly depleting the systems and making pressurized lines in the system vulnerable to failure. This situation nearly resulted in the evacuation of patients at Wilson Hospital, Susquehanna Nursing and Rehabilitation Center, United Methodist Homes’ James G. Johnston Memorial Nursing Home and Ideal Senior Living Center. In the Village of Endicott, Mayor John Bertoni, a sixty-year resident, said the flooding was the worst damage across the village he had ever witnessed, describing one intersection as “a two-acre lake.” Floodwater also overtopped one of Binghamton’s levees, resulting in the destruction of the MacArthur Elementary School.

Numerous roads were impassible or entirely washed out during the 2011 floods. Primary routes 17, 81, and 88 were closed during the height of the flooding. Roads closed included Old Vestal Road, Owen Hill Road, Hyde Street, plus portions of Tracey Creek Road, Dunham Hill Road, Watson Boulevard, Nanticoke Drive, Day Hollow Road, and Airport Road. In the Town of Union, most streets south of Main Street were flooded, including all roads in Fairmont Park. Valleyview Drive was impassable, as water ponded on the roadway. Within the City of Binghamton, the Tompkins Street, Exchange Street, State Street, Memorial, and Washington Street bridges were all closed due to flooding. In the Village of Endicott, the bridges on Route 26 and Vestal Avenue were closed. In addition, all but one of the Village’s underpasses closed.

The flooding inundated stormwater and sewer utility infrastructure, damaging pump systems or causing total failure. This resulted in extensive damage to Johnson City’s commercial district, the Town of Vestal’s municipal offices, and the City of Binghamton’s downtown commercial area along Susquehanna Street. Binghamton’s fire and police headquarters were rendered unusable. Johnson City’s DPW complex was inundated with water, severely damaging equipment and forcing the staff to relocate to inadequate, temporary facilities at Village Hall. The Town of Vestal’s fire station and emergency management facilities flooded when storm drainage pipes and pump systems could not handle the volumes of water entering the system. Flooding also submerged cars parked at Town Square Mall, the Town’s largest commercial complex.

Tropical Storm Lee led to extensive displacement of individuals from their homes. Approximately 2,000 people had to be housed in a temporary shelter at the
Binghamton University Events Center for up to 15 days. In Binghamton, 300 households in Exchange Street housing, a large low- and moderate-income residential housing development, had to be relocated for an extended period.

iii. Summary of Impacts

In total, flooding from Hurricane Irene and Tropical Storm Lee destroyed 229 homes and damaged over 9,000 residential structures in Broome County. Over half of the damaged structures sustained major or moderate damage. According to Broome County records, more than 320 households in the County are participating in the FEMA-funded home buyout program. A FEMA representative stated the flooding and impacts from Lee and Irene combined to be the worst natural disaster in New York State history. New York State eventually brought in rescue and medical evacuation helicopters, over 40 high-axle trucks and Humvees, special boats, and over 1,000 New York National Guardsmen to aid with rescue and response. FEMA estimated that Broome County needed the third largest number of public assistance disaster relief projects, totalling just under 800 projects. It is estimated that Broome County sustained approximately $502.8 million in property damage from Tropical Storm Lee. Due in part to the large number of impacted people least able to absorb the costs of restoration, there were 6,360 registrations for individual assistance from FEMA – the most of any Disaster Recovery community - and 5,128 applications issued for Small Business Administration assistance in Broome County, creating the bulk of the 5,984 applications following Tropical Storm Lee. Tropical Storm Lee is now established as the worst flood of record for the Southern Tier of New York and portions of northeast Pennsylvania.

C. Critical Issues

As part of the public outreach process, community residents, key stakeholders, and Committee members were asked to identify their community’s strengths and the challenges they faced because of Hurricane Irene and Tropical Storm Lee. The following is a list of six critical issues identified by the community that the NYRCR Broome Plan should address to resolve flood-related issues in the Broome Community:

- Communication between public agencies and local residents and businesses was insufficient to provide all parties with adequate information to plan for storm events, to know what is happening during storm events, and to access necessary information and resources to aid in storm response and recovery.

- After the 2011 flood, the NYS Office of Emergency Services used evacuation areas and Census data to estimate that 24,000 people were evacuated in Broome County. Given the potential for future displacements of this magnitude, there is inadequate shelter capacity in Broome County to handle all potentially displaced persons during a major storm event. For example, during Tropical Storm Lee (and the 2006 flood), the Binghamton University Events Center sheltered over 2,000 displaced residents. In addition to creating logistical issues for the University, the Events Center is neither located where it can serve all parts of the County nor is its capacity considered adequate based on the best management practices of the Red Cross, FEMA and others. There is a need to develop additional shelter capacity for future storm events.
Flooding in Broome County is exacerbated by the Susquehanna River’s smaller tributaries. There is a need to identify stream corridor best management practices to control flooding in areas adjacent to the river’s tributaries.

Much of Broome County’s infrastructure was damaged during Hurricane Irene and Tropical Storm Lee and/or is at risk of damage from future storm events. There is a need to repair, replace, and increase resiliency of the most critical assets to health and safety during and after a storm event and to determine how best to protect them.

Buyouts of vulnerable housing, coupled with the loss of businesses damaged by flooding, has negatively affected Broome County’s economic base. There is a need to identify locations for replacement housing and relocated businesses to reduce economic losses from future storms and accelerate economic revitalization. In addition, enhancements to existing infrastructure are required to protect residences and businesses, particularly in those areas that need evacuation routes and contain vulnerable neighborhoods, commercial corridors, public services, or at-risk facilities.

The Susquehanna River and its tributaries are highly flood prone and many Southern Tier communities are potentially affected. Historically, Broome County has engaged in regional watershed planning; however, it has an opportunity to develop programs and projects to improve flood conditions for itself and neighboring communities.
D. Community Vision

To help inspire and guide the planning process, the Broome NYCRC Planning Committee developed a community vision statement at its first planning committee meeting. The draft vision statement was presented for review at the first public engagement event. Based on feedback received from committee members and the public, the draft vision statement was further refined. In its final form, the Broome Community’s vision statement expresses a resilient, vibrant, and safe future for the communities along the Susquehanna River:

### NYRCR Broome Vision Statement

The diverse, urban, suburban, and rural communities of Broome County are working together, regionally, to ensure an economically vibrant, safe future for all residents. The communities recognize the economic, environmental, and social value and challenges associated with the region’s rivers and tributaries. By promoting sound growth, mitigating future damage and transforming these communities through a comprehensive and sustainable approach, the region will reach its full potential for resiliency.

E. Relationship to Regional Plans

The realization that reconstruction and resiliency require a regional approach was behind the decision of the six Broome municipalities to create a single NYRCR Broome Plan. Assets, risks, and solutions were considered within a regional context. In addition, the Broome Community has participated in the Southern Tier Susquehanna River planning effort with the Tioga Community and Village of Sidney. Recommendations of the NYRCR Broome Plan are compatible with these regional plans and studies:

- **Regional Economic Development Council of the Southern Tier Strategic Economic Development Plan: 2011-2016.** In August 2011, the Southern Tier Regional Economic Development Council (REDC) was established. Later that year, REDC members produced a comprehensive economic development plan designed to restore the Southern Tier to a competitive market position. Strategy 5, Economic Development Backbone of the plan relates to the NYRCR Broome Plan. Many of the proposed and featured projects described in Section IV align closely with the REDC’s goal of revitalizing distressed communities in the region.

- **Broome County Hazard Mitigation Plan.** In early 2013, Broome County completed a FEMA-approved, multi-jurisdictional Hazard Mitigation Plan. The plan seeks to improve response to and recovery from disasters, and prioritizes projects and resources. It also identified funding resources for communities seeking Federal and other funds for NYCR projects. Goals outlined in the hazard mitigation plan are compatible with the NYRCR planning process.

  - **Goal 1.** Protect Life, Property, and Economy.
  - **Goal 2.** Increase Public Awareness.
  - **Goal 3.** Encourage Partnerships.
  - **Goal 4.** Provide for Emergency Services.
Broome County Comprehensive Plan. The Broome County Comprehensive Plan lays out a shared vision and builds consensus for public investment. The plan recognizes resiliency as a key component to recovery from economic and environmental challenges attributed to recent flooding. An assessment of the threats to assets revealed the need to provide a diverse employment base, diversify housing options, increase transportation alternatives, preserve and enhance natural and cultural resources, promote healthy communities through planning tools and strategic public investments, and promote collaboration with municipalities and other local partners. Projects and programs recommended by the NYRCR Broome Plan compliment the goals and objectives outlined by the Broome County Comprehensive Plan.

Southern Tier East 2012 Comprehensive Economic Development Strategy. In 2012, the Southern Tier East Regional Development Board (STERPDB) produced a Comprehensive Economic Strategy (2012) for the next 5 years. Among the elements of the strategy are several that relate to the objectives of the NYRCR Broome Plan, including:

- Review potential opportunities for expansion and/or consolidation of sewage treatment facilities and water supply systems to support community and economic development. This is consistent with NYRCR Broome Plan economic development objectives to encourage development in non-hazard areas.

- STERPDB will explore its role in identifying and addressing housing needs in the region. This relates to replacement housing for persons displaced or bought out within hazard areas.

- Assess safety issues and land uses downstream from major dams within the region.

- The region endorses the Susquehanna-Chemung Action Plan (see below) and incorporates the goals, strategies, and recommendations of the Plan into the region’s Comprehensive Economic Development Strategy.

Town of Union Long Term Community Recovery Strategy. The Town of Union is preparing a Long Term Community Recovery (LTCR) Plan that will form the basis for identifying Federal, State, local, nonprofit, and private sector resources for flood-related redevelopment and recovery. The plan focuses on housing to meet the needs of residents displaced by flooding, economic revitalization, infrastructure repair, redevelopment, and environmental restoration and enhancement. Several projects in the NYRCR Broome Plan evolved directly from the town’s LTCR planning process.

Local Comprehensive Plans. Comprehensive plan updates for several Broome Community jurisdictions are underway. Several projects in the NYRCR Broome Plan align with the comprehensive plan updates in Broome County, including those of the Town of Vestal, and the City of Binghamton. The City of Binghamton’s comprehensive plan update, Blueprint Binghamton, has the objectives of enhancing resource protection, strengthening local land use decision-making, guiding infrastructure investments, supporting grant writing, and fostering new economic development. It seeks to “reduce flooding and protect Binghamton’s neighborhoods,” and “improve stormwater management and river water quality.” The
implementation chapter of Vestal’s comprehensive plan contains a series of land use, zoning, and related recommendations, including creation of a stream protection overlay district to protect private property from flooding and erosion and maintain the ecological integrity of creeks and the Susquehanna River.

- **Susquehanna-Chemung Action Plan.** Completed in February 2012, the plan is a 2-year water quality management-planning project intended to conserve and protect water resources of the Susquehanna and Chemung Basins in New York and Pennsylvania. Eleven goals seek to promote sustainable use of waterways through enhanced preservation, economic development, land use patterns, conservation, and transportation planning. Maintenance of flood control structures, enhancing flood-warning systems, regulation of high hazard areas, and mitigation of future development risk are strategies that seek to achieve the goal of flood preparation in Broome County and surrounding jurisdictions. Several projects and programs provided by the NYRCR Broome Plan align with the efforts of the Susquehanna-Chemung Action Plan.
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Section II: Assessment of Risk and Needs

The Broome Community assessed risk to high-value assets to understand what measures were needed to protect them and ensure long-term economic growth. With critical insight from the public, needs and opportunities were identified that guided the planning process while addressing six recovery support functions.

A. Description of Community Assets and Assessment of Risk

i. Description of Community Assets

The New York Rising Community Reconstruction (NYRCR) Planning Committee (Committee) evaluated risks to community assets to help identify, support, and prioritize projects. The first step in preparing the asset inventory was to acquire existing digital asset datasets from multiple municipal, State, and Federal agencies. These asset datasets were cross-referenced and supplemented with aerial imagery and address locators to pinpoint each asset’s location within the study area. Supplemental information was collected and entered into the inventory for each asset: asset name, address, geographic coordinates, risk area, asset class (economic, health and social services, housing, infrastructure systems, natural and cultural resources, socially vulnerable populations), critical facility, and community value. Landscape attributes were also assigned to each asset. Landscape attributes are features of the landscape that lie between the asset and the source of floodwaters that may reduce the potential for flooding and erosion.

Receiving public input on the location and value of community assets.
The Committee, with input from the public at engagement events, identified and evaluated 629 community assets. These assets included major employment centers like BAE Systems and the Home Depot – River Plaza in the Town of Union; residences (especially those in neighborhoods with high senior and other vulnerable populations); public infrastructure; and key human service and cultural assets. In evaluating the assets, the Committee considered the following evaluation criteria:

- **Assets** were ranked high community value if they were “Federal Emergency Management Agency (FEMA) critical,” considered locally significant through the *DMA 2000 Hazard Mitigation Plan Update – Broome County, New York (2013)*, or were deemed locally significant by the Committee. In total, 110 assets were assigned a high community value.

- **Assets** were ranked medium community value if they had an effect on longer-term recovery or represented an important community interest reflecting a critical aspect of resiliency and quality of life in the community. Four assets were ranked medium community value.

- **Assets** were ranked low community value if they did not have a direct effect on relief or recovery, and helped restore the sense of normalcy, and quality of life. In total, 105 assets were ranked low community value.

During the inventory, maps were prepared to illustrate the location of three risk areas (see Figure 2.1 and Figures 2.3 A-D):

- **Extreme**: Locations identified by Broome County GIS & Mapping Services as inundated by both the 2006 and 2011 floods. In total, 110 assets were located in the extreme risk area.

- **High**: The 100-year floodplain identified by FEMA, indicating a 1.0% probability of flooding in any given year. In total, 331 assets are in the high-risk area.

- **Moderate**: The 500-year floodplain identified by FEMA, indicating a 0.2% probability of flooding in any given year. In total, 111 assets are in the moderate risk area.

The remaining 77 assets were not located within a risk area.

Of the 629 assets, 110 high-value assets were selected by the Committee for evaluation using the risk assessment tool. These assets were either FEMA critical facilities, locally significant assets noted in the *DMA 2000 Hazard Mitigation Plan Update – Broome County, New York (2013)*, or locally significant assets identified by the Committee. Figure 2.2 illustrates the location of these high community value assets in relation to the three risk areas. The inventory of high-value assets and risk assessment is included in Section V, Additional Materials.

**ii. Assessment of Risk to Assets and Systems**

The purpose of the risk assessment tool was to help evaluate the potential for floods to compromise community functions. The risk assessment tool scored high-value community assets using *hazard*, *exposure*, and *vulnerability* factors associated with a storm event. These metrics assisted the Committee in identifying, supporting, and prioritizing projects to protect or reduce the risk to high-value community assets. Higher
scores revealed increased threats of damage during a storm event. The tool is a formula-based spreadsheet that incorporates information related to landscape attributes (exposure factors), hazard, and vulnerability to generate a risk score for each asset.

- The **hazard score** is a fixed score representing storm frequency and magnitude. A hazard score of 3 was assigned to assets in a 100-year flood zone and a hazard score of 4 was assigned for a 500-year flood zone.

- The **exposure score** was generated based on the risk area where each asset is located (Extreme, High, or Moderate) plus the condition of each of the six landscape attributes. Specific point values were assigned in the Tool based on a yes or no response for each landscape attribute. These points together created the exposure score. The possible exposure scores range from 0.5 to 5.

- The **vulnerability score** ranged from 1 to 5 with a score of 1 indicating the asset was out of service for a short period and a score of 5 indicating the asset was out of service for an extended period of time or indefinitely.

- The **risk score** was generated by multiplying the hazard, exposure, and vulnerability scores.

Once the assets were evaluated, ranges of risk scores were captured into four categories:

- **Severe** (risk score >53 for a 100-year event, >70 for a 500-year event). Assets at severe risk could be in a dangerous situation and relocation of the asset may be a priority option. Although the Broome Community has assets located in the extreme risk area, the maximum risk score calculated for these assets was 41, which is below the threshold severe risk score of 53. Therefore, for the Broome Community, no assets received a severe risk score.

- **High** (risk score range of 24-53 for a 100-year event and 32-70 for a 500-year event). Significant negative outcomes from a storm could result, which may include the likely loss of service of an asset for an extended period. In total, 59 assets received 100-year event high-risk scores ranging from 27 to 41.

- **Moderate** (risk score range of 6-23 for a 100-year event and 8-31 for a 500-year event). Floods pose moderate to serious consequences. In total, 37 assets received 100-year event moderate risk scores ranging from 5 to 23.

- **Residual.** Floods pose minor or infrequent consequences. The remaining 20 assets received a residual risk score, primarily due to their location outside of a floodplain.

Five economic assets received risk scores. Robson Electric Supply and Home Depot – River Plaza are in extreme risk areas. The former BAE Systems site and Goodrich Implement Inc. are in high risk areas. Flooding at these facilities can result at major disruptions to business and cause numerous people to be out of work for a prolonged period of time. The effects of future storm impacts will vary, depending on the severity of the flood and the recovery time of the assets, transportation, and infrastructure systems.
There are 39 health and social service assets that received risk scores. Eleven received 100-year event high-risk scores. These included the Johnson City Highway Garage (32), Our Lady of Lourdes Memorial Hospital (30), Jennie F. Snapp Middle School (27), Vestal Fire Company 1 (27), and Vestal Government Offices (27). The Johnson City Highway Garage flooded in 2006 and 2011. A recently constructed flood control wall at Our Lady of Lourdes Memorial Hospital has increased its ability to withstand a significant flood. Twenty health and social service assets received 100-year event moderate risk scores. These included the MacArthur School (23), Conklin Highway Garage (23), Conklin Town Hall (23), Town of Union offices (18), and the YMCA Emergency Shelter (9). Broome County Head Start and the MacArthur School are located in high-risk “islands.” In the 2011 storms, the flooding isolated the schools after surrounding roads submerged in water. The Conklin Highway Garage flooded in 2006 and 2011.

There are 9 neighborhood assets that received risk scores. Seven neighborhoods received 100-year event high-risk scores. These included Southside West (32), the East Side neighborhoods (27 for both), Conklin Center North (27), and Westover (27). The State Street neighborhood (18) and First Ward (14) received 100-year event moderate risk scores.

Twenty-three infrastructure assets received risk scores. Of these, 17 received 100-year event high-risk scores. These included the Front Street Pump Station (41), Conklin Water Supply Wells 5 and 6 (36), Endicott Water Pollution Control Facility (36), City of Binghamton Water Filtration Plant (27), and Tri-Cities Airport (27). Six assets received 100-year event moderate risk scores. These included the Bevier Street pump station (23), a NYS Electric and Gas electrical substation (9), and the Johnson City water supply facility (9). The Village of Johnson City’s water treatment plant and potable water well houses flooded in 2011 and are at risk of repeated flooding unless relocated or provided with additional resiliency measures.16

Twenty-one natural and cultural resource assets received risk scores. Of these, 14 received 100-year event high-risk scores. These included the South Washington Street Parabolic Bridge (41), Washingtonian Hall (36), Broome County Veterans Memorial Arena (27), Drovers Inn (27), and Rounds House (27). Seven assets received 100-year event moderate risk scores. This includes West Endicott Park (23), Conklin Town Hall (23), and the Ross Park Zoo (18).

Eight assets in the socially vulnerable population category received risk scores. Of these, six received 100-year event high-risk scores. These included the Hearth at Castle Gardens (36), the Vestal Nursing Center (36), BHA North Shore Towers (27), Woodburn Court I (27), and Woodburn Court II (27). The Hearth at Castle Gardens and the Vestal Nursing Center were flooded in 2006 and the nursing center remains vacant. The other assets listed are publicly subsidized housing complexes in Binghamton whose basement-level mechanical and electrical systems were severely damaged by flooding in 2011.
2.1. Risk Areas

Broome County

Tioga County

Susquehanna County

Figure 2.1: Risk Areas
Figure 2.2: Assets and Risk Areas
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Figure 2.3D: Assets and Risk Areas - Southwest Detail

Legend
- Economic
- Health and Social Service
- Housing
- Infrastructure
- Natural and Cultural Resource
- Socially Vulnerable Population
- Extreme Risk Area
- High Risk Area
- Moderate Risk Area
- Planning Area Boundary
- Municipal Boundary
- County Boundary
- State Boundary
- Park
- River
- Railroad

Data Sources:
- Base Imagery – ESRI ArcGIS Online Server.
- Planimetric Features – CIRIS.
- Risk Areas - FEMA; Broome County.
- Assets: CIRIS; Parsons.

Broome County

Tioga County

Choconut Creek

Sugar Creek

Willow Run Creek

Town of Vestal

Figure 2.3D: Assets and Risk Areas - Southwest Detail
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B. Assessment of Needs and Opportunities

The needs and opportunities for Broome County have been identified through review of existing data sources and plans, discussions with public officials, field inspections, and input from the Broome Community public outreach process. These needs and opportunities are described in relation to the six FEMA core recovery support functions established by President Barack Obama in 2011 through the “National Disaster Recovery Framework.”

i. Community Planning and Capacity Building

Communication Needs and Opportunities. One of the key elements required to enhance the ability of the Broome Community to plan for resiliency is the need for better communications systems before, during, and after storm events. Community planning and capacity building is the ability to effectively plan and implement disaster recovery activities, engaging the whole community to achieve their objectives and increase resilience. During prior storms, the 2-1-1 system administered by the United Way of Broome County was not only a conduit for information but also relieved pressure on the 9-1-1 system. The Broome Community learned after the 2006 flood that improving communication of timely and easily understood information before, during, and after storms would allow residents to make appropriate preparations and speed the efficient return of residents from shelters and other places of refuge.

The Broome Community recognizes that additional shelter space is necessary to relieve the burden on the Binghamton University system, which accommodated many more people than it anticipated during the 2011 storm event. The Community also learned that communication should include improved awareness of shelters through greater media exposure and education for property owners regarding flood risks, resilient construction techniques, and procedures for handling buildings that have been inundated. Continuing to improve communication systems and procedures will enhance the recovery support function of community planning and capacity building. Providing emergency back-up generators and micro-grid systems, which increase reliability within small areas in key locations, will help to maintain critical communications as well as key infrastructure elements during storm events.

Building Codes Needs and Opportunities. The ability of the Broome Community to handle future storm events relates to where facilities are located and how they are constructed. The Broome Community must update various municipal codes to reflect the current understanding of flooding risks and encourage the construction industry to adopt more resilient construction practices that limit the amount and duration of displacement. For example, mechanical equipment located in basements of critical assets such as health care facilities, public housing, and government services, should be relocated above the base flood elevation. If
Section II: Assessment of Risk and Needs

building support and basic utility functions are not destroyed, then cleanup and re-occupancy becomes more manageable, significantly reducing the time that residents need to be displaced from their homes, businesses, or other locations, such as hospitals or nursing homes. This is particularly important for those special needs populations that are displaced from their residences and creates a strain on the social service providers that serve these constituents. For new construction, there should be an emphasis on new construction occurring outside the floodplain; additional considerations may include elevating building pads to provide additional freeboard or using construction techniques that place garage space at the first level with habitable space elevated above. Resilient construction techniques will enhance several recovery support functions, including economic development, housing, and infrastructure. The need is for additional and clearer regulations and increased education of homeowners, business owners, and contractors to ensure that new and or restored buildings and improvements are better able to withstand future flooding.

Regional Cooperation Needs and Opportunities. The NYRCR Broome Planning Committee decided early in the planning process that their capacity to plan for and respond to storm events could be improved by increasing regional cooperation among municipalities and service providers. After New York Governor Andrew M. Cuomo announced the NYRCR Program, each municipality agreed to work collectively to prepare one plan (with one planning committee) for all participating municipalities in Broome County. Another early example of this cooperation was the Committee’s invitation to the Village of Endicott to participate in the NYRCR Broome planning process prior to Endicott being formally included in the NYCR Program.

Regional cooperation has occurred throughout the planning process. In November 2013, the Committee collaborated with its neighboring Susquehanna River NYRCR communities Tioga and Sidney to host the Regional Resiliency Summit, a day-long event focused on regional cooperation, information sharing, and sustainable resiliency strategies, plans, and actions. The Broome municipalities continued to cooperate on specific programs and projects. For example, they have tentatively agreed to a memorandum of understanding that will pool available implementation funds for a regional emergency shelter feasibility study. Other programs demonstrating a commitment to regionalism include supporting the United Way’s regional 2-1-1 call system, building on the work of the Upper Susquehanna Coalition, expanding Soil and Water Conservation District stream improvement programs, and supporting the goals of the Southern Tier Regional Economic Development Council.

In November 2013, the Committee collaborated with its neighboring Susquehanna River NYRCR communities Tioga and Sidney to host the Regional Resiliency Summit.
ii. Economic Development

Economic Development Needs. The Broome County Comprehensive Plan focuses its economic development recommendations on business attraction, retention, and expansion. The Plan identifies a need to look at all three approaches in order to expand the local employment and tax base and build upon the area's strengths. Strengths that serve as the key drivers of the area's economy include Broome County's proximity to major markets, including upstate New York, New York City, and New England; multi-modal access via highways, rail, and air; Binghamton University programs in engineering and business; competitive labor costs; affordable real estate; skilled labor force; and agriculture. These strengths can counteract some economic drawbacks such as the aging workforce, aged industrial facilities, presence of brownfields, and inadequate utility infrastructure to expand commercial and industrial development. The 2010 U.S. Census's County Business Patterns identified 4,308 business establishments in Broome County employing 72,363 people. Nearly half of these businesses are small, with only one to four employees.

The Broome Community’s jurisdictions have moved aggressively to minimize housing in vulnerable areas through the buyout programs created in response to Hurricane Irene and Tropical Storm Lee. While helping to reduce risk, buyouts can have other consequences. These consequences may include the loss of residents, associated economic activity, and property tax revenue, creating fiscal challenges for many of the buyout communities. The loss can be compounded by damages sustained by local businesses and industries, not all of whom have been able to rebuild at their existing locations or find new locations within Broome County. Facilitating development in less vulnerable locations to compensate for these losses will be critical to ensure that the communities can remain economically and fiscally secure. In addition to facilitating new growth, there is a need to provide support to existing establishments, particularly small businesses, to expedite clean up and return to normal operations after storm events. In some locations, sewer and water mains will need to be extended to facilitate new development.

Economic Development Opportunities. The NYRCR Broome Plan has identified the need to delineate areas suitable for accommodating new and expanded development. In planning for increased resiliency, there are opportunities to assist local businesses to relocate to less vulnerable locations and to expand, modernize and/or upgrade their operations.

Specific economic development opportunities include potential redevelopment of commercial sites impacted by past flooding. Any redevelopment in flood-prone areas would incorporate resiliency techniques, including flood-proof buildings, green infrastructure, stormwater retention, or other mitigation measures. Additionally, in areas where there are limited opportunities for new economic growth, extension of utility services could stimulate redevelopment.
iii. Health and Social Services

Life Safety Needs and Opportunities. During previous storms, the Events Center at Binghamton University was used to shelter over 2,000 residents, including special needs populations, for long durations. This created operational difficulties, whereby occupation of the facility exceeded best practices standards as established by the Red Cross, FEMA and others, and significantly strained University and local government resources. Developing additional sheltering space, support services, and resources will be necessary to ensure life safety during future storms.

Improvements need to be made to the health and social services networks in the Broome Community to strengthen the resilience of residents during storms and storm recovery, while improving their health and independence.

There is also a need to enhance information exchanges between first responders, medical providers, the County Health Department, and regional emergency medical service providers to protect persons with serious medical conditions during storm events.

Asset Protection Needs and Opportunities. There is a need to identify staging sites, equipment storage locations, landfill capacities, staffing needs, and other factors necessary to carry out demolition, clearance, and reconstruction activities quickly in the aftermath of a major storm. A post-disaster sanitation plan should be developed to address these needs and to identify the required coordination between municipalities and other service providers.

Protecting key assets of the local health system is a critical need in Broome County. The resiliency of sewer and water infrastructure must be ensured so essential services and facilities are operational during and after storms. In addition, improvements to emergency service facilities have been identified to increase resiliency.

iv. Housing

Housing Needs. According to the Broome County Comprehensive Plan, “The local housing stock is under tremendous pressure.” Recent floods damaged and destroyed substantial numbers of residential units, and led to changes in flood maps and costs of flood insurance. In 2011 alone, flooding destroyed 229 homes and damaged over 9,000 residential structures in Broome County. Over half of the damaged structures sustained major or moderate damage. The national restructuring of housing markets and the negative impact on housing values has also affected the region.

Given the proximity of waterways to existing housing in Broome County and the lack of adequate resources to fully retrofit endangered homes and reduce potential flooding risks in those areas, substantial portions of the County’s housing supply remain physically endangered by the threat of flooding. This is particularly true in sections of the Town of Conklin and the City of Binghamton.

Stagnant population growth County-wide, suburban migration, reductions in household size, and an aging population show a need to diversify the Broome County housing stock, both in location and in unit sizes and types. Loss of population and the need to replace housing destroyed by flooding exacerbate the need for change.
Housing Opportunities. Expanding housing choice should reflect the changing demographics as well as the realities of storm events and the flooding risks associated with high-risk areas. Providing alternative housing options – including attractive multi-family units close to urban amenities such as jobs, shopping, entertainment and transportation – will be necessary to retain and attract the young workers needed to expand and revitalize Broome County’s economy. In the City of Binghamton, virtually no new rental housing (except for students) has been built since the 1980s. As a result, the City of Binghamton’s Comprehensive Plan, Binghamton Blueprint, has noted there is a shortage of good quality rentals of the type needed to attract young professionals, an important element of the area’s economic development strategy.

Based on input received from the Broome Committee and reinforced through public engagement, immediate priorities are focused primarily on critical infrastructure improvements. Many of these improvements will protect the existing housing stock. The Broome Community recognizes short and long-term housing needs should be addressed, including replacing flood damaged units at more suitable locations, assisting property owners in retrofitting homes with flood protection measures, expanding housing choice (types and locations) to accommodate the needs of seniors, young professionals, and low and moderate income residents, and creating sustainable and resilient neighborhoods. Individual communities have solutions specific to their demographic and physical characteristics.

According to Broome County records, 331 households have applied to the FEMA-funded home buyout program since the 2011 flooding. An opportunity exists to identify and plan new residential redevelopment sites for residents who want to remain part of the Broome Community. These sites would be located out of high-risk areas and would help offset any potential reduction in the area’s property tax base.

v. Infrastructure

Infrastructure Needs. In addition to the Susquehanna River and Chenango River, the Broome Community is home to numerous smaller streams and tributaries that drain into the rivers. During storms, these watercourses are subject to flash flooding that has led to inundation of commercial and residential properties, severe erosion, and blockage at discharge points. This compounds the damage from the flooding of the Susquehanna River. In many cases, storm drainage infrastructure systems were installed in the mid-nineteenth century. Pipe size and capacity in certain locations are insufficient to accommodate extreme storm level flows. Many pump stations, stormwater lines and ditches, and wastewater treatment plants are also inadequate. In other cases, utility infrastructure (pumps, generators) thought to be protected, were inundated and disabled when flood protection measures (i.e., levees) were overtopped.

Many of the Broome Community’s infrastructure systems were unable to operate as intended during and after Tropical Storm Lee. In the absence of proposed improvements, these systems will be at risk of failure from future storm events. For example, in Binghamton, Endicott, and Vestal, the stormwater systems were compromised by
the failure of key pumping stations, which exacerbated flooding in localized areas. Similarly, the failure of sanitary sewer pump stations in Binghamton, coupled with infiltration and inflow and combined storm/sanitary lines, led to a significant diminishment in the city’s ability to convey and treat sanitary sewage. The Town of Union’s sanitary system also experienced significant infiltration that degraded its capacity, while the Village of Endicott’s sanitary system was hampered by failing pump stations. Mechanical and electrical equipment at the Village of Endicott’s wastewater treatment plant was damaged by floodwater, which significantly affected its ability to treat sewage.

**Infrastructure Opportunities.** Improved stream and stormwater management will enhance the infrastructure of the Broome Community. The Committee expressed a desire to model the effects of some proposed interventions, to ensure that new investments in infrastructure are optimized. For example, resizing pipes to larger diameters may be more costly and less effective than restoring natural stream morphology.

The Broome Community has identified engineering and design evaluations and physical improvements to infrastructure systems that were damaged or inundated by previous storm events. There is also a need to identify locations for providing additional stormwater capacity for use during storm events. Protecting key infrastructure systems by replacing traditional pump systems with submersible pumps and raising electrical panels out of flood zones has also been identified as a critical need.

**vi. Natural and Cultural Resources**

**Natural and Cultural Resource Needs and Opportunities.** The Broome Community can use green infrastructure such as wetlands, rain gardens, bio-infiltration swales and porous pavements to enhance safety, preserve the natural environment, and improve water quality. Using natural approaches to flood control may have secondary economic benefits where recreational resources, such as waterways and waterfronts, can be enhanced and promoted. A comprehensive stream restoration program is needed to mitigate future erosion on some streams and creeks where prior storm events have exacerbated erosion. A proposed riverfront trail network in Endwell would incorporate stormwater mitigation functions as part of the overall design. The Broome Community would like to create a regional stream management system for the Susquehanna River watershed that would enhance regional comprehensive planning and increase resilience.
Section III: Reconstruction and Resiliency Strategies

The strategies developed by the Broome Community are statements of action intended to mitigate negative impacts of future flood events that the community endured during Hurricane Irene and Tropical Storm Lee. The strategies address how best to use community assets, capitalize on opportunities, and resolve critical issues identified during the planning process.

A. Reconstruction and Resiliency Strategies

This section describes the Broome Community’s reconstruction and resiliency strategies, linking them to projects that enable the community to build back better. Developed by the Committee, the strategies are themes for resolving critical issues identified in the planning process. Each project, described in detail in Section IV, is tied to at least one strategy and represents how to capitalize on opportunities available to the Broome Community.

1. Expand educational efforts so that people, businesses, and social service providers know beforehand what to expect and how to access assistance during and after a flood or other catastrophic storm event.

One of the critical issues identified by the Committee was communication. This issue was made clear during and after Tropical Storm Lee when the 9-1-1 system became overloaded. This strategy enhances the community planning and capacity building support function by improving the flow of official information to local citizens. This strategy is important since it addresses a community-wide need for accurate information that can aid evacuations, emergency relief, and recovery efforts. This strategy will enhance emergency preparedness and resiliency of vulnerable populations. The United Way of Broome County is one project that accomplishes the strategy by providing a resource for information and updates as well as providing relief to other critical systems such as 9-1-1. In the Town of Conklin, one neighborhood was effectively cut off as a result of flooding, the opportunity to have more up-to-date, “real time” information on the extent of flooding conditions would provide residents with the better ability to evaluate when to evacuate. A second project will be administered by the Red Cross to provide disaster preparedness education to vulnerable populations in the Southern Tier.
Section III: Reconstruction and Resiliency Strategies

Table 3.1 Projects to Improve Flow of Official Information to Local Citizens

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Description</th>
<th>Estimated Cost</th>
<th>Proposed or Featured</th>
<th>Regional</th>
</tr>
</thead>
<tbody>
<tr>
<td>United Way of Broome County Infrastructure Resiliency</td>
<td>Install back-up generator for United Way 2-1-1 call service.</td>
<td>$75,000</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>Targeted Disaster Preparedness Education, Broome County</td>
<td>Provides a disaster preparedness education campaign for vulnerable populations in the Southern Tier.</td>
<td>$25,000</td>
<td>Featured</td>
<td>Yes</td>
</tr>
</tbody>
</table>

2. **Incorporate an educational component related to understanding flooding, its causes, and implications, starting with students at the elementary grade level and including all ages to senior citizens.**

Education on the risks flooding poses to resident of the Broome Community must be an ongoing effort. When several years pass without a flood it is human nature to become complacent and assume the risk may be less than it actually is. The Committee recognized that public awareness of flooding, its causes, and implications is an important aspect of building resiliency. Education and outreach can create awareness and understanding of the causes of flooding, stream instability, and the realities of living in a flood-prone area. Disseminating information about flood hazard, flood insurance, flood protection measures, and/or the natural and beneficial functions of floodplains can earn credit for communities that participate in the Community Rating System. This strategy has broad applicability to the entire Broome Community.

This strategy enhances the community planning and capacity building recovery support function by expanding education of the river, watershed, and flooding influence on the community. This strategy will enhance educational outreach to vulnerable populations and increase capacity for stream management programs. Projects that will achieve this strategy include the Susquehanna River Regional River Initiative and participation in the National Flood Insurance Program’s Community Rating System. Given the extent of development and introduction of impervious surface area, important design concepts such as green infrastructure and stream management are critical elements to be evaluated and incorporated over time in the Broome Community. This can be accomplished in part by continued cooperation with Soil and Water Conservation Districts and by educational efforts similar to the Regional Resiliency Summit.
Table 3.2 Projects to Expand Education on Flooding and the Watershed

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Description</th>
<th>Estimated Cost</th>
<th>Proposed or Featured</th>
<th>Regional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Susquehanna River Regional River Initiative</td>
<td>Establish a regional river system initiative to build resilience. The initiative will include watershed modeling to identify natural infrastructure practices for implementation; an environmentally sensitive stream management program including components of emergency stream intervention with project implementation; and education and outreach to municipal and county officials, and residents.</td>
<td>$3,000,000</td>
<td>Proposed</td>
<td>Yes</td>
</tr>
<tr>
<td>National Flood Insurance Program’s Community Rating System Participation, Broome County</td>
<td>Participation in the CRS allows for discounts on flood insurance premiums ranging from 5% to up to 45%. These discounts provide an incentive to pay for new flood protection activities that can help save lives and property in the event of a flood. Community participation involves undertaking some or all of the 18 public information and floodplain management activities described in the CRS Coordinator’s Manual.</td>
<td>$60,000</td>
<td>Featured</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3 Prior to storm events, establish neighborhood evacuation routes, and during storms provide information (e.g., extent of flooding, road closures, alternate routes, available shelters) to local residents and businesses.

Rapidly rising floodwater can cut off road access and leave neighborhood residents (and vulnerable populations such as the elderly and disabled in particular) at risk. Boat and airlift rescues are risky and time-consuming and require enormous effort by first responder personnel who in all likelihood are already spread thin. During Tropical Storm Lee, a 600-home neighborhood between Powers Road and Shaw Road in Conklin became isolated by flooding at the north and south ends of Conklin Road.

This strategy enhances the community planning and capacity building support function by ensuring the availability of evacuation routes. It enhances disaster preparedness and recovery by ensuring residents, especially vulnerable populations, can safely avoid severe storm threats. The Committee designed this narrowly defined strategy to specifically address the isolation of the Conklin neighborhood and prevent its reoccurrence during future storms.

Table 3.3 Projects to Establish Neighborhood Evacuation Routes and Provide Information

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Description</th>
<th>Estimated Cost</th>
<th>Proposed or Featured</th>
<th>Regional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powers Road Evacuation Route Flood Protection Study, Town of Conklin</td>
<td>Undertake feasibility study and preliminary engineering</td>
<td>$130,000</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>Powers Road Evacuation Route Flood Protection Construction, Town of Conklin</td>
<td>Implementation and construction of route and flood protection measures</td>
<td>$1,100,000</td>
<td>Featured</td>
<td>No</td>
</tr>
</tbody>
</table>
Encourage participation in the National Flood Insurance Program’s Community Rating System.

The National Flood Insurance Program’s (NFIP) Community Rating System (CRS) is a voluntary incentive program that recognizes communities for implementing floodplain management practices that exceed the Federal minimum requirements of the NFIP to provide protection from flooding. In exchange for a community’s proactive efforts to reduce flood risk, policyholders can receive reduced flood insurance premiums for buildings in the community. These reduced premiums reflect the reduced flood risk resulting from community efforts toward achieving the three CRS goals:

- Reduce flood damage to insurable property;
- Strengthen and support the insurance aspects of the NFIP; and
- Encourage a comprehensive approach to floodplain management.

Rising flood insurance premiums can significantly increase the cost of property ownership and affect the amount of discretionary income residents have available to spend. Participation in the CRS is one means of minimizing the effect of premium increases on property owners in the Broome Community.

This strategy enhances the community planning and capacity building recovery support function by improving the implementation and capacity of local code enforcement in the post-disaster environment. Currently, only two of the six municipalities (Town of Union and Village of Johnson City) participate in the CRS program. The goal is for all six communities to be involved.

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Description</th>
<th>Estimated Cost</th>
<th>Proposed or Featured</th>
<th>Regional</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Flood Insurance Program’s Community Rating System Participation,</td>
<td>Participation in the CRS program allows for discounts on flood insurance premiums ranging from 5% to up to 45%. These discounts provide an incentive to pay for new flood protection activities that can help save lives and property in the event of a flood. Community participation involves undertaking some or all of the 18 public information and floodplain management activities described in the CRS Coordinator’s Manual.</td>
<td>$60,000</td>
<td>Featured</td>
<td>Yes</td>
</tr>
<tr>
<td>Broome County</td>
<td></td>
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</tbody>
</table>

Create flood-safe developments outside the floodplain.

After the extreme flooding caused by Tropical Storm Lee, many Broome Community residents in high risk areas participated in the FEMA voluntary flood buyout program, under which their homes were purchased and demolished with the requirement that the vacant property become perpetual open space. While beneficial, buyout programs can result in loss of tax revenue as properties are taken off of the tax rolls. The Committee concluded that encouraging creation of flood-safe developments outside the floodplain was a sound strategy to counter-balance this effect and ensure the continued fiscal health of affected municipalities.
This strategy enhances the economic development, housing, and infrastructure recovery support functions by adopting measures to promote residential and economic development outside of flood-prone areas. The strategy is also sensitive to providing opportunities for affordable housing to relocated vulnerable populations, protecting critical economic community assets, and promoting sustainable infrastructure. Public investments in new infrastructure will spur development. The projects to achieve this strategy include Susquehanna Street Stormwater Detention, Progress Parkway / Hardie Road sewer extension, and Rental Housing Replacement. While these projects are long-term in nature, they provide the sound planning and design principles that can be applied to other development projects being considered within the Broome Community.

**Table 3.5 Projects to Create Flood-Safe Developments Outside the Floodplain**

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Description</th>
<th>Estimated Cost</th>
<th>Proposed or Featured</th>
<th>Regional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Susquehanna Street Stormwater Detention, City of Binghamton</td>
<td>Engineering and design to evaluate redevelopment of Susquehanna Street neighborhood.</td>
<td>$3,407,094</td>
<td>Featured</td>
<td>No</td>
</tr>
<tr>
<td>Progress Parkway / Hardie Road, Town of Conklin</td>
<td>Design and extend sewer service from Powers Road along Hardie Road terminating at Shaw Road to support new mixed-use development, including senior housing, outside of the floodplain.</td>
<td>$1,000,000</td>
<td>Featured</td>
<td>No</td>
</tr>
<tr>
<td>Rental Housing Replacement, Town of Union</td>
<td>Construct 30 units of affordable rental housing to replace rental-housing stock lost during the flood event.</td>
<td>$4,500,000</td>
<td>Featured</td>
<td>No</td>
</tr>
</tbody>
</table>

**Expand flood protection of underdeveloped parcels to spur economic growth.**

This strategy enhances the economic development recovery support function by adopting flood protection measures to protect underdeveloped economic assets in the community to spur redevelopment. The BAE Systems facility closed permanently after the flooding of 2011. Protective measures are needed to protect and retain the property as an economic asset.

**Table 3.6 Projects to Expand Flood Protection of Underdeveloped Parcels to Spur Economic Growth**

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Description</th>
<th>Estimated Cost</th>
<th>Proposed or Featured</th>
<th>Regional</th>
</tr>
</thead>
<tbody>
<tr>
<td>BAE Systems Floodwall Construction, Town of Union</td>
<td>Enhance floodwall protection in the Westover section of town to facilitate the redevelopment of the former BAE Systems district consistent with plans prepared as part of the Town's Long-term Community Recovery (LTCR) process.</td>
<td>$774,622</td>
<td>Featured</td>
<td>No</td>
</tr>
</tbody>
</table>
Improve stormwater management to mitigate flash flooding.

During Tropical Storm Lee, flash flooding from creeks and ditches caused extensive damage to property, roads, and municipal infrastructure. Post-flood analysis by Public Works Departments revealed many instances in which critical components of the stormwater management system (e.g., pump stations) failed or where undersized or under-performing stormwater infrastructure simply could not handle the velocity and volume of runoff generated by the storm. In addition to increasing the resilience of specific components of the stormwater management system, innovative approaches to stormwater management are required.

This strategy enhances the economic development, infrastructure, and natural and cultural resource recovery support functions by adopting measures to improve stormwater management and reduce risk from flash flooding. This strategy aligns with 29 projects from the NYRCR Broome Plan. Projects use a variety of techniques to achieve flood mitigation, including repair or reconstruction of infrastructure, stormwater detention, use of green infrastructure, and stream and channel modifications to reduce erosion.

Table 3.7 Projects to Improve Stormwater Management to Mitigate Flash Flooding

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Description</th>
<th>Estimated Cost</th>
<th>Proposed or Featured</th>
<th>Regional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Susquehanna River Regional River Initiative</td>
<td>Establish a regional river system initiative to build resilience. This project would involve modeling and analysis of the regional Susquehanna River watershed, piloting of demonstration projects, and ultimately creating regional stream management and stormwater retention programs.</td>
<td>$3,000,000</td>
<td>Proposed</td>
<td>Yes</td>
</tr>
<tr>
<td>Creek Channel Improvements, City of Binghampton</td>
<td>Repair Park Creek channel concrete and replace Chamberlain Creek culvert</td>
<td>$1,500,000</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>Carlin Creek North Flood Mitigation, Town of Conklin</td>
<td>Stormwater control project to mitigate flooding to Carol Court neighborhood</td>
<td>$500,000</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>Carlin Creek South Watershed Improvements Engineering and Design, Town of Conklin</td>
<td>Engineering and design of stormwater diversion project for Carlin Creek including creation of new wetland area located mainly east of the Corporate Park and adjacent to the existing rail line. Most of the proposed wetland area is in an undeveloped portion of the floodplain. Reduction of impact to residential neighborhood, businesses, and school.</td>
<td>$160,000</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>Powers Road Evacuation Route Flood Protection Study, Town of Conklin</td>
<td>Undertake feasibility study and preliminary engineering</td>
<td>$130,000</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>Stillwater Road Stormwater, Town of Conklin</td>
<td>Installation of stormwater drainage system along Stillwater Road to address extreme risk storm events</td>
<td>$300,000</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>Backflow Preventer Program, Village of Endicott</td>
<td>Installation of backflow preventer valves on individual homes.</td>
<td>$135,000</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>Project Name</td>
<td>Description</td>
<td>Estimated Cost</td>
<td>Proposed or Featured</td>
<td>Regional</td>
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<td>-----------------------------------------------------------</td>
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</tr>
<tr>
<td>Anna Maria Drive Ditch Stormwater Management, Village of Johnson City</td>
<td>Rehabilitate the Anna Maria Ditch stormwater system.</td>
<td>$950,000</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>Scatter Site Stream Bank Restoration, Town of Union</td>
<td>Restore stream bank at selected locations.</td>
<td>$300,000</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>Stormwater Outflow Pipe Backflow Prevention, Town of Union</td>
<td>Place flag valves on stormwater outflows and create temporary stormwater storage areas.</td>
<td>$950,000</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>Taft Avenue Sanitary Sewer Basin Flow Metering, Town of Union</td>
<td>Conduct sanitary sewer flow metering to isolate sewer line segments that are contributing to infiltration and inflow.</td>
<td>$50,000</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>Valleyview Drive Drainage Improvements, Town of Union</td>
<td>Upgrade the stormwater drainage system along Valleyview Drive to mitigate flooding</td>
<td>$1,247,533</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>Doris Avenue and Vestal Parkway Stormwater System Upgrades, Town of Vestal</td>
<td>Upgrade stormwater system.</td>
<td>$375,000</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>Hawthorne Street Drainage Improvements, Town of Vestal</td>
<td>Upgrade stormwater system.</td>
<td>$300,000</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>Roberts Street Stormwater Pump Station Upgrade, Town of Vestal</td>
<td>Convert an out of service sewer station to a storm pump station.</td>
<td>$650,000</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>Stair Park Stormwater Detention Facility, Town of Vestal</td>
<td>Engineering study, design and construction of stormwater detention facility on Town owned property south of Stair Park to help alleviate stormwater impacts of Fuller Hollow Creek on adjacent properties.</td>
<td>$1,248,555</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>Susquehanna Street Stormwater Detention, City of Binghamton</td>
<td>Evaluate redevelopment of Susquehanna Street neighborhood to include acquisition and demolition of existing structures; reconfiguration and/or reconstruction of streets and State highway to provide resiliency and resistance to flood effects; adaptive reuse of properties to create open space for stormwater detention.</td>
<td>$3,407,094</td>
<td>Featured</td>
<td>No</td>
</tr>
<tr>
<td>Carlin Creek South Watershed Improvements Construction, Town of Conklin</td>
<td>Construction of stormwater diversion project for Carlin Creek including creation of new wetland area located mainly east of the Corporate Park and adjacent to the existing rail line. Most of the proposed wetland area is in an undeveloped portion of the floodplain. Reduction of impact to residential neighborhood, businesses, and school.</td>
<td>$2,000,000</td>
<td>Featured</td>
<td>No</td>
</tr>
</tbody>
</table>
### Table 3.7 Projects to Improve Stormwater Management to Mitigate Flash Flooding

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Description</th>
<th>Estimated Cost</th>
<th>Proposed or Featured</th>
<th>Regional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powers Road Evacuation Route Flood Protection Construction, Town of Conklin</td>
<td>Implementation and construction of route and flood protection measures</td>
<td>$1,100,000</td>
<td>Featured</td>
<td>No</td>
</tr>
<tr>
<td>Huron Campus Flood Mitigation, Village of Endicott</td>
<td>Implement proposed improvements from flood mitigation study for the Huron Campus.</td>
<td>$1,437,740</td>
<td>Featured</td>
<td>No</td>
</tr>
<tr>
<td>K-Mart Site Redevelopment, Village of Endicott</td>
<td>Engineering/design of existing vacant commercial development to incorporate green infrastructure.</td>
<td>$2,026,022</td>
<td>Featured</td>
<td>No</td>
</tr>
<tr>
<td>Tri-Cities Airport Stormwater Improvements, Village of Endicott</td>
<td>Planning and design for Tri-Cities Airport Stormwater enhancement.</td>
<td>$184,138</td>
<td>Featured</td>
<td>No</td>
</tr>
<tr>
<td>Cloverleaf Bio-Retention/Flood Mitigation, Village of Johnson City</td>
<td>Planning and design for creation of stormwater management system using interior space of cloverleaf interchange for detention.</td>
<td>$128,841</td>
<td>Featured</td>
<td>No</td>
</tr>
<tr>
<td>Oakdale Mall Rehabilitation, Village of Johnson City</td>
<td>Engineering/design of existing commercial development to incorporate green infrastructure.</td>
<td>$1,927,244</td>
<td>Featured</td>
<td>No</td>
</tr>
<tr>
<td>Argonne Neighborhood and South Endwell Riverfront Trail, Town of Union</td>
<td>Planning and design to create passive recreational river trail using properties primarily acquired through Federal Emergency Management Agency (FEMA) buyout programs.</td>
<td>$307,676</td>
<td>Featured</td>
<td>No</td>
</tr>
<tr>
<td>Fairmont Park Protective Measures, Town of Union</td>
<td>Planning and design to create sustainable neighborhood with green space that doubles as additional stormwater storage capacity.</td>
<td>$369,265</td>
<td>Featured</td>
<td>No</td>
</tr>
<tr>
<td>Castle Gardens Buyout Area Stormwater Detention, Town of Vestal</td>
<td>Planning and design to create a sustainable neighborhood in the Castle Gardens buyout area with stormwater detention.</td>
<td>$754,722</td>
<td>Featured</td>
<td>No</td>
</tr>
<tr>
<td>Cloverleaf Bio-Retention/Flood Mitigation, Town of Vestal</td>
<td>Planning and design for creation of stormwater management system using interior space of cloverleaf interchange for detention.</td>
<td>$589,214</td>
<td>Featured</td>
<td>No</td>
</tr>
<tr>
<td>Town Square Mall Green Infrastructure Retrofit, Town of Vestal</td>
<td>Establishment of green infrastructure engineering/design criteria for retrofitting existing major commercial shopping establishments</td>
<td>$1,866,910</td>
<td>Featured</td>
<td>No</td>
</tr>
</tbody>
</table>
Increase resiliency of water supply and sanitary sewer systems.

In addition to severely damaging municipal stormwater systems, flooding from Tropical Storm Lee also adversely affected potable water and sanitary sewer systems in the Broome Community. During Tropical Storm Lee, extremely high volumes of floodwater surged into older, combined stormwater/sanitary sewer lines. Flooding inundated the Village of Endicott Wastewater Treatment Plant, damaging equipment throughout the facility. The Village of Endicott’s water supply system was without power for approximately 36 hours, which compromised the system’s ability to treat and distribute drinking water. The Village of Johnson City’s water supply system was within hours of being shut down. Both of these systems serve areas that extend well beyond their respective municipal boundaries.

When treated water is unavailable for drinking and cooking, area residents must rely on bottled water brought in by relief efforts. The failure of sanitary sewage treatment systems can result in the discharge of untreated sewage, which can have adverse environmental and health effects.

This strategy enhances the health and social services and infrastructure recovery support functions by ensuring that critical infrastructure does not fail residents during severe weather events.

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Description</th>
<th>Estimated Cost</th>
<th>Proposed or Featured</th>
<th>Regional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front Street Stormwater Separation, City of Binghamton</td>
<td>Separate combined sewer infrastructure and replace with separated storm and sanitary systems.</td>
<td>$750,000</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>Taft Avenue Sanitary Sewer Basin Flow Metering, Town of Union</td>
<td>Conduct sanitary sewer flow metering to isolate sewer line segments that are contributing to infiltration and inflow.</td>
<td>$50,000</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>Wastewater Treatment Plant Improvements, Village of Endicott</td>
<td>Provide flood mitigation measures at the wastewater treatment plant.</td>
<td>$1,660,000</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>Water Supply Interconnection, Village of Endicott and Town of Vestal</td>
<td>Project will create additional access to potable water in the event the existing water supply is unavailable due to power outage or flooding of the existing well fields.</td>
<td>$548,563</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>Water Treatment Plant Resiliency Improvements, Village of Johnson City</td>
<td>Upgrade existing water plant complex to enhance resiliency.</td>
<td>$980,000</td>
<td>Proposed</td>
<td>No</td>
</tr>
</tbody>
</table>
Provide adequate emergency shelters north and south of the Susquehanna River to house displaced residents and their pets.

During the 2006 and 2011 floods, the Binghamton University Events Center was pressed into service as an emergency shelter that ultimately accommodated more than 2,000 people. The number of displaced persons served far exceeded recommended standards for emergency shelters and placed undue stress on Binghamton University and its operations. Based on this past experience and with the understanding that future floods could once again result in thousands of displaced persons, the Committee concluded that there was a need for a more robust sheltering capability within the Broome Community. Ideally, this community shelter would be a dedicated facility with ample capacity located on a flood-safe site. In addition, there is a need for smaller neighborhood shelters and assistance centers in hard-hit areas.

This strategy enhances the health and social services recovery support functions by emphasizing the need for adequate sheltering capability in the Broome Community. Planning and evaluating the best locations and facilities to meet this need before the next flood is critical to the Broome Community’s preparedness.

Table 3.9 Projects to Provide Adequate Emergency Shelters

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Description</th>
<th>Estimated Cost</th>
<th>Proposed or Featured</th>
<th>Regional (Y/N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional Emergency Shelter Feasibility Study, Broome County</td>
<td>Feasibility study, design, and preliminary engineering to convert portion of a former military depot for use as a regional emergency shelter.</td>
<td>$500,000</td>
<td>Proposed</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Ensure the resiliency of operational locations used by public works departments, first responders, and emergency management service providers.

During extreme storms and floods, public works department staff, first responders (fire and police departments) and emergency management personnel must be able to quickly organize and effectively deploy their resources to support emergency operations. Each organization’s ability to deploy its personnel and equipment can be compromised if its operating location (e.g., DPW compound, fire station, or EMS facility) has been flooded or damaged, as occurred during Tropical Storm Lee. Practically speaking, the Committee understood that first responders cannot help others if they are preoccupied with their own needs caused by flooded or damaged facilities. Accordingly, they established a strategy of ensuring the resiliency of facilities used by public works departments, first responders, and emergency management service providers.

This strategy enhances the health and social services recovery support functions by protecting critical operating locations used by fire, emergency, and utility service providers. Ensuring these locations are safe and accessible will ensure each community’s first responders will be able to focus on and accomplish their core missions.
**Table 3.10 Projects to Ensure Resiliency of Operational Locations**

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Description</th>
<th>Estimated Cost</th>
<th>Proposed or Featured</th>
<th>Regional (Y/N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community Center Relocation, Town of Conklin</td>
<td>Construct community center at a flood-safe location. Building includes multi-purpose room, kitchen and Town Parks Department garage. Provides space for emergency operations and shelter during storm events.</td>
<td>$1,200,000</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>DPW Complex Resiliency Improvements, Village of Johnson City</td>
<td>Rebuild DPW administration offices and employee locker room on second story and construct vehicle maintenance building and garage for Village vehicles.</td>
<td>$1,450,000</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>Fire Station 1 Flood-Proofing, Town of Vestal</td>
<td>Flood proof station from possible flood damage.</td>
<td>$30,000</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>Emergency Management Services Relocation, Town of Vestal</td>
<td>Construct EMS facility at a flood-safe location.</td>
<td>$2,000,000</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>Refuse Garage Relocation, Town of Union</td>
<td>Construct a new building at a location outside of the floodplain.</td>
<td>$2,500,000</td>
<td>Proposed</td>
<td>No</td>
</tr>
</tbody>
</table>

**Improve the resiliency of residential development in flood-prone areas.**

During Tropical Storm Lee, several high-rise and multi-story residential structures in the City of Binghamton were damaged when water flooded their mechanical rooms. Since the buildings were without power and ventilation, the residents had to be evacuated en masse and sheltered until repairs to the mechanical systems could be completed. The Committee understood that protecting these residents, many of whom are elderly and low- or moderate-income, could be accomplished by making these vulnerable mechanical rooms flood-safe.

In the Town of Union, post-flood buyouts and demolitions have fractured once-established neighborhoods and demonstrated the need for new and innovative residential development concepts. New residential development that helps offset the buyouts would be possible in these areas, but only as part of flood-resilient and vibrant neighborhoods that incorporate elevated homes, complete streets, and stormwater mitigation areas.

This strategy augments the housing recovery support function by improving the resiliency of residential development, specifically in cases where large numbers of residents are affected and where the cohesiveness of once-established neighborhoods has been negatively impacted as a result of buy-out programs.
Table 3.11  Projects to Improve The Resiliency of Residential Development in Flood-Prone Areas

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Description</th>
<th>Estimated Cost</th>
<th>Proposed or Featured</th>
<th>Regional (Y/N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exchange Street Housing Flood Resistance, City of Binghamton</td>
<td>Relocate critical systems above flood elevation.</td>
<td>$2,000,000</td>
<td>Featured</td>
<td>No</td>
</tr>
<tr>
<td>Argonne Neighborhood and South Endwell Riverfront Trail, Town of Union</td>
<td>Planning and design to create passive recreational river trail using properties primarily acquired through Federal Emergency Management Agency (FEMA) buyout programs.</td>
<td>$307,676</td>
<td>Featured</td>
<td>No</td>
</tr>
<tr>
<td>Fairmont Park Protective Measures, Town of Union</td>
<td>Planning and design to create sustainable neighborhood with green space that doubles as additional stormwater storage capacity.</td>
<td>$369,265</td>
<td>Featured</td>
<td>No</td>
</tr>
</tbody>
</table>

Ensure reliability and resiliency of critical public works infrastructure.

This strategy enhances the infrastructure recovery support function by increasing the capacity and resiliency of critical public works infrastructure so it will be available during emergencies. During the 2011 flood, pumping stations in the City of Binghamton and other municipalities were inundated for the first time. Increasing protection and installing backup power generators will enable these facilities to remain operational, thereby protecting adjacent low-to-moderate income neighborhoods. Projects to achieve the strategy include various scatter-site infrastructure projects and pump upgrades.

Table 3.12  Projects to Ensure Reliability and Resiliency of Critical Public Works Infrastructure

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Description</th>
<th>Estimated Cost</th>
<th>Proposed or Featured</th>
<th>Regional (Y/N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scatter Site Stormwater Infrastructure, City of Binghamton</td>
<td>Upgrade stormwater infrastructure and pumps at multiple sites.</td>
<td>$1,100,000</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>Scatter Site Sanitary Sewer Pump Station Resiliency, City of Binghamton</td>
<td>Upgrade sanitary sewer infrastructure and pumps at multiple sites.</td>
<td>$1,150,000</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>Scatter Site Utility Improvements, Village of Endicott</td>
<td>Provide flood mitigation for the Endwell and Loder pump stations and install a generator at the River Terrace Pump Station.</td>
<td>$710,000</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>Sanitary Sewer Pump Station Resiliency Improvements, Village of Johnson City</td>
<td>Upgrade sanitary sewer pump station.</td>
<td>$208,000</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>Water Treatment Plant Resiliency Improvements, Village of Johnson City</td>
<td>Upgrade existing water plant complex to enhance resiliency</td>
<td>$980,000</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>Project Name</td>
<td>Description</td>
<td>Estimated Cost</td>
<td>Proposed or Featured</td>
<td>Regional (Y/N)</td>
</tr>
<tr>
<td>--------------</td>
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</tr>
<tr>
<td>DPW Complex Resiliency Improvements, Village of Johnson City</td>
<td>Rebuild DPW administration offices and employee locker room on second story and construct vehicle maintenance building and garage for Village vehicles</td>
<td>$1,450,000</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>Roberts Street Stormwater Pump Station Upgrade, Town of Vestal</td>
<td>Convert an out of service sewer station to a storm pump station.</td>
<td>$650,000</td>
<td>Proposed</td>
<td>No</td>
</tr>
<tr>
<td>United Way of Broome County Infrastructure Resiliency</td>
<td>Install back-up generator for United Way 2-1-1 call in service.</td>
<td>$75,000</td>
<td>Proposed</td>
<td>Yes</td>
</tr>
</tbody>
</table>
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A. Introduction

The Broome NY Rising Community Reconstruction Plan deepens and enhances planning and recovery begun after Hurricane Irene and Tropical Storm Lee, identifying the overall vision, strategies, critical issues, needs and opportunities, and projects. During the NYRCR process, Broome identified and ranked economic, health and social services, housing, infrastructure, and natural and cultural assets. The Broome NYCR Planning Committee (Committee) evaluated and scored each asset based upon the level of hazard, exposure, and vulnerability each faces in extreme weather, finding many to be at high risk. Once the proposed and featured projects were identified, the Committee used the risk scores, cost estimates, and identified community benefits to evaluate how feasible the projects were and how effectively they reduced risks.

The NYCR Broome Plan includes 49 proposed and featured projects, including five projects that will benefit multiple jurisdictions. The projects are directly linked to the strategies and cover the entire range of Federal Emergency Management Agency (FEMA) Recovery Support Functions. Several of the featured projects illustrate long-term, transformative concepts for stormwater management and flood-safe development in the Broome Community.
Susquehanna River Regional River Initiative, Broome County

**Project Type.** Proposed.

**Project Description.** This proposed project establishes a regional river system initiative to build resilience. This project is intended to link the Broome Community, Tioga Community, and the Village of Sidney together to comprehensively understand and address flooding issues in the Upper Susquehanna River basin. The intent is to partner and build on the USACE/NYSDEC Upper Susquehanna River Study that is currently under way and create regional resiliency through specific projects as well as outreach and education.

The initiative will include three components: watershed modeling to identify natural infrastructure practices for implementation; an environmentally sensitive stream management program including components of emergency stream intervention with project implementation; and education and outreach to municipal officials, county legislatures, and residents of the NYCR Tioga and Broome Communities.

**Component 1: Watershed Modeling to Identify Natural Infrastructure Practices for Implementation.**
Community decision-makers and project staff will work to identify and implement cost-effective floodplain and stream channel improvements that would have positive impacts on flooding and flooding impact reductions. Cost-effective practices will be identified that can be implemented to reduce flood impacts in all the watersheds evaluated. Once these identified projects have been evaluated for the priority watersheds, preliminary designs will be developed to address the resource concerns within all of the watersheds. Designs will be based on an integrated, multiple-barrier approach across the watershed, looking at implementing practices in the headwaters, across the landscape, and finally at the stream edge. The result will provide the chance to reduce the effects of floodwaters by de-synchronizing flows, infiltrating runoff into the groundwater, spreading flow into the natural floodplain and ensuring streams are correctly shaped to accommodate flood events. Projects will focus on the natural infrastructure of the watershed to address stormwater and implement projects that promote this approach. Wetland creation and restoration with flood attenuation, green infrastructure, natural stream rehabilitation and floodplain enhancement through berm removal are few examples of natural infrastructure projects we would identify and implement.

This project component will be completed in four phases: identify and target all priority flood-impacted watersheds in Broome County and Tioga County based on historic, current and projected needs; conduct a level-one geomorphic analysis to identify cost effective practices that can be implemented to reduce flood impacts in the identified watersheds; design several pilot projects within each community; and implement pilot projects.
The estimated cost of this component of the project is $2,400,000. Tasks include conducting watershed modeling for seven primary watersheds; identifying natural infrastructure practices for implementation; conducting a cost-benefit analysis of each practice identified; ranking and selecting potential projects; surveying sites; developing preliminary designs, and constructing pilot projects in the NYRCR municipalities in Broome, Tioga, and Delaware Counties. An educational workshop will be conducted in conjunction with each project to demonstrate its purpose and value to municipal officials.

**Component 2: Environmentally Sensitive Stream Management Program including Integrating Emergency Stream Intervention with Project Implementation.** Flooding in the State has become more common and more destructive as land use, hydrology changes, and development in flood prone areas increase. This trend is likely to continue. The degree of flood damage and whether the next flood will exacerbate that damage are largely determined in the critically short time period directly after the storm. How municipalities work in streams immediately after storms can determine if there is unintentional environmental degradation, including long-term stream instability and loss of aquatic habitat. The need for an environmentally conscious proactive program that provides training for post-flood responders cannot be overstated.

The second phase of this component will provide Directors of Public Works and Highway Superintendents with the education and training needed on stream clearance protocols for restoring a stream’s water and sediment transport after major storm events. The three-day workshops will provide time for both training and on-site construction.

This project component will include a pilot approach to train NYRCR communities’ post-flood responders in techniques to reestablish channel capacity, identify where and when to work in a stream and how to maintain floodplain connection. This component will include training in stream intervention techniques and educational presentations for legislators, environmental groups, highway supervisors and regulators on stream and floodplain function, changing climate factors, and why channel dredging is ineffective and results in stream instability. These educational presentations are an essential component of the successful acceptance of the Post-Flood Emergency Stream Intervention within the NYRCR communities.

Implementation costs associated with the Environmentally Sensitive Stream Management Program are estimated at $522,000. Expenses include implementation of a series of 3-day, hands-on workshops in each...
of the twelve NYRCR municipalities in Tioga, Broome and Sidney over the next two years, associated staff expenses, and a one-time equipment purchase to undertake debris removal.

**Component 3: Education and Outreach to Municipal and County Officials, and Residents of the NYRCR Broome Community.** The third project component will educate municipal officials, county legislators and residents in the NYCR communities about the function of floodplains and associated land use development decisions. Workshops will include “Stream Dynamics and Flooding Causes”; sessions with local code enforcement officers to review floodplain management ordinances; educating residents who live in floodplains to help them take actions that can minimize flood damage to their homes; installing community visual landmark flood signs; and establishing a network of trained community stormwater/floodplain outreach volunteers.

Education and outreach are critical elements of the regional river initiative and must include decision makers and residents within the NYRCR communities. Education and outreach will create awareness and understanding of the causes of flooding and stream instability as well as the implications of living in a floodplain. Workshops will train municipal staff on existing floodplain regulations; municipal officials on understanding flooding and stream issues; and residents on stormwater management and implications of living in a floodplain. In addition, the community visual landmark flood signage that was developed for Tioga County will be expanded to installed in all NYRCR communities.

The estimated cost of the education component of the proposed project is $78,000. Expenses include:

- Conducting education workshops for municipal and county officials, and residents in each of the 12 NYRCR municipalities;
- Conducting one-on-one training for local officials in each of the 12 NYRCR municipalities on locally-adopted floodplain management ordinances;
- Installing up to 48 community visual landmark flood signs throughout Broome, Tioga and Delaware Counties; and
- Conducting training sessions for residents on identifying flooding and stormwater hazards.

**Project Cost.** The estimated cost to develop all three components is approximately $3 million.

**Project Benefits.** Benefits of the project include:

- **Risk Reduction Benefits.** The project will reduce the effects of floodwaters by de-synchronizing
flows, infiltrating runoff into the groundwater, spreading flow into the natural floodplain and ensuring streams are correctly shaped to accommodate flood events.

- **Economic Benefits.** There will be indirect benefits will accrue of reduced flooding leads to decreased damage to property and infrastructure. There will also be co-benefits from improved ability to support new opportunities for outdoor recreation and tourism development.

- **Environmental Benefits.** Environmental benefits will include wetland creation and restoration with flood attenuation, green infrastructure, natural stream rehabilitation, and floodplain enhancement through berm removal. Co-benefits may include improved habitat and carrying capacity for wildlife, enhanced outdoor recreational opportunities for people, and provision of ecosystem services such as improved water quality.

- **Health and Social Benefits.** The collaborative, regional nature of the Susquehanna River Regional River Initiative will improve working relationships amongst political entities and jurisdictions in the Southern Tier. This effort should have a cascading impact on regional health and social issues that need to be addressed.

**Cost-Benefit Analysis.** Regional goals and initiatives needed to increase resiliency towards future flooding include scientific modeling focused on how natural infrastructure practices could be implemented, an innovative stream management program, and educational outreach. Based on available information and preliminary evaluations, the proposed project would have a net benefit on community safety, health, and economy by potentially reducing the extent and severity of flooding through the aforementioned regional goals. The potential benefits of this project are considered to outweigh the $3.0 million investment required to implement the Regional River Initiative.

*The Susquehanna River Regional River Initiative involves participation from municipalities located in Broome, Tioga, and Delaware Counties.*
**Risk Reduction Analysis.** This project has the potential to reduce the extent and severity of flooding and its impacts throughout the region through a multi-faceted effort. Flood risk will be mitigated through the development of additional capacity for water storage, passive open space, research for contemporary methods for addressing stream repair to reduce the risk of upland contaminants getting into riverine environments, and reducing the risk of pavement failure along creek-side road segments.

**Timeframe for Implementation.** 24 months.

**Regulatory Requirements.** Stream work may require USACE and NYS DEC permits.

**Jurisdiction.** Broome and Tioga County and Village of Sidney.
Regional Emergency Shelter Feasibility Study
Broome County

Project Type. Proposed.

Project Description. During both Tropical Storm Lee and the 2006 storm event, there was mass evacuation throughout the Broome Community. As noted by representatives of Binghamton University, in each instance the University’s Events Center housed more than 2,000 people, including persons with special needs. The shelter was operational for five days after the 2006 flood and 15 days after Tropical Storm Lee. The number of displaced people placed incredible stress on the University’s staff and facilities.

This project will evaluate the feasibility of renovating a portion of a former military supply depot located in Fenton, NY to serve as a regional emergency shelter. It will also identify appropriate synergistic uses that can be incorporated into the project, such as a logistics center, first responder shelter, emergency domestic animal co-shelter, and hands-on emergency training facility.

Project Cost. The estimated cost to develop the feasibility study, which would include preparation of preliminary design and construction cost estimates, is approximately $500,000. All six Broome Community municipalities and the Phase II community Town of Chenango have tentatively agreed to share in the cost of the project.
Project Benefits. Benefits of the project include:

■ **Economic Benefits.** Displaced residents would be more able to continue working after a severe storm event, thereby improving economic conditions during post-storm recovery.

■ **Health and Social Benefits.** The project can accommodate special needs populations and displaced residents.

Cost-Benefit Analysis. Improving Broome County’s capacity to shelter persons displaced by flooding will positively affect the community’s overall resilience and ability to address the health and social needs of its citizenry. Based on available information, the proposed project would have a net positive benefit on community safety and health, since a regional shelter would provide a centralized, safe location for persons with no access to lodging and post-flood assistance. Persons with special needs would particularly benefit from the shelter designed with them in mind. A centralized regional shelter would allow post-disaster assistance to be administered more efficiently and effectively since specific plans and supplies can be in place prior to need. Binghamton University would indirectly benefit from the project since a regional shelter would provide an alternative to the use of its Events Center, which served as a shelter after the 2011 flooding. The potential benefits of this project are considered to outweigh the $500,000 investment required to prepare the feasibility study, preliminary design, and construction cost estimates.

Risk Reduction Analysis. This project would reduce the risk of injury or ill health to Broome County residents displaced from their homes due to flooding.

Timeframe for Implementation. 24 months.

Regulatory Requirements. Coordination with the NYS Department of Environmental Review and NYS DOH may be required as this was a former Department of Defense hazardous waste cleanup site. Construction projects resulting in a disturbance of one or more acres may require coverage under SPDES Permit for Stormwater Discharges for Construction Activity.

Jurisdiction. Broome County.
United Way of Broome County Infrastructure Resiliency
Broome County

Project Type. Proposed.

Project Description. This proposed project would enhance the United Way’s 211 call service for emergency use across a five-county area: Broome County, Tioga County, Chenango County, Delaware County, and Otsego County. During storm events, the 211 system provides critical relief to the 911 system that is needed for emergencies. During Tropical Storm Lee, the 911 system serving Broome County received so many calls that its operators could not handle the volume. United Way contributed staff on a 24-hour basis to assist with call volumes. The United Way’s 211 system responded to more than 12,000 flood-related calls20. Since the United Way does not have an emergency power generator to rely on in case of power outages, this project would purchase and install an emergency generator at the United Way’s facility to keep the 211 system operational.

Project Cost. The estimated cost to procure and install the generator is approximately $75,000.

Project Benefits. Benefits of the project include:

- Health and Social Benefits. The project will improve emergency response throughout the community by relieving local 911 systems and diverting less urgent calls to a volunteer organization. The 211 system can help match callers with needed health or social services.

Cost-Benefit Analysis. Improvements to the region’s ability to communicate effectively with its citizens would positively affect public health and safety during and after storm events. Past experience has demonstrated that the public needs answers to a wide range of questions, many of which do not concern immediate emergencies traditionally handled by the 911 system. An investment in a backup emergency power generator at the United Way headquarters will enable the 211 system to be operated on a continuous basis. This will indirectly benefit the 911 system by diverting non-emergency calls that might otherwise overwhelm the system. The potential benefits of this project are considered to outweigh the $75,000 investment required to purchase and install the generator.

Risk Reduction Analysis. This project would reduce risk to public health and safety by keeping residents of the five-county area informed about a broad range of non-emergency topics, including official announcements, local conditions, relief efforts, and assistance programs.

Timeframe for Implementation. 3 months.
Regulatory Requirements. None.

Jurisdiction. The United Way.
National Flood Insurance Program’s Community Rating System Participation
Broome County

Project Type. Featured.

Project Description. Participation in the Community Rating System (CRS) can increase a community’s resilience, reduce flood insurance premiums, and help save lives and property in the event of a flood. Community participation requires undertaking some or all of the 18 public information and floodplain management activities described in the CRS Coordinator’s Manual. In the Broome Community, two municipalities, the Town of Union and Village of Johnson City, already participate in the CRS. This project would provide technical assistance to the other four municipalities that lack the resources and/or capacity to undertake the required activities to apply for and participate in the program.

The technical assistance would include assistance with application preparation and program activities. It would also include development of measures to maintain participation in the rating system.

Project Cost. The cost to provide technical assistance and participation in the rating system is $60,000.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** Participation in the program will provide residents incentive to construct flood protection measures on properties, due to flood insurance premium discounts.

- **Economic Benefits.** Reduced flooding leads to decreased damage to property and infrastructure, thus reducing private repair costs and public emergency response costs. Residents and businesses will experience monetary savings from a reduction in flood insurance premiums.

- **Environmental Benefits.** Environmental benefits may include runoff prevention and water quality improvements, dependent upon the flood protection measures ultimately undertaken by the communities.

- **Health and Social Benefits.** Flood protection measures, if constructed, may ultimately save lives in future severe weather events. The protection of life and property would also reduce burdens on health and emergency services and storm recovery efforts.

Cost-Benefit Analysis. The residents of Broome County recognize the importance of participation in the Community Rating System, which can reduce flood insurance premiums from 5% to up to 45%. Participation in the program provides incentives to property owners to construct flood protection measures that can help save lives and property in the event of a flood. Indirect economic benefits will accrue to property owners by less damage to property and infrastructure. Based on available information, there are four municipalities that...
would benefit from joining the program, but lack funding and resources to effectively participate. The various incentives offered in this program will help reduce out-of-pocket costs for citizens, improve water quality, and prevent runoff based on flood protection measures being installed. The potential benefits of this project are considered to outweigh the $60,000 investment required to provide the technical assistance necessary to comprehensively implement the program throughout the Broome Community.

**Risk Reduction Analysis.** This project would reduce risk to public health and safety by providing for a program that makes available incentives to pay for new flood protection. There may be indirect economic benefits if reduced flooding leads to reduced damage to property and infrastructure. Residents will experience monetary savings from a reduction in flood insurance premiums.

**Timeframe for Implementation.** 1 year.

**Regulatory Requirements.** None.

**Jurisdiction.** N/A.
Targeted Disaster Preparedness Education  
Broome County  

**Project Type.** Featured.

**Project Description.** This project provides a disaster preparedness education campaign for vulnerable populations in the Southern Tier. These groups could include low-income residents, renters, persons for whom English is a second language, persons with disabilities, or other identified vulnerable populations. The project would raise individual preparedness levels for these groups through three training programs: “Preparedness for Individuals and Households”, “Preparing Your Pet”, and “Preparedness for Businesses”. The business training would include planning for continuity of operations after a disaster. Project funds would be used for volunteer recruitment, training, orientation, and program implementation and cover a service area that includes Broome, Chenango, Delaware, and Tioga Counties.

**Project Cost.** The estimated cost is approximately $25,000.

**Project Benefits.** Benefits of the project include:

- **Health and Social Benefits.** Vulnerable populations will be more prepared for future disasters. This educational outreach and flood awareness program has the potential to reduce the burden on health and social services during extreme weather events.

**Cost-Benefit Analysis.** Providing training resources for the citizens of Broome County will help bring awareness and preparedness during future emergency events. Based on available information and preliminary plans prepared by the Red Cross, the proposed project would have a net benefit on community safety, health and economy by providing educational tools, particularly to segments of the population that are most vulnerable due to economic, mental, and physical constraints. This proposed project would provide training for individuals and households for handling future storm/emergency events, particularly in the first 72 hours following a disaster. The training would make the Broome Community, as a whole, more resilient in advance of disaster events and during post-storm recovery activities. The potential benefits of this project are considered to outweigh the $25,000 investment required to prepare and implement the training and educational outreach.

**Risk Reduction Analysis.** Increased awareness of flood risk, particularly among vulnerable populations, can enhance the efficiency and coordination of response and recovery activities by the Broome municipalities and other governmental entities such as the Broome County Office of Emergency Management, thereby improving resiliency pre- and post-storm.

**Timeframe for Implementation.** 9 months.

**Regulatory Requirements.** None.

**Jurisdiction.** Broome County.
Front Street Stormwater Separation Project
City of Binghamton

Project Type. Proposed.

Project Description. This project would include planning, design, and construction services to remove existing combined sewer infrastructure and replace it with separated storm and sanitary sewer systems. During storm events, the amount of stormwater entering the City’s combined system has overwhelmed the regional sewage treatment system and caused the release of untreated or minimally treated effluent into the Susquehanna River. This project would be integrated with the Front Street Gateway project, a City-led effort to reconstruct Front Street, including new curbs, sidewalks, and landscaping, that is designed to identify Front Street as one of the gateways into Binghamton. Although the Front Street Gateway project is being funded by the U.S. Federal Highway Administration, the separation of the combined sewers is not eligible for this funding source. The City anticipates that this project will be bid in mid-2014, with construction starting and ending in 2015. As of April 2014, the project’s design was 75% complete.

Project Cost. The estimated cost is approximately $750,000.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** Reductions in localized flooding are expected during storm events.
- **Environmental Benefits.** Environmental benefits include stormwater runoff prevention and water quality improvements since untreated effluent will no longer be released into the Susquehanna River watershed.
- **Health and Social Benefits.** This project reduces risk of exposure to disease-causing bacteria and viruses contained in combined sewer overflow that is discharged into the water.

Cost-Benefit Analysis. Enhancing public infrastructure maximizes system strength and increases the ability for it to mitigate damage from future flooding events. Based on available information and preliminary plans, separating the City’s stormwater and sanitary sewer systems along Front Street would reduce localized flooding, improve water quality, and improve public health and safety. The project would protect numerous residential and commercial assets located along approximately 1.4 miles of Front Street from localized flooding caused by sewer overflow during intense rainfall events. Communities located downstream from Binghamton would benefit from improved water quality in the Susquehanna River since the regional treatment system would be less likely to discharge untreated sewage. Overall public health and safety benefits would result if hazardous combined sewer overflow is not present. The potential benefits of this project are considered to outweigh the $750,000 investment required to plan, design, and construct the separated stormwater and sanitary sewer systems.

Risk Reduction Analysis. This project would reduce the risk of localized flooding to residents and business owners along Front Street in Binghamton. Risk to public health, both locally and in downstream communities would be reduced by ensuring sanitary sewage is properly contained and treated.

Timeframe for Implementation. 24 months.
**Regulatory Requirements.** Coordination with the NYS Department of Environmental Conservation (DEC) will be needed to determine the impacts of the flood control project. An Article 16 (use of flood control lands) permit may be needed. A highway work permit must be obtained from NYS Department of Transportation (DOT) prior to work activities in State rights-of-way. An Environmental Impact Assessment under the NYS Environmental Quality Review Act (SEQRA) may be required.

**Jurisdiction.** City of Binghamton.

*Location Map of Front Street Stormwater Separation Project.*
Scatter Site Sanitary Sewer Pump Station Resiliency
City of Binghamton

Project Type. Proposed.

Project Description. During Tropical Storm Lee, flooding inundated sanitary sewer pump stations that had not been flooded before, resulting in the failure of the pumping systems that serve significant portions of Binghamton, including neighborhoods with low- and moderate-income residents. The failure of the pump systems caused raw sewage to back up into nearby homes and businesses. The proposed project would provide design and construction services to replace existing electrical power panels and increase the flood resistance and resiliency of the power supply, operational equipment, primary structure, and physical access to Jackson Street and Bevier Street pump stations. The project would also replace pump at the Bevier Street station with a new, submersible pump.

Project Cost. The estimated cost to develop all phases and components is approximately $1.15 million.

Project Benefits. Benefits of the project include:

- Risk Reduction Benefits. The project will protect utility infrastructure to prevent failure during extreme weather events.

- Environmental Benefits. Untreated sanitary sewage will not discharge into area water bodies during periods of extreme rainfall, thereby protecting water quality of the Susquehanna River watershed.

- Health and Social Benefits. This project will reduce risks of exposure to disease-causing bacteria and viruses contained in combined sewer overflow discharged into the water.

Cost-Benefit Analysis. Improvements to public infrastructure increase community resilience during future storms and flooding, thereby ensuring protection of the City of Binghamton’s assets and the safety of its citizens. Based on available information and preliminary plans, improving the City’s Jackson Street and Bevier Street sanitary sewer pump stations would enhance their resiliency and ensure their continuous operational reliability during floods. The project would improve public health and safety by eliminating the potential for disease-causing raw sewage to back up into the numerous homes and businesses served by each pump station. The project would also benefit local and regional water quality since the likelihood of untreated effluent discharges would be minimized. According to the U.S. Department of Commerce (DOC), Economics and Statistics Administration (ESA), the estimated job creation from recovery spending on infrastructure projects in New York is 7.15 construction jobs per $1,000,000 in construction spending\(^2\). Using this methodology and given the $1.15 million expenditure, an estimated 8 construction jobs would be created by
this project. The potential benefits of this project are considered to outweigh the $1.15 million investment required to plan, design and construct the Jackson Street and Bevier Street sanitary sewer pump station improvements.

**Risk Reduction Analysis.** This project does not explicitly reduce the risk of flooding; however, it would reduce the risk of two key sanitary sewer pump stations being rendered inoperable as a result of flooding. Risk to public health, both locally in the Jackson Street and Bevier Street neighborhood and in downstream communities would be reduced by ensuring sanitary sewage is properly contained and treated.

**Timeframe for Implementation.** 12 months.

**Regulatory Requirements.** Coordination with NYS DEC will be needed to determine the impacts of the flood control project. An Article 16 (use of flood control lands) permit may be needed. A highway work permit must be obtained from NYS DOT prior to work activities in State rights-of-way.

**Jurisdiction.** City of Binghamton.

*Location Map of Scatter Site Sanitary Sewer Pump Station Resiliency Project.*
Scatter Site Stormwater Infrastructure
City of Binghamton

Project Type. Proposed.

Project Description. During Tropical Storm Lee, the extent of the flooding overwhelmed and inundated stormwater management infrastructure that had flooded in the past. Electrical equipment required for continuous operation of the system was flooded and damaged. The Emma Street and Glenwood Avenue pump stations, which are located at a railroad underpass, proved to be extremely vulnerable to localized flooding. This project would provide design and construction services to introduce flood resistance and resiliency for the power supply, operational equipment, primary structure, and physical access at the Rush Avenue, Moeller Street, Emma Street, and Glenwood Avenue pump stations. Depending on site-specific conditions, the project could include elevating equipment and other components above the base flood elevation, waterproofing electrical panels to withstand being fully submerged, or relocating the panels and other equipment out of the floodplain. The pump station buildings would be flood-proofed to minimize floodwater infiltration and damage to components inside.

Project Cost. The estimated cost is approximately $1.1 million.

Project Benefits. Benefits of the project include:

| Risk Reduction Benefits. | These improvements will protect utility infrastructure to prevent failure during extreme weather events. |
| Health and Social Benefits. | Area neighborhoods with low and moderate-income residents will be positively impacted by these protection measures. The project will also improve and ensure continued emergency service operations during similar events. |

Cost-Benefit Analysis. Enhancing public infrastructure maximizes system strength and increases the ability for it to mitigate damage from future flooding events, thereby ensuring protection of the City of Binghamton’s assets and the safety of its citizens. Based on available information and preliminary plans, improving the City’s Rush Avenue, Moeller Street, Emma Street, and Glenwood Avenue stormwater pump stations would enhance their resiliency and ensure their continuous operational reliability during floods. Since each pump station would continue to operate, the risk of flooding to adjacent streets, homes, and businesses in their service areas would be reduced. Low-and moderate-income residents of these neighborhoods would benefit from the reduced risk of localized flooding. Using the methodology from the U.S. DOC ESA report, the $1.1 million project would create an estimated 8 construction jobs. The potential benefits of this project are considered to outweigh the $1.1 million investment required to plan, design, and construct Rush Avenue, Moeller Street, Emma Street, and Glenwood Avenue stormwater infrastructure improvements.

Risk Reduction Analysis. This project would reduce flood risk to four key stormwater pump stations: Rush Avenue, Moeller Street, Emma Street, and Glenwood Avenue. As a result, each pump station would be able
to continuously operate in adverse conditions, which would reduce the risk of flooded streets, homes, and businesses at the low points within their service areas.

**Timeframe for Implementation.** 13 months.

**Regulatory Requirements.** Coordination with NYS DEC will be needed to determine the impacts of the flood control project. An Article 16 (use of flood control lands) permit may be needed. A highway work permit must be obtained from NYS DOT prior to work activities in State rights-of-way.

**Jurisdiction.** City of Binghamton.

*Location Map of Scatter Site Stormwater Infrastructure.*
Creek Channel Improvements
City of Binghamton

Project Type. Proposed.

Project Description. Park Creek is lined with concrete from Cross Street to Vestal Avenue and generally parallels Park Avenue. The City of Binghamton is responsible for the maintenance and repair of this concrete channel. The City has performed work in the past to maintain the channel and has made some repairs to the concrete to keep it serviceable. In addition, two of the bridges over the channel have been replaced. Recent inspections have revealed that flooding during Tropical Storm Lee caused damage to the concrete lining that had not been evident before. The City has concluded that if this concrete lining fails, it would block the channel and cause flooding of nearby residential neighborhoods and Binghamton General Hospital.

Chamberlain Creek flows from its headwaters in the Town of Binghamton south under Route 81/17 and into the City of Binghamton. It generally flows from north to south through residential areas and crosses under Robinson Street in a culvert. Both the creek channel and culvert were functional before the 2011 flood; however, the flooding caused damage in the creek, including erosion of its banks near some residences. This erosion was caused by the inadequate capacity of the culvert on Robinson Street. The flood waters backed up behind the culvert and eventually overflowed the culvert onto Robinson Street. This overflow damaged a nearby commercial building and the downstream channel.

This project would repair the concrete sections of the Park Creek channel to extend the life of its structure and to prevent its failure. The project would also replace the Chamberlain Creek culvert with a larger structure that would have the capacity to convey more stormwater. Stone lining would be installed upstream and downstream of the new culvert to protect the structure and stream bank.

Project Cost. The estimated cost to develop all phases and components of the project is approximately $1.5 million.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** These improvements will protect utility infrastructure to prevent failure during extreme weather events.

- **Health and Social Benefits.** Area neighborhoods with low- and moderate-income residents will be better protected with these improvements. The project will also increase resiliency of Binghamton General Hospital.

Cost-Benefit Analysis. Improvements to public infrastructure increase community resilience in the face of future storms and flooding, thereby ensuring protection of the City of Binghamton’s assets and the safety of its citizens. Based on available information and preliminary plans, improving selected creek channels and culverts to improve their reliability and capacity would reduce the potential for localized flooding, erosion, and damage to adjacent homes and businesses. Using the methodology from the U.S. DOC ESA report[^22]
and given the $1.5 million project cost, an estimated 10 construction jobs would be created by this project. Repairing the concrete-lined channel of Park Creek will reduce its risk of failure and the possibility that a portion of the channel lining could be dislodged and obstruct the flow of stormwater. By minimizing flood risk, the project would protect approximately 50 homes and businesses (including Binghamton General Hospital) that are located along the east and west sides of Park Avenue between Cross Street and Vestal Avenue. Similarly, installing a larger culvert on Chamberlain Creek at Robinson Street would protect homes and businesses in the adjacent area.

**Risk Reduction Analysis.** This project would positively affect community health and safety by reducing the flood risk for nearly 50 homes and businesses, including a hospital facility. Patients and residents served by the hospital would benefit from unimpeded service interruptions due to severe storms and flooding. Low- and moderate-income residents would be better served by this project due to uninterrupted access and connectivity to residences and places of work and business during future storms and floods.

**Timeframe for Implementation.** 14 months.

**Regulatory Requirements.** Coordination with NYS DEC will be needed to determine the impacts of the flood control project. An Article 16 (use of flood control lands) permit may be needed.

**Jurisdiction.** City of Binghamton.
Exchange Street Housing Flood Resistance
City of Binghamton

Project Type. Featured.

Project Description. During Tropical Storm Lee, vulnerable populations were displaced from their homes for extended periods of time due to the failure of utility systems serving the buildings in which they resided. This negatively affected the residents themselves and the health and social service providers who assist them. This project will provide feasibility study, design, and construction services for resilient and flood-resistant infrastructure within existing high-rise and multi-story housing structures (three publicly subsidized housing complexes and a women’s homeless shelter). The project would relocate critical systems (e.g., standard power, emergency power, heating, ventilation and air conditioning, and potable water) above flood elevation.

Project Cost. The estimated cost to develop all phases and components of the project is approximately $2 million.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** This project will protect building power, water, heating, and cooling systems to prevent their failure during extreme weather events.

- **Health and Social Benefits.** Exchange Street housing supports services for more than 400 residents considered ‘vulnerable populations’ (e.g., senior, low-income, transient female, and handicapped persons). During evacuations, these residents can require highly specialized services and support that are dependent on critical building systems working uninterrupted. The project will ensure evacuations can be handled seamlessly without power and/or water disruptions and failures. Retrofitting the buildings with flood-resistant utility systems will reduce risk exposure of social services provided to the vulnerable populations.

Cost-Benefit Analysis. Improvements to critical elements of public housing infrastructure increase resilience in the face of future storm events and flooding, minimizing impacts on vulnerable populations and the support system that serves them. Based on available information and preliminary plans, relocating building utility systems above flood elevation would reduce the risk of failure, cost to replace in kind, and the time that the more than 400 residents would be dislocated from their homes. The investment of approximately $2.0 million would provide a number of benefits, including decreased vulnerability and risk of flood damage and social benefits of allowing residents to return to their homes more quickly after flooding from storm events. Based on the methodology from the U.S. DOC ESA report the $2 million project cost would create 14 construction jobs. The potential benefits of this project are considered to outweigh the $2 million investment required to plan, design, and construct the Exchange Street Housing Flood Resistance project.

Risk Reduction Analysis. This project would reduce the flood risk to key building utility infrastructure at an estimated cost of approximately $2.0 million. As a result of retrofitting the buildings to move the
utilities above the flood elevation, future costs to replace damaged infrastructure would be reduced and
placement time would be minimized.

**Timeframe for Implementation.** 8 months.

**Regulatory Requirements.** None.

**Jurisdiction.** Binghamton Housing Authority or other housing providers.
Susquehanna Street Stormwater Detention  
City of Binghamton

Project Type. Featured.

Project Description. This project presents a long-term, visionary conceptual plan for the Susquehanna Street area in the City of Binghamton. It illustrates flood-resilient design concepts to relocate vulnerable populations to safer, lower-risk areas, provide for additional stormwater management and flood storage, and generate quality of life and economic co-benefits for the community. The project would evaluate the long-term, strategic redevelopment of this area, including acquiring and demolishing existing structures, reconfiguring and/or reconstructing existing transportation infrastructure (e.g., local streets and State highway) to provide resiliency and resistance to flood effects, and allowing adaptive reuse of properties to create open space designed for stormwater detention. Figure 4.1 illustrates a conceptual design of this transformative stormwater detention project in downtown Binghamton. The scope of this featured project is limited to architectural and engineering design.

Project Cost. The estimated cost for architect-engineer design is approximately $3.4 million.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** The project protects the area located south of Susquehanna Street, between Chapman Street (east) and State Street, which is a mixed commercial and residential district that includes several public housing units that house vulnerable populations, including senior, low- to moderate-income, and handicapped residents.

- **Economic Benefits.** The project protects commercial assets that contribute to the tax base of the City of Binghamton. It also enhances the desirability to work and live adjacent to the Susquehanna River, potentially spurring revitalization of downtown Binghamton.

- **Environmental Benefits.** Stormwater detention in the area will reduce runoff into the Susquehanna, improving the water quality.

- **Health and Social Benefits.** Secondary benefits include the creation of green space(s) for urban agriculture or public recreation, expanding public access to the river.

Cost-Benefit Analysis. Enhancing public infrastructure maximizes system strength and increases its ability to mitigate damage from future flooding events, thereby strengthening community resilience and protecting assets of the City of Binghamton and the safety of its citizens. Based on available information and preliminary conceptual plans, the project would improve the stormwater management system, relocate flood-prone buildings in the Susquehanna Street neighborhood, and provide an additional water storage capacity of approximately 93 acre feet. The added water storage capacity during storm events would improve system functionality and reduce the potential for localized flooding, erosion, and damage to adjacent homes and businesses. The potential benefits of this project are considered to outweigh the $3.4 million investment required to plan and design the stormwater detention system.
**Risk Reduction Analysis.** The addition of approximately 93 acre feet of water storage capacity will reduce the risk of localized flooding to residents and businesses. Given the information and data analyzed to date, other risk reduction benefits would include removing critical assets from the floodplain, decreasing stormwater runoff, and protecting riverine ecosystems and limiting contributing to flood waters.

**Timeframe for Implementation.** 18 months.

**Regulatory Requirements.** It is anticipated that for implementation, approvals would be required from NYS DEC for SPDES, DEC and USACE for flood control project, and NYS DOT for highway work permits.

**Jurisdiction.** City of Binghamton.
Figure 4.1: Conceptual Plan for Susquehanna Street, Binghamton

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**Carlin Creek North Flood Mitigation**  
**Town of Conklin**

**Project Type.** Proposed.

**Project Description.** This proposed project will construct stormwater control measures to mitigate flooding that occurs in Schnurbush Park, which is located west of the Susquehanna River and east of Conklin Road. The project would also benefit the residential area east of Carlin Creek and west of Conklin Road that is served by Carol Court and David Road. The stormwater improvements include replacing undersized culverts along Carol Court and David Road, reshaping and widening the width of Carlin Creek’s channel to increase its capacity, and establishing a routine maintenance program to remove debris and enhance stormwater capacity. The scope of the proposed improvement program was established during public outreach meetings with the neighborhood residents.

**Project Cost.** The estimated cost is approximately $500,000.

**Project Benefits.** Benefits of the project include:

- **Risk Reduction Benefits.** The project would reduce the risk of flash flooding and erosion to residential neighborhoods, specifically the Carol Court neighborhood.

- **Economic Benefits.** By protecting the Carol Court neighborhood from flooding, the neighborhood will remain viable and continue to generate taxes for the local community. Economic benefits will also accrue to the neighborhood's residents based on the prevention of future flood-related damage.

- **Environmental Benefits.** Potential for increased water quality due to settlement of sediments and pollutants in detained stormwater runoff.

**Cost Benefit Analysis.** Improvements to public infrastructure increase community resilience in the face of future storms and flooding, thereby ensuring protection of the Town of Conklin’s assets and the safety of its citizens. Based on available information and preliminary plans, improving the stormwater management system in the Carlin Creek North project area would improve the system’s functionality, water storage capacity, and reduce the potential for localized flooding, erosion, and damage to adjacent homes and businesses. By minimizing flood risk, the project would protect approximately 70 homes as well as Francis P. Donnelly Elementary School located north of Carol Court. The potential benefits of this project are considered to outweigh the $500,000 investment required to plan, design, and construct the stormwater control measures.

**Risk Reduction Analysis.** The development of additional storage capacity would reduce the risk of localized flooding to residents and the elementary school located north of Carol Court and west of Route 7.

**Timeframe for Implementation.** 15 months.
Section IV: Implementation—Project Profiles

**Regulatory Requirements.** Dam safety and site disturbance permits may be needed and coordinated through the NYS DEC prior to construction. A highway work permit must be obtained from NYS DOT prior to work activities in State rights-of-way.

**Jurisdiction.** Town of Conklin.

![Location Map of Carlin Creek North Flood Mitigation.](image)
Carlin Creek South Watershed Engineering and Design
Town of Conklin

Project Type. Proposed.

Project Description. During major storm events, restrictions in the lower reaches of Carlin Creek cause localized flooding to occur in the Carol Court/David Road neighborhood. The project area is roughly bounded by Carlin Road on the north; Route 7/Conklin Road to the east; the intersection of Corporate Drive and Route 7/Conklin Road to the south; and Karic Drive and Tracy Drive on the west. This project would evaluate the feasibility of stormwater diversion for Carlin Creek south of Carlin Road, including the creation of a new flood storage wetland area east of the Corporate Park and adjacent to the rail line. The project also would evaluate using the existing adjacent undeveloped forest and riparian land in this area for added flood storage.

The Carlin Creek South Watershed Improvements reduce flooding impacts in the area of Francis P. Donnelly Elementary School and the intersection of Powers Road and Conklin Road. In addition, there is an opportunity to provide for approximately 55 acre feet of storage during storm events which would further reduce impacts further downstream in the more heavily developed portions of the Broome Community.

Project Cost: The estimated cost is approximately $160,000.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** Potential for reduced risk of flash flooding and erosion to residential neighborhoods, businesses, and schools near Corporate Drive, dependent on the outcomes of the engineering.

- **Environmental Benefits.** Potential for increased water quality due to settlement of sediments and pollutants in detained stormwater runoff.

Cost Benefit Analysis. Enhancing public infrastructure maximizes system strength and increases its ability to mitigate damage from future flooding events. Based on available information and preliminary plans, improving the stormwater management system along the Carlin Creek South project area would provide an additional water storage capacity of approximately 55 acre feet during storm events. The added water storage capacity would improve the system functionality and reduce the potential for localized flooding, erosion, and damage to adjacent homes and businesses. By minimizing flood risk, the project would protect approximately 70 homes and businesses, as well as Francis P. Donnelly Elementary School. The potential benefits of this project are considered to outweigh the $160,000 investment required to plan and design the stormwater control measures.

Risk Reduction Analysis. The addition of approximately 55 acre feet of water storage capacity will reduce the risk of localized flooding to residents and businesses as well as the elementary school located north of Carol Court and west of Route 7. Given the information and data analyzed to date, other risk reduction benefits
include decreasing stormwater runoff, protecting riverine ecosystems, and limiting contribution to flood waters.

**Timeframe for Implementation.** 1 year.

**Regulatory Requirements.** No regulatory requirements to generate design and engineering services for the project.

**Jurisdiction.** Town of Conklin.

*Location Map of Carlin Creek South Watershed Engineering and Design.*
Powers Road Evacuation Route Flood Protection Study
Town of Conklin

Project Type. Proposed.

Project Description. When Tropical Storm Lee struck the Town of Conklin, a 600-home neighborhood between Powers Road and Shaw Road became isolated by flooding at the north and south ends of Conklin Road. The proposed project would include planning and design of a new evacuation route for residents living in the neighborhood. A featured project in the second phase would execute site preparation and actual construction of the evacuation route. As currently planned, the road would be routed westerly to a point approximately 400 feet north of the low lying intersection of Powers Road and Conklin Road. It would then wrap around a large open area before connecting to an upland section of Powers Road east of the railroad tracks. The road would be elevated above the base flood elevation, enabling residents to safely exit the neighborhood and maintain access to primary evacuation routes.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** Completion of the planning and design will better define the risk reduction benefits of the evacuation route for the neighborhood. However, the inclusion of this project assumes that an evacuation route will provide some level of flood protection for the Cherry Drive and Roxbury Street neighborhoods.

- **Health and Social Benefits.** Completion of the evacuation route will ensure residents of the Cherry Drive and Roxbury Street neighborhoods can evacuate safely during an emergency.

Cost Benefit Analysis. Based on available information and preliminary plans, the proposed study would have a net benefit on community safety, health and mobility. The creation of an evacuation route would increase the protection of the approximately 600 homes in the neighborhood, and is intended to avoid isolation of the neighborhood during major storm events that have occurred in the past. The potential benefits of this project are considered to outweigh the $130,000 investment required for planning and design of the flood protection and evacuation route.

Risk Reduction Analysis. This project reduces the risk of residents located in 600 homes becoming stranded during flood events by providing enhanced mobility for residents and emergency service providers.

Project Cost. The estimated cost of planning and design is approximately $130,000.

Timeframe for Implementation. 12 months.

Regulatory Requirements. None.

Jurisdiction. Town of Conklin.
Section IV: Implementation—Project Profiles

Location Map of Powers Road Evacuation Route Flood Protection Study
Stillwater Road Stormwater Improvements  
Town of Conklin

Project Type. Proposed.

Project Description. The Town of Conklin’s Stillwater Road neighborhood floods during extreme storm events, particularly at the intersection of Stillwater Road and Route 7A. Since Stillwater Road is the only primary access road out of the neighborhood, this proposed project will install a stormwater drainage system along a one-block long section of Stillwater Road to mitigate flooding. Construction activities would include installation of one end section with bar screen, approximately 900 feet of 36-inch corrugated pipe, four manholes, and one flap gate at the pipe’s discharge point into the Susquehanna River.

Project Cost. The estimated cost is approximately $300,000.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** The project will reduce flooding threats to residences and businesses in and around the Stillwater Road neighborhood.

- **Economic Benefits.** Protection of surrounding residences and businesses will preserve the tax base of the community.

- **Health and Social Benefits.** Completion of the stormwater project will ensure residents of the neighborhood can evacuate safely during an emergency.

Cost Benefit Analysis. Providing sustainable stormwater infrastructure in high-risk flood areas supports community resilience to future storms and flooding. Based on available information and preliminary plans, installation of a stormwater management system in the Stillwater Road neighborhood would enhance the resiliency of this neighborhood by reducing the risk of localized flooding and addressing mobility issues that impact approximately 50 homes that use the intersection of Route 7A and Stillwater Road since Stillwater is the only access road for the neighborhood. This project would provide residents of the Stillwater Road neighborhood with an evacuation route in flooding emergencies. The potential benefits of this project are considered to outweigh the $300,000 investment required to plan, design, and construct the stormwater improvements along the evacuation route.

Risk Reduction Analysis. This project would reduce the flood risk to the street system and homes in the Stillwater Road neighborhood. Approximately 50 homes would be served by unimpeded access to the Stillwater Road neighborhood during flood events.

Timeframe for Implementation. 1 year.
Regulatory Requirements. Construction projects resulting in a disturbance of one or more acres require coverage under SPDES Permit for Stormwater Discharges for Construction Activity. A highway work permit also must be obtained from NYS DOT prior to work activities in State rights-of-way.

Jurisdiction. Town of Conklin.

Location Map of Stillwater Road Stormwater Improvements.
Community Center Relocation
Town of Conklin

Project Type. Proposed.

Project Description. The Town of Conklin’s community center is located on the west side of Route 7 in an area that repeatedly floods. During Tropical Storm Lee, the building was inundated. This project would construct a new 10,500 square-foot community center outside the floodplain. The building would include a 6,000 square-foot event space and adjacent kitchen. In addition to hosting community center activities and functions, the building would serve as the Town’s emergency command center and shelter. A 2,400 square-foot portion of the structure would be used as a garage by the Town’s Parks Department. As of April 2014, the Town has neither selected nor acquired a site on which to construct the new community center. Consideration is being given to sites on Powers Road that are either in or adjacent to the industrial park served by Broome Corporate Parkway.

Project Cost. The estimated cost is approximately $1.2 million.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** The proposed project mitigates flood risk by relocating the community center from a location that is highly susceptible to flooding.

- **Economic Benefits.** Economic benefits would accrue since the Town would no longer incur costs related to clean up and repair of the community center after it is flooded.

- **Health and Social Benefits.** Residents of Conklin would benefit from having a flood-safe emergency command center and shelter.

Cost-Benefit Analysis. Improving the Town of Conklin’s capacity to shelter persons displaced by flooding will positively affect the community’s overall resilience and ability to address the health and social needs of its citizenry. Based on available information, the proposed project would have a net positive benefit on community safety and health, since a local shelter would provide a centralized, safe location for Conklin residents with no access to lodging and post-flood assistance. In addition, a relocated facility would not be subject to repeated flooding and the expense of repairs associated with the existing community center. Based on the methodology from the U.S. DOC ESA report, the $1.2 million project would create 8 construction jobs. The potential benefits of this project are considered to outweigh the $1.2 million investment required to design and construct the community center.

Risk Reduction Analysis. This project would reduce the risk of injury or ill health to Town of Conklin residents displaced from their homes due to flooding and reduce the risk of inundation by creating a new facility in an area not subject to flooding.

Timeframe for Implementation. 24 months

![The Conklin Community Center was inundated by Tropical Storm Lee.](image)
**Regulatory Requirements.** Construction projects resulting in a disturbance of one or more acres requires coverage under SPEDES Permit for Stormwater Discharges for Construction Activity. SEQR review at the local level.

**Jurisdiction.** Town of Conklin.
Carlin Creek South Watershed Improvements
Town of Conklin

**Project Type.** Featured.

**Project Description.** The project links a series of contiguous parcels of land by lowering the land adjacent to Carlin Creek and allowing the creek to flow in a controlled manner during high flow events. Construction will involve removing existing earth adjacent to the creek to lower the surface and allow it to flood, providing substantial flood storage capacity and the opportunity to filter sediments before being conveyed downstream. Carlin Creek will remain undisturbed, except in areas where bypass channels will be created that allow high water to flow into and out of the flood storage areas and surrounding floodplain. The area will be replanted with native riparian vegetation to naturally store and clean stormwater runoff and occasional flooding, while reducing the impacts of erosion during high flow events. Future phases of the mitigation areas shall incorporate a trail network with a series of overlooks, boardwalks, and interpretive signage. Figure 4.2 is a conceptual depiction of possible watershed improvements adjacent to Carlin Creek.

**Project Cost.** The estimated cost to develop all phases and components is approximately $1.84 million. This project may be eligible for GIGP financial assistance from the NYS EFC.

**Project Benefits.** Benefits of the project include:

- **Risk Reduction Benefits.** Reduced risk of flash flooding and erosion to residential neighborhoods, businesses, and schools near Corporate Drive.
- **Economic Benefits.** Potential economic benefits from tourism generated by the trail network.
- **Environmental Benefits.** Potential for improved water quality due to settlement of sediments and pollutants in detained stormwater runoff.
- **Health and Social Benefits.** The trail network will provide the entire community with a beautiful recreational and educational amenity that promotes the benefits of sustainable floodplain management and green infrastructure.

**Cost Benefit Analysis.** Improvements to public infrastructure increase community resilience during future storms and flooding events, thereby ensuring protection of the Town of Conklin’s assets and the safety of its citizens. Based on available information and preliminary plans, improving the stormwater management system along the Carlin Creek South project area would provide an additional water storage capacity of approximately 55 acre feet during storm events. The added water storage capacity would improve system functionality and reduce the potential for localized flooding, erosion, and damage to downstream homes and businesses. By minimizing flood risk, the project would protect 70 homes and businesses, as well as Francis P. Donnelly Elementary School. Using the methodology from the U.S. DOC ESA report and given the $1.84 million project cost, an estimated 13 construction jobs would be created by this project. The potential benefits of this project are considered to outweigh the $1.84 million investment required to construct the stormwater drainage system.
**Risk Reduction Analysis.** The addition of approximately 55 acre feet of water storage capacity will reduce the risk of localized flooding to residents and businesses as well as the elementary school located north of Carol Court and west of Route 7.

**Timeframe for Implementation.** 14 months.

**Regulatory Requirements.** A dam safety permit may be needed and coordinated through the NYS DEC prior to construction. A highway work permit must be obtained from NYS DOT prior to work activities in State rights-of-way.

**Jurisdiction.** Town of Conklin.
Figure 4.2: Conceptual Plan for Carlin Creek South Watershed Improvements, Conklin
Powers Road Evacuation Route Flood Protection Construction
Town of Conklin

Project Type. Featured.

Project Description. When Tropical Storm Lee struck the Town of Conklin, a 600-home neighborhood between Powers Road and Shaw Road became isolated by flooding at the north and south ends of Conklin Road. This featured project would follow the proposed project for the road's planning and design. This project would construct the proposed emergency evacuation roadway (approximately 1,200 linear feet) to serve as an evacuation route for residents living in the neighborhood along Route 7 between Shaw Road and Powers Road. The gated roadway would only be opened during storm events. Based on its final design, it would also provide some limited flood protection for Cherry Drive and Roxbury Street neighborhoods. The project includes acquisition of private property for the access road’s right-of-way.

Project Cost: The estimated cost is approximately $1.1 million.

Project Benefits. Benefits of the project include:

- Risk Reduction Benefits. The Powers Road Evacuation Route will provide limited flood protection for the Cherry Drive and Roxbury Street neighborhoods.

- Health and Social Benefits. Approximately 600 households and business interests will have a viable evacuation route during severe weather events.

Cost Benefit Analysis. The construction of the Powers Road Evacuation Route would significantly increase community resilience in the face of future storms and flooding events, thereby ensuring protection of the Town of Conklin's assets and the safety of its citizens. Based on available information and preliminary plans, construction of approximately 1,200 linear feet of roadway would have a net benefit on community safety, health and mobility for the 600 home neighborhood. The evacuation route would protect the health and safety of residents by reducing neighborhood isolation during major storm events. Using the methodology from the U.S. DOC ESA report and given the $1.1 million project cost, an estimated 8 construction jobs would be created by this project. The potential benefits of this project are considered to outweigh the $1.1 million investment required to construct the evacuation route.

Risk Reduction Analysis. The evacuation route would reduce neighborhood isolation of the neighborhood during major storm events that in the past has required some residents be airlifted to safety. The improvements would also improve access for emergency service providers.

Timeframe for Implementation. 18 months.

Regulatory Requirements. Project may require U.S. Army Corps of Engineers (USACE) and NYS DEC Protection of Water and Freshwater Wetlands permits. A highway work permit must be obtained from NYS DOT prior to
work activities in State rights-of-way. This project will require approval from the State Historic Preservation Officer (SHPO) and State Environmental Quality Review (SEQR) through the NYS Office of Parks, Recreation, and Historic Preservation – Finger Lakes Region.

**Jurisdiction.** Town of Conklin.

*Location Map of Powers Road Evacuation Route Flood Protection Construction.*
Progress Parkway / Hardie Road Sewer Extension  
Town of Conklin

**Project Type.** Featured.

**Project Description.** This project would design and extend sanitary sewer service along Hardie Road for approximately 1 mile from Powers Road to Shaw Road. The Town of Conklin wants to provide sanitary sewer services to this area to enable future development to take occur. This project coincides with another featured project under which the Town of Conklin is exploring acquisition of adjacent property to develop a neighborhood that will accommodate displaced residents.

**Project Cost.** The estimated cost is approximately $1 million.

**Project Benefits.** Benefits of the project include:

- **Economic Benefits.** Existing property owners along Progress Parkway and Hardie Road will benefit from sanitary sewer service. The Town of Conklin is exploring the acquisition of adjacent property for redevelopment purposes that includes an affordable senior housing component.

- **Health and Social Benefits.** Existing property owners along Progress Parkway and Hardie Road will benefit from sanitary sewer service. Long-term benefits include potential for senior housing, accommodating a socially vulnerable population.

**Cost Benefit Analysis.** Providing additional sewer infrastructure supports community redevelopment and economic growth for the Town of Conklin. Based on available information and preliminary plans, extending sewer service would provide existing residents and businesses along Progress Parkway, Shaw Road, and Hardie Road improved utility service and create an opportunity to develop an area approximately 3.8 square miles for displaced residents, low and moderate income households, and other vulnerable populations. The economic benefits of this project include potential local business growth, retaining and growing the current tax base, and the potential to create new jobs through development and construction. Using the methodology from the U.S. DOC ESA report, the $1 million project would create an estimated 7 construction jobs. The potential benefits of this project are considered to outweigh the $1 million investment required to plan, design, and construct the sewer line extension.

**Risk Reduction Analysis.** Given the information and data analyzed to date, risk reduction benefits include encouraging new development in flood-safe areas, reducing town-wide vulnerability, and installing disaster-resilient infrastructure.

**Timeframe for Implementation.** 2.5 years.

**Regulatory Requirements.** Sewer extension plans will require DEC Division of Water (DOW) approval. The NYS and Broome County Departments of Health (DOH) will need to review and approve the engineering plan.

**Jurisdiction.** Town of Conklin.
Location Map of Progress Parkway/Hardie Road Sewer Extension.
Backflow Preventer Program
Village of Endicott

Project Type. Proposed.

Project Description. During Tropical Storm Lee, the infiltration and inflow of stormwater into the Village of Endicott’s sanitary sewer system caused localized backups of sewage into residential homes. This project would install backflow preventer valves in approximately 45 homes to prevent stormwater and raw sewage from entering area homes.

Project Cost. The estimated cost to develop all phases and components is approximately $135,000.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** The project will reduce sewage backups into homes during extreme weather events.
- **Economic Benefits.** Economic benefits will accrue to Endicott residents since they will avoid paying for the cleanup required when untreated sewage backs up into their homes.
- **Environmental Benefits.** Untreated sanitary sewage will not discharge into area water bodies during periods of extreme rainfall.
- **Health and Social Benefits.** This project will reduce risk of exposure to disease-causing bacteria and viruses contained in combined sewer overflow discharged into the water.

Cost Benefit Analysis. Enhancements to property infrastructure protect the health and safety of the residents of the Village of Endicott and also reduce the potential for property damage due to system failures and backflows. Based on available information and preliminary plans, installing backflow preventers in individual homes would have a net benefit by reducing stormwater damage during heavy rain events and risk of contact with raw sewage. This project would improve public health and safety by eliminating the potential for disease-causing raw sewage to back up into approximately 45 homes located in neighborhoods with low- and moderate-income populations. The potential benefits of this project are considered to outweigh the $135,000 to implement the proposed infrastructure improvements.

Risk Reduction Analysis. This project would protect the health and safety of low and moderate income neighborhoods in the Village of Endicott by installing backflow preventers that will strengthen existing infrastructure.

Timeframe for Implementation. 5 months.

Regulatory Requirements. Construction activity resulting in a disturbance of one or more acres requires coverage under SPDES Permit for Stormwater Discharges. A highway work permit must be obtained from NYS DOT prior to work activities in State rights-of-way. The NYS and Broome County DOH will review and approve the engineering plan.

Jurisdiction. Village of Endicott
Scatter Site Utility Improvements  
Village of Endicott  

Project Type. Proposed.

Project Description. During Tropical Storm Lee, flooding inundated and damaged a number of stormwater pump stations located in the Village of Endicott. When these pump stations failed, stormwater flooded the low-lying portions of the adjacent service areas. This proposed project will rehabilitate and upgrade aged, under-designed, and vulnerable stormwater pump station components. The work will be performed at three locations: Endwell Pump Station (State 1106), Loder Pump Station (State 2325), and River Terrace Pump Station (State 828).

Project Cost. The estimated cost to develop all phases and components is approximately $710,000.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** The project will reduce the risk of flooding to Endwell, Loder, and River Terrace neighborhoods. In addition, some local businesses, low to moderate-income residents, and area schools will benefit from flood mitigation at these pump stations.

- **Economic Benefits.** Businesses protected by the utility improvement will continue contributing to the community’s tax base.

Cost Benefit Analysis. Improvements to public infrastructure increase community resilience in the face of future storms and flooding, thereby ensuring protection of the Village of Endicott’s assets and the safety of its citizens. Based on available information and preliminary plans, improving the Village’s stormwater system in the Endwell, Loder, and River Terrace neighborhoods would have a net benefit on community safety, health and mobility. With improved pump station functionality and unimpeded operations, the risk of flooding to adjacent streets, homes, and businesses in their service areas would be reduced. Low- and moderate-income residents of these neighborhoods would benefit from the reduced risk of localized flooding and property damage. The potential benefits of this project are considered to outweigh the $710,000 investment required to plan, design and construct the Endwell, Loder and River Terrace Rush Avenue stormwater infrastructure improvements.

Risk Reduction Analysis. This project would reduce flood risk to three key stormwater pump stations Endwell, Loder and River Terrace. As a result, each pump station would be able to continuously operate in adverse conditions, which would reduce the risk of flooded streets, homes, and businesses at the low points within their service areas.

Timeframe for Implementation. 15 months.

Regulatory Requirements. Backup generators of the size proposed at the River Terrace Pump Station are exempt from NYS DEC permitting requirements. Possible petroleum bulk storage registrations may be needed.
depending on type and quantity of fuel. The NYS and Broome County DOH will review and approve the engineering plan.

**Jurisdiction.** Village of Endicott.

*Location Map of Scatter Site Utility Improvements.*
Water Supply Interconnection
Village of Endicott and Town of Union

Project Type. Proposed.

Project Description. During Tropical Storm Lee, flooding at the Village of Endicott’s Ranney Well water supply facility knocked out electrical power for 36 hours. The water storage tanks serving the Village of Endicott and the Town of Union were depleted and water mains collapsed when they became depressurized. The lack of a resilient and reliable water supply and distribution system increases health and safety risks for the Village’s residents and other water system customers. This project would create additional access to potable water if the existing water supply is unavailable due to a power outage or flooding of the well fields. The project would use an existing, pressurized 10-inch transmission line beneath the Susquehanna River. The interconnection would require approximately 250 linear feet of 10-inch ductile iron pipe, several valves, a meter, a blow-off hydrant, two pumps, and two motors. The project would also include construction of a 12-foot by 18-foot concrete vault with an emergency generator installed above the 500-year flood elevation.

Project Cost. The estimated cost is approximately $548,563.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** The project will ensure continued availability of potable water for Endicott and Vestal residents.

- **Economic Benefits.** A more reliable water supply system may increase confidence in the business community to continue investments in the Village of Endicott and the Town of Union.

- **Health and Social Benefits.** All municipal water district users will benefit from the water system’s improved reliability.

Cost Benefit Analysis. Improvements to public infrastructure increase community resilience in the face of future storms and flooding. Based on available information and preliminary plans, establishing the interconnection between the Village of Endicott and Town of Vestal water systems would improve public health and safety by reducing service interruptions during power outages and flood events. The project would protect numerous residential and commercial assets within the Village of Endicott’s water service district. Overall public health and safety benefits would result by having water available for firefighting and general consumption purposes. The potential benefits of this project are considered to outweigh the approximately $320,000 investment required to plan, design and construct the water supply interconnection between the Town of Vestal and the Village of Endicott.

Risk Reduction Analysis. This project would reduce the risk of losing access to water for general consumption and firefighting purposes. The continued availability of water in the service lines reduces the risk of depressurization of the lines and subsequent damage through collapse.
**Timeframe for Implementation.** 8 months.

**Regulatory Requirements.** Backup generators of the size used for this project are exempt from DEC permitting requirements. Possible petroleum bulk storage registrations will be needed depending on type and quantity of fuel. A highway work permit must be obtained from NYS DOT prior to work activities in State rights-of-way.

**Jurisdiction.** Village of Endicott and Town of Vestal.
Wastewater Treatment Plant Improvements
Village of Endicott

Project Type. Proposed.

Project Description. During Tropical Storm Lee, flooding inundated the Village of Endicott’s wastewater treatment plant and damaged equipment throughout the facility. This was the second major flood at the plant within a five-year period. The project would construct flood mitigation measures at the Village of Endicott’s wastewater treatment plant. These measures would include elevating critical equipment above flood level, updating plant equipment, and replacing a redundant power supply. All residents and businesses in the service area, including low to moderate-income neighborhoods (Census tracts 131, 135, 136 and 137), will benefit from improved wastewater treatment.

Project Cost. The estimated cost is approximately $1.66 million.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** The project will elevate the plant’s critical equipment above BFE, and replace a redundant power supply.

- **Environmental Benefits.** Untreated sanitary sewage will not discharge into area water bodies during periods of extreme rainfall.

- **Health and Social Benefits.** This project will reduce risk of exposure to disease-causing bacteria and viruses contained in combined sewer overflow discharged into the water.

Cost Benefit Analysis. Providing sustainable environmental infrastructure and increased potable water storage in high-risk flood areas supports community resilience to future storms and flooding. Based on available information and preliminary plans, improving the Village of Endicott’s wastewater treatment plant and adding potable water storage capacity would ensure the continuous infrastructure reliability and access to safe drinking water for residents during floods. The project would improve public health and safety by eliminating the potential for disease-causing raw sewage to be released into the Susquehanna River. The project would also benefit local and regional water quality since the likelihood of untreated effluent discharges would be minimized. Using the methodology from the U.S. DOC ESA report, the $1.66 million project would create an estimated 12 construction jobs. The potential benefits of this
Broome | NY Rising Community Reconstruction Plan

Project are considered to outweigh the $1.66 million investment required to plan, design and construct the Endicott wastewater treatment plant improvements.

**Risk Reduction Analysis.** This project does not explicitly reduce the risk of flooding; however, it would reduce the risk of the wastewater treatment plant being rendered inoperable as a result of flooding. Risk to public health in downstream communities would be reduced by ensuring sanitary sewage is properly contained and treated.

**Timeframe for Implementation.** 13 months.

**Regulatory Requirements.** Coordination with NYS DEC must occur to determine the impacts to existing flood control projects. An Article 16 (use of flood control lands) permit may be needed.

**Jurisdiction.** Village of Endicott.

*Location Map of Wastewater Treatment Plant Improvements.*
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Huron Campus Flood Mitigation
Village of Endicott

Project Type. Featured.

Project Description. This project presents a long-term, visionary concept for flood mitigation at the 162-acre Huron Campus. The campus is located in the heart of the Village and contains significant large areas of impervious surface, including building roofs and at-grade parking lots. Although the campus was significantly flooded in 2011 from Tropical Storm Lee, it has also experienced localized flooding after less severe storms. Some of the localized flooding can be attributed to problems with existing infrastructure, particularly in the campus’ northwestern quadrant. A flood mitigation study funded by the Town of Union is underway. It will evaluate solutions to the campus’ immediate flooding concerns. The conceptual plan for the Huron Campus Flood Mitigation, shown in Figure 4.3, illustrates long-term concepts to restore an historic neighborhood, improve downtown’s resiliency, and promote economic sustainability by transforming underutilized expanses of paving into residential lots and neighborhood parks. The concept plan also depicts ways to consolidate underutilized parking areas and develop multi-story parking structures. These would enable the campus to transform several surface parking areas into green space or large bio-retention areas to significantly reduce stormwater runoff and treat it on-site.

Project Cost. The estimated cost for architecture and engineering is approximately $1,437,740.

Project Benefits. Benefits of the project include:

- Risk Reduction Benefits. The project will alleviate flooding at the Huron Campus.
- Economic Benefits. The Huron Campus is home to many jobs, including the recently relocated BAE Systems, and a mitigated campus would provide new opportunities to attract economic growth and generate more tax revenues for the Town of Union and Broome County.
- Environmental Benefits. Redeveloping underutilized parking areas into green space and bio-retention areas will enhance filtration of stormwater runoff, potentially improving the water quality of the Susquehanna River watershed.

Cost Benefit Analysis. Improvements to public infrastructure increase community resilience in the face of future storms and flooding events, thereby ensuring protection of the Huron Campus located in the Village of Endicott. A flood mitigation study is currently underway which will provide information and preliminary plans for improving the stormwater management system in and around the Huron Campus and surrounding neighborhood. The benefits of this project include addressing the localized flooding that affects the effective reuse of the facility to continue to attract economic growth and generate tax revenue, economic benefits related to maintaining property values and reduced property damage, and improved connectivity to the adjacent historic neighborhood and downtown commercial area. The potential benefits of this project are considered to outweigh the $1,437,740 investment required to plan and design the stormwater management system.
**Risk Reduction Analysis.** Given the information and data analyzed to date, risk reduction benefits would include decreasing stormwater runoff, protecting riverine ecosystems, limiting contributions to flood waters, reducing overall exposure to flood waters, and reducing the risk of localized flooding to residents and businesses in the Huron Campus area.

**Timeframe for Implementation.** 16 months.

**Regulatory Requirements.** Construction activity resulting in a disturbance of one or more acres requires coverage under SPDES Permit for Stormwater Discharges.

**Jurisdiction.** Village of Endicott.
Figure 4.3: Conceptual Plan for Huron Campus Flood Mitigation, Endicott

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1. Bio-Retention/Flood Storage & Mitigation
2. Parking Structure to Provide Reduction of Surface Parking and Extreme Impervious Surfaces
3. Future Conversion of Surface Parking to Green Space
4. Possible Future Location for High Tech “Green” Buildings, Including Green Roof Technology
5. Bio-Swale
6. Conversion of Existing Lawn Area to Urban Green-Retention
7. Bio-Retention for Existing Stormwater Wells
8. Conversion of Under-utilized and Flood Prone Impervious Surfaces to Bio-Retention Flood Storage Mitigation Area
9. Future Infill Development
11. Possible Future Infill Senior Housing/Multi-family Housing
12. Conversion of Under-utilized Impervious Surface Area “Back” to Residential Lots to Restore Downtown Neighbourhood and Reduce Impervious Surfaces

LAND USE LEGEND
- Senior Housing/Multi-Family Housing
- Parking Structure
- Infill Development
- Senior Park/Visitor Lots
- Possible Future High Tech “Green” Buildings

Existing Conditions
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K-Mart Site Redevelopment  
Village of Endicott

Project Type. Featured.

Project Description. Prior to Tropical Storm Lee, the K-Mart retail department store at this location was one of the highest grossing (per capita) K-Marts in the region, and an important contributor to the local tax base. Flooding closed the store.

This project presents a long-term, visionary concept for redevelopment at the former K-Mart site (see Figure 4.4). The conceptual plan illustrates how a larger “anchor” commercial establishment and several out-parcel commercial structures could be organized around a central linear green. In addition to providing an attractive entry that would control the site’s traffic circulation, the recessed central green also would reduce the site’s impervious surfaces and provide additional flood storage. The finished floor elevation of the commercial buildings would be above base flood elevation to enhance the development’s resiliency. Parking and landscape areas would remain at-grade, enabling the site to occasionally flood. The commercial buildings would provide accessibility through an integrated system of ramps and stairs that would directly connect the parking areas to the store entrances. Site resiliency and sustainability would be enhanced by integrating green infrastructure to handle stormwater runoff generated on-site and provide additional storage for occasional flooding. A system of inter-connected bio-swales and bio-retention areas on the perimeter of the site would naturally store and clean the stormwater runoff, reducing the site’s impact on the Village’s stormwater infrastructure system and the Susquehanna River watershed.

The conceptual plan also calls for further evaluation of an underground stormwater storage system, potentially located across Vestal Avenue under the athletic fields at Jennie F. Snapp Middle School. The feasibility of this system would depend on groundwater levels at the site. Conceptually, this system could handle additional stormwater runoff volumes from the K-Mart site and the surrounding neighborhood, further reducing the impacts to the Village’s stormwater infrastructure system.

The conceptual plan demonstrates a more resilient, sustainable, and attractive approach than conventional “auto-dependent” commercial development. The reuse of this underutilized site would increase the tax base for the Village of Endicott. This alternative approach to conventional commercial development could serve as a model for the Village and the region to demonstrate responsible, resilient, and sustainable economic development.

Project Cost. The estimated cost for architect-engineer design is approximately $2.03 million.

Project Benefits. Benefits of the project include:

- Risk Reduction Benefits. This project reduces flooding threats to adjacent residential and commercial properties.

- Economic Benefits. When implemented, the project may lead to redevelopment of the property, providing jobs and an increased tax base for the Village of Endicott.
Environmental Benefits. The project, through stormwater retention and reductions in impervious surface, reduces stormwater runoff into and improves water quality of the Susquehanna River watershed.

Cost Benefit Analysis. During the course of community planning in response to the storm events of 2011, the need was expressed to reinvigorate older commercial properties. The conceptual planning for the former K-Mart site in the Village of Endicott presents a redevelopment plan that incorporates site resiliency and sustainability by integrating green infrastructure elements. The benefits include mitigating localized flooding that prevents reuse of the facility, attracting economic growth, generating tax revenue, maintaining property values, and reducing property damage. The potential benefits of this project are considered to outweigh the approximately $2.03 million investment required to plan and design the green infrastructure stormwater management system.

Risk Reduction Analysis. Given the information and data analyzed to date, risk reduction benefits would include decreasing stormwater runoff, protecting riverine ecosystems and limiting contributing to flood waters, reducing overall exposure to flood waters, and reduce the risk of post-disaster disruptions to business operations and loss of tax revenue which would help to make the Village economy more resilient to fluctuations in the wake of future storm events.

Timeframe for Implementation. Approximately 1 year for architect-engineer design.

Regulatory Requirements. Construction activity resulting in a disturbance of one or more acres will require coverage under SPDES Permit for Stormwater Discharges.

Jurisdiction. Village of Endicott.
Figure 4.4: Conceptual Plan for K-Mart Site Redevelopment, Union

INDEX OF KEY FEATURES
1. Doc-Burkett
2. Residential Community
3. Existing Conditions
4. Overhead & Street Lighting
5. Underground Storm Water Storage Tank
6. Potential Future Location for Underground Storm Water Storage Tank

Existing Conditions
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Tri-Cities Airport Stormwater Improvements
Village of Endicott

Project Type. Featured.

Project Description. This project presents a long-term, visionary concept for creating large flood storage areas at the municipally-owned Tri-Cities Airport by expanding the river’s floodplain. This project demonstrates the Planning Committee’s commitment to a regional approach, since these mitigation measures primarily benefit their downstream neighbors. The project would capitalize on the open land resources at the airport. The project would remove the airport’s abandoned runway and associated fill to increase the floodplain’s storage capacity. The project would excavate the abandoned runway to a lower elevation, creating approximately 200,000 cubic yards of floodplain storage and protecting adjacent infrastructure at the airport. This project complements the Castle Gardens Buyout Area Stormwater Detention project in the Town of Vestal. Figure 4.11 illustrates the conceptual stormwater improvements associated with both projects.

Project Cost. The estimated cost of architect-engineer design is approximately $184,000.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** Reduced stormwater backup threats to downstream communities during severe weather events.

- **Economic Benefits.** Downstream communities will be spared flood damage, which can negatively affect economic vitality and strength of the community.

- **Environmental Benefits.** Large flood storage areas may reduce riverbank erosion downstream, due to the decreased velocity of floodwaters. In addition, the reduction of flooding downstream may reduce stormwater runoff into the watershed attributed to those areas.

Cost Benefit Analysis. As part of a more comprehensive, regional strategy for addressing stormwater issues, the Tri-Cities Airport Stormwater Improvements increase resilience for downstream communities in future flooding events. Based on available information and preliminary conceptual plans, improving the stormwater management system would provide an additional water storage capacity of approximately 122 acre-feet. The added water storage capacity would improve system functionality and reduce the potential for localized flooding, erosion, and damage to downstream homes and businesses. The potential benefits of this project are considered to outweigh the approximately $184,000 investment required to plan and design the stormwater improvements.

Risk Reduction Analysis. The addition of approximately 122 acre feet of water storage capacity will reduce the risk of localized flooding to residents and businesses. Given the information and data analyzed to date, other risk reduction benefits would include decreasing stormwater runoff, protecting riverine ecosystems, and reducing overall exposure to flood waters.
**Timeframe for Implementation.** Approximately 6 months for architect-engineer design.

**Regulatory Requirements.** Construction activity resulting in a disturbance of one or more acres requires coverage under SPDES Permit for Stormwater Discharges.

**Jurisdiction.** Village of Endicott.

*Location Map of Tri-Cities Airport Stormwater Improvements.*
Anna Maria Drive Ditch Stormwater Management
Village of Johnson City

Project Type. Proposed.

Project Description. Tropical Storm Lee and other storms have caused erosion along the banks of a drainage ditch that is east of and parallel to Anna Maria Drive. The erosion has undermined an existing concrete-encased sanitary sewer main, which if compromised, could release untreated effluent into the creek and ultimately to the Finch Hollow Stormwater Retention Facility 1, located at the southern end of the ditch. Given the approximate 6% slope of the ditch, this erosion endangers properties that are adjacent to the ditch. In some cases, the erosion is 14 feet deep and approximately 30 feet from the rear of existing residences. It also has caused increased sediment loads downstream at the Finch Hollow Stormwater Retention Facility 1. The additional sedimentation reduces the capacity of the retention system. The project would rehabilitate approximately 3,500 feet of drainage ditch to eliminate erosion at 50 residential properties and increase holding capacity of Broome County’s Finch Hollow Stormwater Retention Facility 1. The required permits from the Army Corps of Engineers have been obtained by the Village.

Project Cost. The estimated cost is approximately $950,000.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** The project increases holding capacity at the stormwater retention facility, reducing flood risk to downstream residents and businesses.

- **Environmental Benefits.** It reduces erosion of residential properties in proximity to Anna Maria Ditch.

Cost Benefit Analysis. Core environmental infrastructure improvements will benefit community resilience in future storm events, ensuring the protection of the Village of Johnson City’s assets and the safety of its residents. Based on available information and preliminary designs, the proposed project would have a net benefit on community safety and increased protection for nearly 50 properties from the rehabilitation of 3,500 linear feet of drainage ditch. Additionally, increased stormwater holding capacity at the Finch Hollow Stormwater Retention Facility No.1 will create resiliency during future flooding for the...
neighborhood. The potential benefits of this project are considered to outweigh the approximately $950,000 investment required to plan, design, and construct the stormwater management system.

**Risk Reduction Analysis.** The stabilization of the drainage structure would reduce the risk of localized flooding to downstream residents, and businesses. Given the information and data analyzed to date, other risk reduction benefits include decreasing stormwater runoff, protecting riverine ecosystems and limiting contributing to flood waters, and reducing overall exposure to flood waters.

**Timeframe for Implementation.** 10 months.

**Regulatory Requirements.** A dam safety permit may be needed and coordinated through the NYS DEC.

**Jurisdiction.** Village of Johnson City.

*Location Map of Anna Maria Drive Ditch Stormwater Management.*
DPW Complex Resiliency Improvements  
Village of Johnson City  

Project Type. Proposed.

Project Description. During Tropical Storm Lee, the Village of Johnson City’s DPW complex was inundated, severely damaging equipment and forcing the staff to relocate to inadequate, temporary facilities at Village Hall. During extreme weather events, DPW employees often work long shifts and require use of the facility locker room to rest before going back out. The current space at Village Hall is inadequate. This project would relocate the DPW’s administration offices and employee locker room to a second-story that would be located above the base flood elevation. The project also would construct a new 3,000 square-foot maintenance building and a 13,041 square-foot garage for the Village’s vehicles.

Project Cost. The estimated cost to develop all phases and components is approximately $1.45 million.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** This project protects the DPW administrative offices and employee locker room by relocating them above base flood elevation.

- **Health and Social Benefits.** The project ensures uninterrupted public works services that protect residents, businesses, and institutions during severe weather events. Employees will be capable of resting at the employee locker room during severe weather events when they must work long shifts.

Cost Benefit Analysis. Improvements to public infrastructure increase community resilience in the face of future storms and flooding, thereby ensuring protection of the Village of Johnson City’s assets and the safety of its citizens. Based on available information and preliminary plans, improving the Village’s DPW complex by expanding the existing facility, adding a second-story above BFE, and constructing a new maintenance facility and garage would enhance their resiliency and ensure the continuous operational reliability during floods. This project protects the health and safety of DPW personnel by creating a facility that is more resilient to flooding and also improves DPW response capability during flooding events. Using the methodology from the U.S. DOC ESA report, the $1.45 million project would create an estimated 10 construction jobs. The potential benefits of this project are considered to outweigh the $1.45 million investment required to plan, design, and construct the Johnson City DPW Complex resiliency improvements.
**Risk Reduction Analysis.** This project does not explicitly reduce the risk of flooding for the entire facility; however, this project would protect the safety of DPW personnel and provide better response capability during flooding events.

**Timeframe for Implementation.** 13 months.

**Regulatory Requirements.** Construction activity resulting in a disturbance of one or more acres will require coverage under SPDES Permit for Stormwater Discharges.

**Jurisdiction.** Village of Johnson City.
Sanitary Sewer Pump Station Resiliency Improvements
Village of Johnson City

Project Type. Proposed.

Project Description. During Tropical Storm Lee, the Brown Street sanitary sewer pump station located at Johnson City’s Public Works Department complex was inundated by floodwater and damaged. The damage caused the pump to fail which resulted in the discharge of untreated sewage into an adjacent commercial and residential area that included 19 homes and four businesses.

This project would improve the Brown Street pump station to comply with NYS DEC and “10 States Standards” design guidelines. Specific improvements would include upgrades to the pump station’s power supply, operational equipment, and primary structure, as well as improved physical access.

The project would be designed in accordance with Chapter 40 of the 10 State Standards. Chapter 40 of the 10 State Standards, Wastewater Pumping Stations, states, “Wastewater pumping station structures and electrical and mechanical equipment shall be protected from physical damage by the 100-year flood. Wastewater pumping stations should remain operational and accessible during the 25-year flood. Regulations of State, provincial, and Federal agencies regarding flood plain obstructions shall be considered.”

Project Cost. The estimated cost to develop all phases and components is approximately $208,000.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** Protects the sanitary sewer pump station from water inundation.

- **Environmental Benefits.** The project reduces the risk of untreated sanitary sewage discharge due to pump station failures.

- **Health and Social Benefits.** This will lead to reduced risk of exposure to disease-causing bacteria and viruses contained in combined sewer overflow.

Cost Benefit Analysis. Enhancing public infrastructure maximizes system strength and increases the ability for it to mitigate damage from future flooding events, thereby ensuring protection of the Village of Johnson City’s assets and the safety of its citizens. Based on available information and preliminary plans, improving the Village’s sanitary sewer pump station would enhance the resiliency and ensure the continuous operational reliability during floods. The project would improve public

More than four feet of floodwater inundated the Brown Street sanitary sewer pump station located at Johnson City’s Public Works complex.
health and safety by eliminating the potential for disease-causing raw sewage to be released locally and into the Susquehanna River. Local and regional water quality would also benefit from the likelihood that untreated effluent discharges would be minimized. The potential benefits of this project are considered to outweigh the $208,000 investment required to plan, design, and construct the sanitary sewer pump station improvements.

**Risk Reduction Analysis.** This project does not explicitly reduce the risk of flooding; however, it would reduce the risk of the sanitary sewer pump from being rendered inoperable as a result of flooding. Risk to public health in downstream communities would be reduced by ensuring sanitary sewage is properly contained and treated.

**Timeframe for Implementation.** 16 months.

**Regulatory Requirements.** Plans may require NYS DEC Division of Water approval.

**Jurisdiction.** Village of Johnson City.
Water Treatment Plant Resiliency Improvements
Village of Johnson City

Project Type. Proposed.

Project Description. During Tropical Storm Lee, the levee system surrounding the Village of Johnson City’s water treatment plant overtopped for the first time, leading to structural damage to the water treatment plant and inundation of individual well houses. This project would construct a new water treatment plant building at a more-elevated location within the existing Village-owned site. The project would also flood-proof individual well houses. Crucial office and operational functions necessary to maintain effective water supply service would be located above the 2011 flood level.

Project Cost. The estimated cost is approximately $980,000.

Project Benefits. Benefits of the project include:

- Risk Reduction Benefits. The program will reduce the risk of flooding to the water treatment plant, water wells, and pumps.

- Health and Social Benefits. This project protects the water supply for the Village of Johnson City and some portions of the Town of Union, Town of Dickinson, and Village of Endicott. Critical facilities served by this water treatment plant include the Greater Binghamton Airport, Wilson Hospital, Susquehanna Nursing and Rehabilitation Center, and United Methodist Homes’ James G. Johnston Memorial Nursing Home.

Cost Benefit Analysis. Improvements to public infrastructure increase community resilience in the face of future storms and flooding, thereby ensuring protection of the Village of Johnson City’s assets and the safety of its citizens. Based on available information and preliminary plans, upgrading the Village’s water treatment plant and flood proofing well houses would enhance their resiliency and ensure the continuous operational reliability during floods. This project also protects the water supply for the Village of Johnson City and three other adjacent areas. The potential benefits of this project are considered to outweigh the $980,000 investment required to plan, design, and construct the Johnson City water treatment plant improvements.
**Risk Reduction Analysis.** This project would reduce the risk of the Village's service district losing access to water for general consumption and firefighting purposes.

**Timeframe for Implementation.** 13 months.

**Regulatory Requirements.** Coordination with NYS DEC will be required to determine the effect of the project on existing flood control projects. An Article 16 (use of flood control lands) permit may be needed. The NYS and Broome County DOH will need to review and approve the engineering plan.

**Jurisdiction.** Village of Johnson City.
Oakdale Mall Rehabilitation
Village of Johnson City

Project Type. Featured.

Project Description. This project presents a long-term, visionary concept of how the Oakdale Mall could be retrofitted with green infrastructure techniques and best management practices for stormwater management (see Figure 4.5). The mall building’s flat roof would be modified to a green roof to retain and slow stormwater during rain events, reduce the burden on the stormwater system, and reduce energy costs by absorbing heat. A second alternative would use solar technology on the roof to reduce energy consumption from the power grid and may offset a percentage of the building’s retrofit costs. Portions of the parking area surrounding the mall would be reconstructed and re-graded to redirect stormwater into rain gardens and bio-swales. These features would promote infiltration, improve water quality, and reduce runoff. The large, underutilized asphalt parking lots would be replaced by grass parking surface.

Project Cost. The estimated cost of architect-engineer design is $1.93 million.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** This project increases the holding capacity of stormwater retention facility to reduce flood and erosion risks to residents and businesses surrounding Oakdale Mall. Reductions in stormwater runoff will improve the water quality of the Susquehanna River watershed.

- **Environmental Benefits.** Reduced erosion of residential and commercial properties near Oakdale Mall. Reduced stormwater runoff into and improved water quality of the Susquehanna River watershed.

Cost Benefit Analysis. During the course of community planning in response to the storm events of 2011, the need was expressed to reinvigorate older commercial properties and make them more resilient through the introduction of green stormwater techniques. The conceptual planning for the Oakdale Mall site in the Village of Johnson City presents an opportunity for the community to envision a redevelopment plan that incorporates site resiliency and sustainability by integrating green infrastructure elements. The benefits include addressing the localized flooding downstream, attracting economic growth and generate tax revenue, and economic benefits related to maintaining property values and reduced property damage. The potential benefits of this project are...
considered to outweigh the approximately $1.93 million investment required to plan and design the green infrastructure stormwater management system.

**Risk Reduction Analysis.** Given the information and data analyzed to date, risk reduction benefits would include decreasing stormwater runoff, protecting riverine ecosystems and limiting contributing to flood waters, and reducing overall exposure to flood waters.

**Timeframe for Implementation.** Approximately 1 year for planning and design.

**Regulatory Requirements.** Construction activity resulting in a disturbance of one or more acres requires coverage under SPDES Permit for Stormwater Discharges.

**Jurisdiction.** Village of Johnson City.
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Cloverleaf Interchange Bio-Retention/Flood Mitigation Village of Johnson City and Town of Union

Project Type. Featured.

Project Description. In the Town of Union, a portion of Little Choconut Creek flows between the Route 201 and Route 17 cloverleaf interchange and the commercial site formerly occupied by the Gander Mountain sporting goods store. During Tropical Storm Lee, the creek flash flooded. This flooding inundated the Gander Mountain site and caused significant damage to the store’s inventory. Ultimately, the store closed which negatively affected the Town’s commercial tax base.

This project presents a long-term, visionary design for bio-retention measures that would expand the floodplain of Little Choconut Creek using undeveloped and underutilized land. As shown of Figure 4.6, the pockets of land within the adjacent cloverleaf interchange of Route 201 and Route 17 would provide a series of inter-connected bio-retention areas to expand the creek’s floodplain and provide additional flood storage.

Project Cost. The estimated cost of architect-engineer design is $129,000.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** The increased holding capacity will reduce flood risk to surrounding properties.

- **Environmental Benefits.** The project also reduces erosion of commercial properties near the interchange and reduces stormwater runoff into the Susquehanna River watershed.

Cost Benefit Analysis. Improvements to public infrastructure increase community resilience in the face of future storms and flooding events, thereby ensuring protection of the Town of Union and Village of Johnson City’s assets and the safety of its citizens. Based on available information and preliminary plans, improving the stormwater management system at the Route 17/Route 201 interchange would provide an additional water storage capacity of approximately 32 acre feet during storm events. The added water storage capacity would improve system functionality and reduce the potential for localized flooding, erosion, and damage to downstream homes and businesses. The potential benefits of this project are considered to outweigh the approximately $129,000 investment required to plan and design the bio-retention/flood mitigation system.

Risk Reduction Analysis. The addition of approximately 32 acre feet of water storage capacity will reduce the risk of localized flooding to residents and businesses. Given the information and data analyzed to date, other risk reduction benefits would include decreasing stormwater runoff, protecting riverine ecosystems and limiting contributing to flood waters, and reducing overall exposure to flood waters.

Timeframe for Implementation. Approximately 1 year for planning and design.

Regulatory Requirements. A highway work permit must be obtained from NYS DOT prior to work activities in State rights-of-way. Construction projects resulting in disturbance of one or more acres will require coverage
Section IV: Implementation—Project Profiles

under SPDES Permit for Stormwater Discharges for Construction Activity. May require Army Corps and NYS DEC Protection of Water and Freshwater Wetland permits where project involves disturbance to existing wetland areas.

Jurisdiction. Village of Johnson City and Town of Union.

Location Map of Cloverleaf Interchange Bio-retention/Flood Mitigation.

Cloverleaf Interchange Bio-Retention conceptual design (bottom left) and the conceptual design of the Oakdale Mall Rehabilitation projects (top right).
Figure 4.6: Conceptual Plan for Cloverleaf Interchange Bio-Retention/Flood Mitigation, Johnson City
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Refuse Garage Relocation
Town of Union

Project Type. Proposed.

Project Description. During Tropical Storm Lee, the Town of Union’s refuse garage was flooded. During flooding events, the Town’s employees are unable to access the property and must move the equipment to a safe location before flooding occurs. Relocating this equipment is labor intensive and disruptive to operations. This project would construct a new refuse garage on a site outside of the floodplain. The proposed site consists of two adjacent parcels, 2900 Wayne Street and 1 North Seward Avenue, that are owned by the Town.

Project Cost. The estimated cost to develop all phases and components is approximately $2.5 million.

Project Benefits. Benefits of the project include:

- Risk Reduction Benefits. The flood risk is greatly reduced by relocating the refuse garage outside the floodplain.
- Economic Benefits. The Town of Union will not need to expend resources to relocate equipment during severe weather events.
- Health and Social Benefits. This project also ensures availability of refuse collection and services after flooding occurs.

Cost Benefit Analysis. Constructing facilities with community support equipment in flood-safe areas increases community resilience to future storms and flooding by eliminating future flood risks. Based on available information and preliminary plans, relocating the Refuse Garage facility would enhance their resiliency and ensure the continuous operational reliability during floods. A new facility would prevent losses associated with inundation of the facility along with the loss of manpower necessary to relocate equipment every time there is a storm event that inundates the facility. Using the methodology from the U.S. DOC ESA report\(^2\) and given the $2.5 million project cost, an estimated 18 construction jobs would be created by this project. The potential benefits of this project are considered to outweigh the $2.5 million investment required to plan, design, and construct the Refuse Garage facility.

Risk Reduction Analysis. This project does not explicitly reduce the risk of flooding; however, this project would reduce the risk of post–disaster disruptions and the Town losing access to the facility.

Timeframe for Implementation. 13 months.

Regulatory Requirements. The project may require USACE and NYS DEC Protection of Water permits.

Jurisdiction. Town of Union.
Location Map of Refuse Garage Relocation.
Scatter Site Stream Bank Restoration
Town of Union

Project Type. Proposed.

Project Description. During Tropical Storm Lee, flash flooding caused the banks of several creeks in the Town of Union to erode. Properties along West Creek and Patterson Creek were particularly affected. This project would protect a 4,500-foot segment of West Creek located north of Day Hollow Road and a 6,400-foot segment of Patterson Creek located west of Hooper Road. Heavy stacked stone would be placed at selected locations to mitigate soil erosion.

Project Cost. The estimated cost is approximately $300,000.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** Reduce flood risk to residents located along the stream banks.
- **Environmental Benefits.** Reduced soil erosion and sediment loads in West Creek and Patterson Creek.

Cost-Benefit Analysis. Improvements to core environmental infrastructure benefit overall community resilience towards future storms and flooding, ensuring the protection of the Town of Union’s assets and the safety of its residents. Based on available information and preliminary plans, the project would stabilize more than 2 miles of stream banks to prevent further erosion. The potential benefits of this project are considered to outweigh the $300,000 investment required to plan, design, and install the stream bank restoration measures.

Risk Reduction Analysis. The project reduces the risk of flooding for residents living along West Creek and Patterson Creek. Stabilized stream banks will also reduce the risk of erosion and sediment deposits downstream.

Timeframe for Implementation. 13 months.

Regulatory Requirements. The project may require USACE and NYS DEC Protection of Water permits.

Jurisdiction. Town of Union.
Section IV: Implementation—Project Profiles

Location Map of Scatter Site Stream Bank Restoration.
Stormwater Outflow Pipe Backflow Prevention
Town of Union

Project Type. Proposed.

Project Description. During storm events, the Susquehanna River backs up into the stormwater outfall system, causing flooding throughout the Town of Union. This project would install flap valves on stormwater outflows and create temporary stormwater storage areas on municipally-owned properties along Argonne Avenue. The flap valves would reduce the risk of backflow and the stormwater storage areas would reduce flood risk by containing additional stormwater volume. In addition to the flap valves and storage areas, the project would install approximately one mile of 42-inch HDPE pipe with pumps.

Project Cost. The estimated cost is approximately $950,000.

Project Benefits. Benefits of the project include:

- Risk Reduction Benefits. The flap valves will reduce the risk of backflow. The stormwater storage areas will reduce flood risk by providing additional stormwater storage volume.

- Health and Social Benefits. The Stormwater Outflow Pipe Backflow Prevention project targets locations with low- to moderate-income households.

Cost-Benefit Analysis. Improvements to public infrastructure increase community resilience in the face of future storms and flooding, thereby ensuring protection of the Town of Union’s assets and the safety of its citizens. Based on available information and preliminary plans, installing flap valves on stormwater outflows and creating temporary stormwater storage areas would improve the reliability and capacity of the stormwater system. With increased capacity in the stormwater system, the risk of flooding to adjacent streets, homes, and businesses in their service areas would be reduced. Low-and moderate-income residents of these neighborhoods would benefit from the reduced risk of localized flooding. The potential benefits of this project are considered to outweigh the $950,000 investment required to plan, design, and construct the stormwater system improvements.

Risk Reduction Analysis. This project directly reduces the risk of flooding by adding areas of stormwater storage along Argonne Avenue.

Timeframe for Implementation. 7 months.

Regulatory Requirements. There are no regulatory requirements for installing flap valves on stormwater outflows.

Jurisdiction. Town of Union.
Location Map of Stormwater Pipe Outflow Prevention.
Taft Avenue Sanitary Sewer Basin Flow Metering

Town of Union

Project Type. Proposed.

Project Description. This proposed project addresses inflow and infiltration issues in Taft Avenue area. The area currently experiences sanitary sewer overflows during heavy rain and snowmelt events. This project would install flow meters along the approximate 1.5 mile Taft Avenue sewer basin to provide the Town of Union with real-time flow data required to isolate sewer line segments and ultimately prevent untreated sanitary sewage from being discharged into water bodies near the Town of Union.

Project Cost. The estimated cost to develop all phases and components is approximately $50,000.

Project Benefits. Benefits of the project include:

- **Environmental Benefits.** Ancillary project benefits include that untreated sanitary sewage will no longer be discharged into area water bodies during periods of extreme rainfall (i.e., combined sewer overflow) once metering can isolate problematic segments of the sewer line.

- **Health and Social Benefits.** Reduced risk of exposure to disease-causing bacteria and viruses contained in combined sewer overflow that is discharged into the water.

Cost-Benefit Analysis. Enhancing public infrastructure maximizes system strength and increases the ability for it to mitigate damage from future flooding events, thereby strengthening community resilience and protecting assets of the Town of Union and the safety of its citizens. Based on available information and preliminary plans, installing flow meters along the approximate 1.5 mile Taft Avenue sewer basin will provide the real-time flow data required to isolate sewer line segments and prevent untreated sanitary sewage from being discharged into water bodies near the Town of Union. The potential benefits of this project outweigh the $50,000 investment required to purchase and install the meters.

Risk Reduction Analysis. The improved control over the sanitary system would provide a health benefit to the community from the reduced risk of exposure to bacteria and viruses contained in untreated sanitary sewage.

Timeframe for Implementation. 7 months.

Regulatory Requirements. Construction projects resulting in a disturbance of one or more acres require coverage under SPDES Permit for Stormwater Discharges for Construction Activity.

Jurisdiction. Town of Union.
Section IV: Implementation—Project Profiles

Location Map of Taft Avenue Sanitary Sewer Basin Flow Metering.
Valleyview Drive Drainage Improvements
Town of Union

Project Type. Proposed.

Project Description. During periods of heavy rainfall, areas within the 196-acre Valleyview Drive neighborhood experience shallow depth flooding. The ponding of stormwater within the travel lanes of public roadways creates a public safety hazard for residents and students accessing the Homer Brink Middle School. This project would upgrade the stormwater drainage system along Valleyview Drive to mitigate flooding in the Town of Union. The improvements would focus on the main trunk stormwater sewer line by increasing its diameter and replacing sections of corrugated metal pipe with high density polyethylene pipe or reinforced concrete elliptical pipe. In addition, a debris basin at the inlet of the system would trap and accumulate debris and bed material before it reaches the inlet.

Project Cost. The estimated cost to develop all phases and components is approximately $1.2 million.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** The project will reduce flooding threats to surrounding residences and Homer Brink Middle School.

- **Health and Social Benefits.** The project will enhance protection of the middle school to ensure operations can continue unimpeded during severe weather events.

Cost-Benefit Analysis. Improvements to public infrastructure increase community resilience in the face of future storms and flooding, thereby ensuring protection of the Town of Union’s assets and the safety of its citizens. Based on available information and preliminary plans, increasing the diameter of the main trunk line, installing more durable materials, and installing a debris trap at the entrance of the main trunk line will improve the reliability and capacity of the Valleyview Drive drainage system. The improvements made would reduce the potential for localized flooding, erosion, and damage to roughly 350 homes and businesses, including Homer Brink Middle School, located in the approximately 0.33 square mile area surrounding Valleyview Drive. Homer Brink Middle School would also benefit due to school operations remaining unimpeded during periods of heavy rainfall. Using the methodology from the U.S. DOC ESA report, the $1.2 million project would create an estimated 10 construction jobs. The potential benefits of this project are considered to outweigh the $1.2 million investment required to plan, design, and construct the drainage improvements.

Risk Reduction Analysis. Upgrading the stormwater collection system along Valleyview Drive reduces the risk of flooding for nearby residents and Homer Brink Middle School.

Timeframe for Implementation. 13 months.
**Regulatory Requirements.** Construction projects resulting in a disturbance of one or more acres require coverage under SPDES Permit for Stormwater Discharges for Construction Activity.

**Jurisdiction.** Town of Union.

*Location Map of Valleyview Drive Drainage Improvements.*
Argonne Neighborhood
and South Endwell Riverfront Trail
Town of Union

Project Type. Featured.

Project Description. Tropical Storm Lee severely damaged the Town of Union’s Argonne neighborhood. After the flood, some homes were abandoned and some property owners participated in the FEMA buy-out program. Following the buyouts, many former homes were demolished, leaving vacant parcels throughout the once-established neighborhood.

This project illustrates a long-term conceptual plan for flood-safe development in the Argonne neighborhood (see Figure 4.7). The project would incorporate temporary stormwater and riverine floodwater storage capacity and help strengthen the integrity of the neighborhood. The project would also include initial planning and design of a riverfront trail using properties primarily acquired through FEMA and other buyout programs conducted over the past 20 years. The trail was identified as part of the “Big Loop” trail in the 2011 Intermunicipal Local Waterfront Revitalization Plan.

Project Cost. The estimated cost for architect-engineering design is $307,676.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** The project will increase the holding capacity for stormwater and riverine floodwaters and reduce flood risks to residents and businesses located downstream.

- **Economic Benefits.** Increased tourism from the trail network could positively impact local businesses and may improve desirability of homes in the neighborhood. Strengthened neighborhood integrity would ensure the municipality’s continued collection of property taxes from remaining homes.

- **Environmental Benefits.** There is potential for improved water quality due to settlement of sediments and pollutants in detained stormwater runoff.

- **Health and Social Benefits.** The trail is part of a larger proposed regional system to enhance recreational opportunities for area residents. An ancillary benefit of a regional trail system is increased tourism at the waterfront.

Cost-Benefit Analysis. Redeveloping high-risk flood areas with sustainable infrastructure supports community resilience to future storms and flooding. Based on available information and preliminary plans, relocating homes to areas above the base flood elevation and creating a recreational trail with increased stormwater holding capacity would protect assets and the safety of its citizens plus repair the neighborhood abandonment of the once established neighborhood. Increased stormwater holding capacity created on the recreational site would reduce flood risks to neighboring homes and business downstream as well as create a sustainable and desirable focal point in the community. Furthermore, the reduction of sediment and pollutants captured in the additional stormwater runoff could also improve water quality in the surrounding vicinity.
area. As part of a larger network aimed at increasing recreational opportunities, this project would also generate an economic benefit from the increased tourism at the waterfront. The potential benefits of this project are considered to outweigh the $307,676 investment required to plan and design the riverfront trail and relocated homes.

**Risk Reduction Analysis.** This project directly reduces the risk of flooding by adding 52,700 cubic feet of stormwater storage to the Argonne neighborhood.

**Timeframe for Implementation.** 1 year.

**Regulatory Requirements.** A dam safety permit may be needed and coordinated through the NYS DEC. Construction projects resulting in a disturbance of one or more acres require coverage under SPDES Permit for Stormwater Discharges for construction Activity. NYSDOT would seek discretionary federal assistance opportunities authorized pursuant to the Disaster Relief Appropriations Act of 2013. The project may require USACE and NYS DEC Protection of Water and Freshwater Wetland permits where project involves disturbance to existing wetland areas.

**Jurisdiction.** Town of Union.
Figure 4.7: Conceptual Plan for Argonne Avenue Neighborhood and South Endwell Riverfront Trail, Union

Existing Conditions

LAND USE LEGEND
- Existing conditions
- Reoccupied/abandoned
- High-density residential
- Mixed-use development

INFEA UP IN FEATURERS
1. Reclaimed and/or expanded existing housing to connect current single-family housing with up-zoned commercial
2. Reclaimed and/or expanded existing housing to connect current single-family housing with up-zoned commercial
3. Flood storage & mitigation
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82. Flood storage & mitigation
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96. Flood storage & mitigation
97. Flood storage & mitigation
98. Flood storage & mitigation
99. Flood storage & mitigation
100. Flood storage & mitigation

Broome | NY Rising Community Reconstruction Plan
BAE Systems Floodwall Improvement
Town of Union

Project Type. Featured.

Project Description. The former BAE Systems site in the Town of Union was flooded in 2011 during Tropical Storm Lee when the earthen levee surrounding the site overtopped at its low settling points. Once the levees were overtopped, the site filled with 5 to 6 feet of water until it was pumped out days after the storm. The flooding caused tremendous damage to the BAE Systems facility and forced it to shut down. Subsequently, BAE Systems and its 1,500 employees relocated to the Huron Campus in the neighboring Village of Endicott, NY. The U. S. Air Force owns the property and has agreed to demolish the existing building, clean up the site, and make it “shovel-ready” for future development.

This project would initially survey existing floodwalls at smaller intervals to accurately determine where improvements are required. Based on the survey results, the Town of Union would request permission from the NYS DEC to elevate the floodwall to provide at least two feet of freeboard. These improvements would benefit the Westover section of the Town and facilitate redevelopment of the former BAE Systems facility, consistent with plans prepared during the Town’s Long Term Community Recovery planning process.

As part of the NYCRCP planning process, a long-term, visionary concept for potential redevelopment of the former BAE site was prepared (see Figure 4.8). This concept proposes construction of walk-up row houses, loft apartments, and mixed-use development with parking on the first floor overlooking a sunken recreation green that would provide additional flood storage.

Project Cost. The estimated cost to enhance the floodwall is approximately $775,000.

Project Benefits. Benefits of the project include:

- **Economic Benefits.** The project reduces flood risk to a large industrial redevelopment site and may lead to redevelopment of the property, providing jobs and an increased tax base for the Town of Union.

- **Health and Social Benefits.** Redevelopment of the site may incorporate recreational amenities, such as a multi-purpose trail and fields, which improve health and social interactions of area residents.

Cost-Benefit Analysis. Enhancing public infrastructure maximizes system strength and increases the ability for it to mitigate damage from future flooding events, thereby strengthening community resilience and protecting assets of the Town of Union and the safety of its citizens. Based on available information and preliminary plans, elevating the existing floodwall would further reduce flood risks to a large industrial development site and would allow the creation of a mixed-use, 22.5-acre development that would have a significant economic impact, if developed. The potential benefits of this project are considered to outweigh the $750,000 investment required to survey and construct the enhancement to the existing floodwall.
Risk Reduction Analysis. The risk of flooding at the former BAE Systems complex will be reduced by upgrading the floodwall to include two feet of freeboard.

Timeframe for Implementation. 8 months.

Regulatory Requirements. Coordination with NYS DEC must occur to determine the project’s effects on existing flood control projects. An Article 16 (use of flood control lands) permit may be needed. USACE permits may also be required.

Jurisdiction. Town of Union.
Figure 4.8: Conceptual Plan for BAE Facility Redevelopment, Union

Existing Conditions
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Fairmont Park Protective Measures
Town of Union

Project Type. Featured.

Project Description. The Fairmont Park Neighborhood was flooded and damaged by Tropical Storm Lee. The neighborhood will soon be only a “shell” of what it was as homes begin to be demolished following closings in the FEMA and CDGB-DR buyout programs. Many of the neighborhood streets, once populated with dozens of houses, will soon have only one or two remaining homes. The vacant properties will become the responsibility of the Town and require maintenance (e.g., grass mowing). Streets and infrastructure that serve the few remaining homes must also be maintained.

Figure 4.9 illustrates a long-term, visionary concept for flood-safe redevelopment of the Fairmont Park neighborhood. The plan would increase density by relocating dwellings to a compact neighborhood footprint. This consolidation would provide a sustainable and resilient neighborhood fabric, since the new homes would be elevated above base flood elevation. It also would reduce the Town’s burden of maintaining vacant parcels and underutilized neighborhood streets. The lowest, most flood prone area of the neighborhood would be transformed into a substantial bio-retention area for additional flood mitigation and storage. This area would receive the neighborhood’s stormwater runoff while also providing significant flood storage for future flood events.

Project Cost: The estimated cost of architect-engineer design is $369,265.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** Added stormwater mitigation will reduce flooding threats to the remaining neighborhood. Flood storage will also protect assets downstream. Elevating newly constructed homes would prevent flooding of critical infrastructure in housing.

- **Economic Benefits.** Consolidation of the housing area will reduce maintenance and infrastructure responsibilities for the Town of Union.

- **Environmental Benefits.** Interconnected bio-retention areas would be seeded and planted with native trees and shrubs, creating a natural, low maintenance amenity that stores, cleans, and reduces sediment transfer from neighborhood runoff and occasional floodwater, treating both water quantity and water quality.

- **Health and Social Benefits.** The project retains the neighborhood fabric and local residents.

Cost-Benefit Analysis. Redeveloping high-risk flood areas with sustainable infrastructure and elevated structures supports community resilience to future storms and flooding. Based on available information and preliminary plans, increasing neighborhood density through elevated homes and the repurposing of lower elevations into multiple bio-retention areas would protect assets in the Town of Union and the safety of its citizens, reduce maintenance costs, and repair the neighborhood abandonment and disjointed condition of
the once established neighborhood. Furthermore, the reduction of sediment and pollutants captured in the additional stormwater runoff could also improve water quality in the surrounding area. The potential benefits of this project are considered to outweigh the $369,265 investment required to plan and design the Fairmont Park neighborhood protective measures.

**Risk Reduction Analysis.** Increased stormwater holding capacity created in each bio-retention area would reduce flood risks to neighboring homes and business downstream as well as create a sustainable and desirable focal point around the relocated homes in the community.

**Timeframe for Implementation.** 1 year.

**Regulatory Requirements.** Coordination with DEC may be needed to determine the project’s effects to existing flood control projects. An Article 16 (use of flood control lands) permit may be needed.

**Jurisdiction.** Town of Union.

![Location Map of Fairmont Park Protective Measures.](image-url)
Figure 4.9: Conceptual Plan for Fairmont Park Protective Measures, Union

Existing Conditions

Legend:
- Buildings and/or Existing Residential Housing
- New Commercial, Industrial, or Mixed-Use Development
- Recreational
- Redevelopment of Existing Commercial or Industrial
- Existing Commercial or Institutional
- Residential

Figure 4.9 shows the conceptual plan for Fairmont Park Protective Measures, Union. The plan includes various features such as buildings and existing residential housing, new commercial or mixed-use development, recreational areas, and the redevelopment of existing commercial or institutional areas. The map provides a detailed view of the current conditions at Fairmont Park.
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Rental Housing Replacement
Town of Union

Project Type. Featured.

Project Description. This featured project would constructs 30 units of affordable rental housing to replace rental-housing stock lost due to flooding during Tropical Storm Lee. This is a long-range project for the Town of Union.

Project Cost. The estimated cost to develop all phases and components is approximately $4.5 million. The project is long-range in nature.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** The project would reduce risk to residents since the units would be constructed in flood-safe areas.
- **Economic Benefits.** Replacing rental housing would provide tax base increases to the Town of Union.
- **Health and Social Benefits.** The project will target low to moderate-income households that lost their living quarters during the 2011 flood.

Cost-Benefit Analysis. Constructing affordable housing in flood-safe areas supports community resilience to future storms and flooding by eliminating future flood risks. Based on available information and preliminary plans, construction of a 30-unit affordable rental housing complex would protect assets, increase safety of residents, and provide an increased tax base for the Town of Union. Low-and moderate-income residents of this neighborhood would benefit from the eliminated risk of localized flooding and the availability of affordable rental housing in the community. Based on the U.S. DOC ESA report, the $4.5 million investment would create 32 construction jobs. The potential benefits of this project are considered to outweigh the $4.5 million investment required to plan, design, and construct the affordable housing development.

Risk Reduction Analysis. This project does not have any direct risk reduction; however, new housing units will be constructed in flood-safe areas.

Timeframe for Implementation. Long-range.

Regulatory Requirements. Construction projects resulting in a disturbance of one or more acres require coverage under SPDES Permit for Stormwater Discharges for Construction Activity.

Jurisdiction. Town of Union.
Section IV: Implementation—Project Profiles

Location Map of Rental Housing Replacement.
Fire Station 1 Flood-Proofing
Town of Vestal

Project Type. Proposed.

Project Description. This project would increase the resiliency of Fire Station 1 in the Town of Vestal by adding door dams to all access points. The door dams would reduce the flood risk to fire fighting vehicles and other emergency response apparatus.

Project Cost. The estimated cost to develop all phases and components is approximately $30,000.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** The project would reduce the risk of critical firefighting and emergency vehicles and equipment being inaccessible or damaged due to floodwater. The entire community would benefit from the Fire Department’s improved readiness.

- **Health and Social Benefits.** Flood-proofing will ensure fire-fighting and emergency response services are unimpeded during a severe weather event.

Cost-Benefit Analysis. Maximizing the resilience of emergency services facilities benefits community emergency response capabilities during future storms, ensuring the protection of the Town of Vestal’s assets and the safety of its residents. Based on available information and preliminary plans, the project installs flood dams to the doors of the fire station on Main Street, reducing the risk of flooding to fire fighting vehicles and equipment that would slow or impede their responses to emergencies. The community will benefit from a safer community through a more capable emergency response and a reduction of property loss due to fires during severe weather events. The potential benefits of this project are considered to outweigh the $30,000 investment required to install the flood dams to the fire station doors.

Risk Reduction Analysis. By adding door dams to all access points, the risk of flooding and damage to fire fighting vehicles and equipment is reduced.

Timeframe for Implementation. 3 months.

Regulatory Requirements. There are no regulatory requirements to retrofit the Fire Station doors.

Jurisdiction. Town of Vestal.
Location Map of Fire Station 1 Flood-Proofing.
Hawthorne Street Drainage Improvements
Town of Vestal

Project Type. Proposed.

Project Description. The Hawthorne Avenue neighborhood in the Town of Vestal is located south of the Vestal Parkway, west of Route 26, and east of Choconut Creek. The drainage system serving the neighborhood floods during severe storms. Hawthorne Street, Melbourne Street, and Hazel Drive are especially susceptible to flooding as a result of an undersized stormwater drainage system. The proposed project would install approximately 1,200 feet of large diameter elliptical reinforced concrete pipe to improve stormwater management.

Project Cost. The estimated cost is approximately $300,000.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** Reduced flood risk by providing increased stormwater capacity in the Hawthorne Street neighborhood.

Cost-Benefit Analysis. Improvements to core environmental infrastructure benefit overall community resilience towards future storms and flooding, ensuring the protection of the Town of Vestal’s assets and the safety of its residents. Based on available information and preliminary plans, the project installs 1,200 feet of larger elliptical reinforced concrete pipe along Hawthorne Street, between Main Street and Clayton Avenue. Upgrading the existing undersized drainage system in the neighborhood will reduce the flood risk for nearly 100 homes along Hawthorne Street, Melbourne Street, and Hazel Drive. The potential benefits of this project are considered to outweigh the $300,000 investment required to plan, design, and construct the upgraded stormwater drainage system.

Risk Reduction Analysis. Increased stormwater storage capacity will directly reduce the risk of flooding in the Hawthorne Street neighborhood.

Timeframe for Implementation. 7 months.

Regulatory Requirements. Construction projects resulting in a disturbance of one or more acres require coverage under SPDES Permit for Stormwater Discharges for Construction Activity.

Jurisdiction. Town of Vestal.
Location Map of Hawthorne Street Drainage Improvements.
Emergency Management Services Relocation
Town of Vestal

Project Type. Proposed.

Project Description. The Town of Vestal’s EMS facility is located in the flood plain and is often inundated by water during storm events. During Tropical Storm Lee, flooding of the facility required EMS operations to be conducted away from their headquarters. This project would construct a new EMS facility in an area not susceptible to flooding. The Town is coordinating with NYS DOT and other stakeholders to identify flood-safe sites on which to construct a new EMS building.

Project Cost. The estimated cost, including site acquisition, design, and construction, is approximately $2 million.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** The project reduces the flood risk to emergency management services by relocating it outside the floodplain.
- **Health and Social Benefits.** The project also ensures emergency management services are unimpeded during a severe weather event.

Cost-Benefit Analysis. Maximizing the resilience of emergency services facilities benefits community emergency response capabilities during future storms, ensuring the protection of the Town of Vestal’s assets and the safety of its residents. Based on available information and preliminary plans, the project relocates the Town’s EMS facility in a flood-safe area away from its current location in the floodplain. The overall risk of flooding to the EMS facility will be greatly reduced, which allows EMS operations to carry on unimpeded during severe storms. Using the methodology from the U.S. DOC ESA report\(^2\) and given the $2 million project cost, an estimated 14 construction jobs would be created by this project. Overall, the potential benefits of this project are considered to outweigh the $2 million investment required to plan, design, and construct the new EMS facility.

Risk Reduction Analysis. Relocating the EMS facility outside the floodplain would greatly reduce the risk of flooding.

Timeframe for Implementation. 11 months.

Regulatory Requirements. Construction projects resulting in a disturbance of one or more acres require coverage under SPDES Permit for Stormwater Discharges for Construction Activity. A highway work permit must be obtained from NYS DOT prior to work activities in State rights-of-way.

Jurisdiction. Town of Vestal.
Roberts Street Stormwater Pump Station Upgrade  
Town of Vestal

Project Type. Proposed.

Project Description. This project would upgrade the Roberts Street stormwater pump station that is located in the Roberts Street neighborhood, west of Choconut Creek between Vestal Parkway and Front Street. Recent improvements to the town’s sewage collection system resulted in a sewage pump station on Roberts Street being taken out of service. An existing levee, located between the neighborhood and Choconut Creek, protects the low end of the neighborhood, near the old sewage pump station. The levee prevents stormwater from discharging to the Choconut Creek but allows the water to pond within the neighborhood. This project would convert the out-of-service sewer station to a stormwater pump station that will pump stormwater over the levee to discharge into Choconut Creek.

Project Cost. The estimated cost to develop all phases and components is approximately $650,000.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** The project reduces the risk of flooding for homes located along Roberts Street and improves stormwater management for surrounding neighborhoods, businesses, and the Town of Vestal Tax Assessor’s office.

- **Economic Benefits.** This project provides protection for existing businesses located along Elizabeth Street directly to the east of Robert Street, strengthening the resiliency of the Town of Vestal’s tax base.

Cost-Benefit Analysis. Improvements to public infrastructure benefit overall community resilience towards future storms, ensuring the protection of the Town of Vestal’s assets and the safety of its residents. Based on available information and preliminary plans, conversion of the abandoned sewage pump station to a stormwater pump station would allow discharge of water ponding in the Roberts Street neighborhood during storms. The potential benefits of this project are considered to outweigh the $650,000 investment required to convert the sewage pump station to a stormwater pump station.

Risk Reduction Analysis. This project reduces the risk of localized flooding for approximately 20 homes along Robert Street and improves overall stormwater management capabilities for surrounding neighborhoods. The project also protects approximately 5 businesses along the adjacent Elizabeth Street from interruptions due to flooding in the Roberts Street neighborhood.

Timeframe for Implementation. 13 months.

Regulatory Requirements. Coordination with NYS DEC may be needed to determine the effects of the project on existing flood control projects. An Article 16 (use of flood control lands) permit may be needed.

Jurisdiction. Town of Vestal.
Location Map of Roberts Street Stormwater Pump Station Upgrade.
Stair Park Stormwater Detention Facility  
Town of Vestal

**Project Type.** Proposed.

**Project Description.** The Town of Vestal’s Public Works Department wanted to explore opportunities to create more flood storage capacity along Fuller Hollow Creek. Additional flood storage capacity would minimize high flows that cause erosion and reduce stormwater runoff entering the Susquehanna River. The project would also improve the water quality of the brook and its riparian corridor. The conceptual plan completed for this NYRCR process and shown in Figure 4.10, targets three sections of Fuller Hollow Creek, while this proposed project is limited to the improvements at the Fuller Hollow Road and Campus Drive location. A flood control structure would be constructed over an existing culvert under Fuller Hollow Road in the section south of Fuller Hollow Road and Cameron Place, north of Marietta Drive. During high flow events, a ravine south of Fuller Hollow Road would fill up and store water before slowly releasing it over time. If the ravine fills to its maximum capacity, water will bypass the structure to the next flood mitigation section north of Fuller Hollow Road. This would segment provides additional flood storage to minimize localized flooding impacts and impacts on the Susquehanna River.

**Project Cost.** The estimated cost is approximately $1.25 million.

**Project Benefits.** Benefits of the project include:

- **Risk Reduction Benefits.** The project reduces flood risk to adjacent residents, the Binghamton-Johnson City water treatment plant, and the Binghamton University campus due to increased stormwater storage.

- **Environmental Benefits.** The project may provide water quality improvements in the Susquehanna River watershed due to settlement of sediments and pollutants in detained stormwater runoff.

- **Health and Social Benefits.** The project would also help protect the Binghamton-Johnson City water treatment plant.

**Cost-Benefit Analysis.** Creating additional environmental infrastructure increases system capacity which enhances the system’s ability to mitigate damage from future flooding events, ensuring the protection of the Town of Vestal’s assets and the safety of its residents. Based on available information and preliminary plans, constructing a series of stormwater detention basins in the Stair Park area will increase the flood storage capacity along Fuller Hollow Creek which drains to the Susquehanna River. The flood control system reduces flood risk to a 0.75 square mile area directly surrounding the flood control area that contains over 300 homes. Downstream from the system, flood risks are reduced for the Binghamton-Johnson City water treatment plant and Binghamton University campus. Using the methodology from the U.S. DOC and ESA report\textsuperscript{22} given the $1.25 million project cost, an estimated 9 construction jobs would be created by this project. Overall, the potential benefits of this project are considered to outweigh the $1.25 million investment required to plan, design, and construct the stormwater detention and flood control system.
Risk Reduction Analysis. As described above, the increased stormwater storage created by this project reduces the flood risk for nearby homes and businesses. Approximately 173,500 cubic feet of stormwater storage will be added.

Timeframe for Implementation. 1 year.

Regulatory Requirements. Construction projects resulting in a disturbance of one or more acres require coverage under SPDES Permit for Stormwater Discharges for Construction Activity. The project may also require USACE and NYS DEC Protection of Water permits.

Jurisdiction. Town of Vestal.
Figure 4.10: Conceptual Plan for Stair Park Flood Mitigation, Vestal
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Doris Avenue and Vestal Parkway Stormwater System Upgrades
Town of Vestal

Project Type. Proposed.

Project Description. The Doris Avenue neighborhood is located south of the Vestal Parkway, west of Choconut Creek, and north of a ridge that contributes to the extent and velocity of stormwater flows entering the neighborhood. The Doris Avenue neighborhood floods during severe storms due to an inadequate stormwater drainage system. Doris Avenue, Harding Avenue, Hoffman Avenue, and Reese Avenue are particularly impacted by flooding. This proposed project would upgrade and replace approximately 1,500 feet of the stormwater drainage system with larger diameter, elliptical, reinforced concrete pipe to increase stormwater capacity in the neighborhood.

Project Cost. The estimated cost to develop all phases and components is approximately $375,000.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** This project will reduce the flood risk of the Doris Avenue neighborhood.

- **Economic Benefits.** This project provides protection for existing businesses located along Front Street, strengthening the resiliency of the Town of Vestal’s tax base.

Cost-Benefit Analysis. Improvements to public infrastructure benefit overall community resilience towards future storms, ensuring the protection of the Town of Vestal’s assets and the safety of its residents. Based on available information and preliminary plans, the project installs 1,500 feet of larger elliptical reinforced concrete pipe between Front Street and Vestal Parkway, in the Doris Avenue neighborhood. Upgrading the existing undersized drainage system in the neighborhood will reduce the flood risk for homes and businesses located along Front Street near the intersections of Doris Avenue, Harding Avenue, Hoffman Avenue, and Reese Avenue. The potential benefits of this project are considered to outweigh the $375,000 investment required to plan, design, and construct the upgraded stormwater drainage system.

Risk Reduction Analysis. Drainage system upgrades will reduce flood risks for the Doris Avenue neighborhood by increasing the flow rate capacity of the stormwater collection system.

Timeframe for Implementation. 7 months.

Regulatory Requirements. Construction projects resulting in a disturbance of one or more acres require coverage under SPDES Permit for Stormwater Discharges for Construction Activity. A highway work permit must be obtained from NYS DOT prior to work activities in State rights-of-way.

Jurisdiction. Town of Vestal.
Location Map of Doris Avenue and Vestal Parkway Stormwater System Upgrades.
Castle Gardens Buyout Area Stormwater Detention
Town of Vestal

**Project Type.** Featured.

**Project Description.** The Castle Gardens neighborhood in the Town of Vestal was severely affected by flooding in both 2006 and 2011. Following these floods, some homes were abandoned and some residents participated in the FEMA buy-out program while others remained. Following the buyouts, many properties were demolished, leaving behind a “patchwork quilt” of remaining homes. After the buyouts are completed, many of the neighborhood’s streets will have only one or two homes remaining. The vacant parcels, streets, and infrastructure must be maintained by Town. Streets and infrastructure connected to the remaining homes will need to be maintained and plowed during the winter.

The conceptual plan for this featured project, shown in Figure 4.11, proposes the construction of stormwater detention on vacant property within Castle Gardens. This featured project includes initial planning and design studies to create a more resilient network of complete neighborhood streets, and consolidate properties into large, contiguous tracts for use as bio-retention areas and stormwater storage sites. This project complements the Tri-Cities Airport Stormwater Improvements project in the Village of Endicott.

**Project Cost.** The estimated costs for architect-engineer design is $754,722.

**Project Benefits.** Benefits of the project include:

- **Risk Reduction Benefits.** The project reduces flood risk of the Castle Gardens neighborhood by providing increased stormwater capacity.

- **Economic Benefits.** By protecting the Castle Gardens neighborhood, the community will retain some tax base and the vitality of the remaining neighborhood.

- **Environmental Benefits.** Stormwater detention within the neighborhood will reduce stormwater runoff into the Susquehanna River and adjacent creeks and streams, thereby improving the overall water quality of the watershed.

**Cost-Benefit Analysis.** Redeveloping high-risk flood areas with sustainable infrastructure supports community resilience to future storms and flooding. Based on available information and preliminary plans, the project will convert land abandoned from homes bought and demolished by FEMA into stormwater detention basins. Using the vacated land for stormwater detention not only preserves the remaining homes and vitality of the Castle Gardens
neighborhood, it also reduces the risk of flooding for other downstream homes and businesses. Furthermore, the reduction of sediment and pollutants captured in the additional stormwater runoff could also improve water quality in the surrounding area. Overall, the potential benefits of this project are considered to outweigh the $754,722 investment required to plan and design the stormwater detention system.

**Risk Reduction Analysis.** As described above, the increased stormwater storage created by this project reduces the flood risk for nearby homes and businesses.

**Timeframe for Implementation.** 1 year.

**Regulatory Requirements.** Construction activity resulting in a disturbance of one or more acres requires coverage under SPDES Permit for Stormwater Discharges.

**Jurisdiction.** Town of Vestal.

*Location Map of Castle Gardens Buyout Area Stormwater Detention.*
Figure 4.11: Conceptual Plan for Castle Gardens Buyout Area Stormwater Detention, Vestal
Cloverleaf Bio-Retention/Flood Mitigation  
Town of Vestal

Project Type. Featured.

Project Description. The entire southern half of the Route 17/Route 26/Route 434 cloverleaf interchange is a healthy, inter-connected wetland. This wetland filters and contains stormwater runoff from flooding. On the other hand, the north side of the cloverleaf interchange contains flat grass areas that could be expanded to create a larger combined bio-retention system. This project would excavate the open areas on the interior and exterior of the cloverleaf. Following excavation, depressions would be re-graded, seeded, and planted with native shrubs and grasses. The bio-retention system, conceptualized in Figure 4.12, would connect to the south side wetland system utilizing directional boring methods. The inter-connected system would nearly double the mitigation area’s flood storage capacity and enable filtration of stormwater runoff from a residential neighborhood that drains into it from the southeast.

Project Cost. The estimated cost of architect-engineer design is $589,214.

Project Benefits. Benefits of the project include:

- Risk Reduction Benefits. Increased holding capacity of the bio-retention system will reduce flood risk to downstream residents and businesses.

- Environmental Benefits. The project reduces erosion of the same properties and improves water quality of the Susquehanna River watershed.

Cost-Benefit Analysis. Redeveloping high-risk flood areas with sustainable infrastructure supports community resilience to future storms and flooding, ensuring the protection of the Town of Vestal’s assets and the safety of its residents. Based on available information and preliminary plans, the expanded bio-retention areas will adequately filter stormwater runoff from over 170 homes and several commercial areas. The increased holding capacity of the bio-retention basins will reduce the flood risk to downstream homes and businesses. The reduction of sediment and pollutants captured in the additional stormwater runoff could also improve water quality in the surrounding area. Overall, the potential benefits of this project are considered to outweigh the $589,214 investment required to plan and design the bio-retention system.

Risk Reduction Analysis. As described above, the increased stormwater storage created by this project reduces the flood risk for nearby homes and businesses. Approximately 320,000 cubic feet of stormwater storage will be added.

Timeframe for Implementation. 1 year.

Regulatory Requirements. A highway work permit must be obtained from NYS DOT prior to work activities in State rights-of-way.

Jurisdiction. Town of Vestal.
Location Map of Cloverleaf Bio-Retention / Flood Mitigation.
Figure 4.12: Conceptual Plan for Cloverleaf Interchange Bio-Retention/Flood Mitigation, Vestal
Town Square Mall Green Infrastructure Retrofit
Town of Vestal

**Project Type.** Featured.

**Project Description.** The Town Square Mall, located along the Vestal Parkway commercial corridor, is prime candidate for a green infrastructure retrofit. This 67-acre site, not including out-parcels, is characterized by almost 100% impervious surface. Eighteen acres of rooftops are impervious. The remaining 49 acres are parking lots and service area pavement. Nearly one-quarter of the shopping center’s parking area is underutilized throughout the year.

This project is a long-term visionary concept for retrofitting the Town Square Mall site. As shown in Figure 4.13, the project would transform all underutilized parking areas into grassy, pervious paver parking areas, allowing water to infiltrate on-site while still accommodating vehicles during peak shopping days. The design would reconfigure the primary circulation routes within surface parking areas to create bio-swales. A linked system of bio-swales would funnel stormwater runoff into larger on-site bio-retention areas. Additionally, the conceptual plan proposes installing green roof systems to store or slow stormwater runoff. This would reduce the burden on the on-site infrastructure and reduce the building’s energy cost.

**Project Cost.** The estimated cost for architect-engineer design is approximately $1.87 million.

**Project Benefits.** Benefits of the project include:

- **Risk Reduction Benefits.** The project will reduce flood risk of businesses surrounding the Town Square mall site by increasing holding capacity of stormwater on-site.

- **Economic Benefits.** The commercial area will be more resilient in future storms, protecting the businesses and ultimately, the tax base of the community.

- **Environmental Benefits.** Resident and commercials properties in proximity to the site will experience reduced erosion during severe weather events. Increased stormwater retention will improve the water quality of the Susquehanna River watershed.

**Cost-Benefit Analysis.** Redeveloping high-risk flood areas with sustainable infrastructure supports community resilience to future storms and flooding, ensuring the protection of the Town of Vestal’s assets and the safety of its residents. Based on available information and preliminary plans, the bio-swale areas will adequately filter stormwater runoff from Town Square Mall. The increased holding capacity of the bio-retention basins will reduce the flood risk to downstream homes and businesses. The reduction of sediment and pollutants captured in the additional stormwater runoff could also improve water quality in the surrounding area. This
project would reduce the burden on the on-site infrastructure and reduce the building’s energy cost. Overall, the potential benefits of this project are considered to outweigh the $1.87 million investment required to plan and design the retrofit.

**Risk Reduction Analysis.** As described above, the increased stormwater storage created by this project reduces the flood risk for nearby homes and businesses.

**Timeframe for Implementation.** 1 year.

**Regulatory Requirements.** Construction activity resulting in a disturbance of one or more acres requires coverage under SPDES Permit for Stormwater Discharges.

**Jurisdiction.** Town of Vestal.
Figure 4.13: Conceptual Plan for Town Square Mall Green Infrastructure Retrofit Pilot Program, Vestal
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Section V

Additional Materials

This section includes additional resiliency recommendations, a master table of projects, a summary of the public engagement process, the community asset inventory, and other reference materials for the Broome Community.

A. Additional Resiliency Recommendations

Table 5.1 presents a list of Broome’s additional resiliency recommendations.

B. Master Table of Projects

Table 5.2 presents a comprehensive list of Broome’s proposed and featured projects, and additional resiliency recommendations.
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<table>
<thead>
<tr>
<th>Project Name</th>
<th>Short Description</th>
<th>Cost</th>
<th>Regional</th>
<th>Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southern Tier Health Link Health Information Exchange</td>
<td>Provide clinical healthcare information to Broome County Health Department, medical providers, home health agencies and Susquehanna Regional Emergency Medical Services that coordinate the regional EMS system. Support the emergency needs of the Broome Community for special needs shelters, ambulance calls, and rapid evacuation processes.</td>
<td>$1,714,024</td>
<td>Yes</td>
<td>1</td>
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<td>Broome County Community Emergency Response Team Support</td>
<td>Purchase utility trailer and personal protective equipment for team members.</td>
<td>$15,000</td>
<td>Yes</td>
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<td>Sanitary Sewer Extension Project</td>
<td>Extend sanitary sewer lines from Corporate Drive to Pride Manor Mobile Home Park (approximately 8 miles).</td>
<td>$4,650,000</td>
<td>No</td>
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<td>Levee Certification</td>
<td>Levee certification.</td>
<td>$157,000</td>
<td>No</td>
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<td>Stormwater Detention</td>
<td>Install underground stormwater storage units at Johnson City School District athletic fields.</td>
<td>$35,000</td>
<td>No</td>
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<td>Finch Hollow County Retention Facility #1</td>
<td>Remove accumulated sediment that affects capacity of stormwater retention facility.</td>
<td>$65,000</td>
<td>No</td>
<td>7</td>
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<tr>
<td>Backflow Preventer Program, Village of Endicott</td>
<td>Install backflow preventer valves in individual residences.</td>
<td>$4,500,000</td>
<td>No</td>
<td>7</td>
</tr>
<tr>
<td>Delano Avenue Drainage</td>
<td>Upgrade Storm pipe system.</td>
<td>$450,000</td>
<td>No</td>
<td>7</td>
</tr>
<tr>
<td>Jensen Road to Vestal Parkway Drainage Improvements</td>
<td>Upgrade Storm pipe system.</td>
<td>$400,000</td>
<td>No</td>
<td>7</td>
</tr>
<tr>
<td>Anderson Road Drainage Improvements</td>
<td>Upgrade Storm pipe system.</td>
<td>$450,000</td>
<td>No</td>
<td>7</td>
</tr>
<tr>
<td>Castileman Road Drainage Improvements</td>
<td>Upgrade Storm pipe system.</td>
<td>$200,000</td>
<td>No</td>
<td>7</td>
</tr>
<tr>
<td>Glenwood Road/Juneberry Road Drainage Improvements</td>
<td>Upgrade Storm pipe system.</td>
<td>$60,000</td>
<td>No</td>
<td>7</td>
</tr>
<tr>
<td>Imperial Woods Neighborhood Drainage Improvements</td>
<td>Upgrade Storm pipe system.</td>
<td>$250,000</td>
<td>No</td>
<td>7</td>
</tr>
<tr>
<td>Echo Creek To Choconut Creek Restoration/Mitigations</td>
<td>Construct Echo Creek discharge outlet into the Choconut Creek.</td>
<td>$350,000</td>
<td>No</td>
<td>7</td>
</tr>
<tr>
<td>Southwood Drive To South Meadowbrook Drainage Improvements</td>
<td>Upgrade Storm pipe system.</td>
<td>$200,000</td>
<td>No</td>
<td>7</td>
</tr>
<tr>
<td>Brandywine Creek Storm Detention Facility Feasibility Study</td>
<td>Identify control points and provide flood control structures to mitigate inundation effects.</td>
<td>$100,000</td>
<td>No</td>
<td>7</td>
</tr>
<tr>
<td>Tracy Creek Erosion Control Project</td>
<td>Construct erosion control improvements east of the bridge.</td>
<td>$50,000</td>
<td>No</td>
<td>7</td>
</tr>
<tr>
<td>Civic Plaza Resiliency</td>
<td>Construct improvements to maintain operations and access during extreme storm events.</td>
<td>$50,000</td>
<td>No</td>
<td>7</td>
</tr>
<tr>
<td>Stormwater Management Study</td>
<td>Stormwater management study.</td>
<td>$112,000</td>
<td>No</td>
<td>7</td>
</tr>
<tr>
<td>City Water Filtration Plant</td>
<td>Construct protective structure or devices at primary water intake to protect pumps at the water filtration plant.</td>
<td>$150,000</td>
<td>No</td>
<td>8</td>
</tr>
<tr>
<td>Civic Plaza Resiliency</td>
<td>Construct improvements to maintain operations and physical access during extreme storm events.</td>
<td>$50,000</td>
<td>No</td>
<td>10</td>
</tr>
<tr>
<td>Red Cross Vehicle Replacement</td>
<td>Fund purchase of vehicles to tow critical response equipment and assets to disaster locations.</td>
<td>$75,000</td>
<td>Yes</td>
<td>10</td>
</tr>
<tr>
<td>Stormwater Management Study</td>
<td>Prepare a stormwater management study.</td>
<td>$112,000</td>
<td>No</td>
<td>12</td>
</tr>
<tr>
<td>Water Street Sewer Separation</td>
<td>Design and construct flood-resistant measures for stormwater control structures and pump stations.</td>
<td>$112,000</td>
<td>No</td>
<td>12</td>
</tr>
<tr>
<td>Inflow And Infiltration Program</td>
<td>Separate stormwater lines from the sanitary sewer system.</td>
<td>$750,000</td>
<td>No</td>
<td>12</td>
</tr>
<tr>
<td>Stormwater Management Study</td>
<td>Evaluate stormwater management alternatives at the G.W. Johnson and J.F. Snapp ballfields.</td>
<td>$183,000</td>
<td>No</td>
<td>12</td>
</tr>
<tr>
<td>Grand Avenue Sewer Separation</td>
<td>Separate stormwater lines from the sanitary sewer system to eliminate flooding at the intersection of Grand Avenue and Burbank.</td>
<td>$992,500</td>
<td>No</td>
<td>12</td>
</tr>
<tr>
<td>Helen Drive Sewer Separation</td>
<td>Separate stormwater lines from the sanitary sewer system to eliminate flooding of Helen Drive.</td>
<td>$992,500</td>
<td>No</td>
<td>12</td>
</tr>
<tr>
<td>Inflow And Infiltration Mitigation Program</td>
<td>Separate stormwater lines from the sanitary sewer system.</td>
<td>$234,000</td>
<td>No</td>
<td>12</td>
</tr>
<tr>
<td>Inflow And Infiltration Mitigation Program</td>
<td>Separate stormwater lines from the sanitary sewer system.</td>
<td>$183,000</td>
<td>No</td>
<td>12</td>
</tr>
<tr>
<td>Generator For Ethel Place Storm Sewer Station</td>
<td>Install generator on existing storm pump station.</td>
<td>$10,000</td>
<td>No</td>
<td>12</td>
</tr>
<tr>
<td>Generator For Valley Road Storm Sewer Station</td>
<td>Install generator on existing storm pump station.</td>
<td>$10,000</td>
<td>No</td>
<td>12</td>
</tr>
<tr>
<td>Fire Department Generators</td>
<td>Install 20kW generators in four fire stations.</td>
<td>$400,000</td>
<td>No</td>
<td>12</td>
</tr>
<tr>
<td>Redundant Power Supply</td>
<td>Install redundant power supply at Ranney Well.</td>
<td>$654,000</td>
<td>No</td>
<td>12</td>
</tr>
<tr>
<td>Redundant Power Supply</td>
<td>Coordinate purchase of backup electrical power generators to achieve economies of scale.</td>
<td>$100,000</td>
<td>No</td>
<td>12</td>
</tr>
</tbody>
</table>
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Table 5.2 Master Table of Projects

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Short Description</th>
<th>Project Category</th>
<th>Estimated Cost</th>
<th>Regional</th>
<th>Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional Emergency Shelter Feasibility Study, Broome County</td>
<td>Feasibility study, design, and preliminary engineering to convert portion of a former military depot for use as a regional emergency shelter.</td>
<td>Proposed</td>
<td>$500,000</td>
<td>Yes</td>
<td>9</td>
</tr>
<tr>
<td>Susquehanna River Regional River Initiative</td>
<td>Establish a regional river system initiative to build resilience. This project would involve modeling and analysis of the regional Susquehanna River watershed, piloting of demonstration projects, and ultimately creating regional stream management and stormwater retention programs.</td>
<td>Proposed</td>
<td>$3,000,000</td>
<td>Yes</td>
<td>2, 7</td>
</tr>
<tr>
<td>United Way of Broome County Infrastructure Resiliency</td>
<td>Install back-up generator for United Way 2-1-1 call service.</td>
<td>Proposed</td>
<td>$75,000</td>
<td>Yes</td>
<td>1, 12</td>
</tr>
<tr>
<td>National Flood Insurance Program’s Community Rating System Participation, Broome County</td>
<td>Participation in the CRS allows for discounts on flood insurance premiums ranging from 5% to up to 45%. These discounts provide an incentive to pay for new flood protection activities that can help save lives and property in the event of a flood. Community participation involves undertaking some or all of the 18 public information and floodplain management activities described in the CRS Coordinator’s Manual.</td>
<td>Featured</td>
<td>$60,000</td>
<td>Yes</td>
<td>2, 4</td>
</tr>
<tr>
<td>Targeted Disaster Preparedness Education, Broome County</td>
<td>Provides a disaster preparedness education campaign for vulnerable populations in the Southern Tier.</td>
<td>Featured</td>
<td>$25,000</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td>Southern Tier Health Link Health Information Exchange</td>
<td>Provide clinical healthcare information to Broome County Health Department, medical providers, home health agencies and Susquehanna’s Regional Emergency Medical Services that coordinate the regional EMS system. Support the emergency needs of the Broome Community for special needs shelters, ambulance calls, and rapid evacuation processes.</td>
<td>Additional</td>
<td>$1,714,024</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td>Broome County Community Emergency Response Team Support</td>
<td>Purchase utility trailer and personal protective equipment for team members.</td>
<td>Additional</td>
<td>$15,000</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td>Redundant Power Supply, Broome County</td>
<td>Coordinate purchase of backup electrical power generators to achieve economies of scale.</td>
<td>Additional</td>
<td>$100,000</td>
<td>Yes</td>
<td>12</td>
</tr>
<tr>
<td>Red Cross Vehicle Replacement</td>
<td>Fund purchase of vehicles to tow critical response equipment and assets to disaster locations.</td>
<td>Additional</td>
<td>$75,000</td>
<td>No</td>
<td>10</td>
</tr>
<tr>
<td>Front Street Stormwater Separation, City of Binghamton</td>
<td>Separate combined sewer infrastructure and replace with separated storm and sanitary systems.</td>
<td>Proposed</td>
<td>$750,000</td>
<td>No</td>
<td>8</td>
</tr>
<tr>
<td>Bartlett Road Stormwater Detention, City of Binghamton</td>
<td>Engineering and design to evaluate redevelopment of Bartlett Road neighborhood.</td>
<td>Featured</td>
<td>$10,000,000</td>
<td>No</td>
<td>5, 7</td>
</tr>
<tr>
<td>City Water Filtration Plant, City of Binghamton</td>
<td>Construct protective structure or devices at primary water intake to protect pumps at the water filtration plant.</td>
<td>Additional</td>
<td>$150,000</td>
<td>No</td>
<td>8</td>
</tr>
<tr>
<td>Civic Plaza Resiliency, City of Binghamton</td>
<td>Construct improvements to maintain operations and physical access during extreme storm events.</td>
<td>Additional</td>
<td>$50,000</td>
<td>No</td>
<td>7, 10</td>
</tr>
<tr>
<td>Fire Department Generators, City of Binghamton</td>
<td>Install 20KW generators in four fire stations.</td>
<td>Additional</td>
<td>$400,000</td>
<td>No</td>
<td>12</td>
</tr>
<tr>
<td>Water Street Sewer Separation, City of Binghamton</td>
<td>Design and construct flood-resistant measures for stormwater control structures and pump stations.</td>
<td>Additional</td>
<td>$750,000</td>
<td>No</td>
<td>12</td>
</tr>
<tr>
<td>Carlin Creek North Flood Mitigation, Town of Conklin</td>
<td>Stormwater control project to mitigate flooding to Carol Court neighborhood.</td>
<td>Proposed</td>
<td>$500,000</td>
<td>No</td>
<td>7</td>
</tr>
<tr>
<td>Carlin Creek South Watershed Improvements Engineering and Design, Town of Conklin</td>
<td>Engineering and design of stormwater diversion project for Carlin Creek including creation of new wetland area located mainly east of the Corporate Park and adjacent to the existing rail line. Most of the proposed wetland area is in an undeveloped portion of the floodplain. Reduction of impact to residential neighborhood, businesses, and school.</td>
<td>Proposed</td>
<td>$160,000</td>
<td>No</td>
<td>7</td>
</tr>
<tr>
<td>Powe's Road Evacuation Route Flood Protection Study, Town of Conklin</td>
<td>Undertake feasibility study and preliminary engineering.</td>
<td>Proposed</td>
<td>$130,000</td>
<td>No</td>
<td>3, 7</td>
</tr>
<tr>
<td>Stillwater Road Stormwater, Town of Conklin</td>
<td>Installation of stormwater drainage system along Stillwater Road to address extreme risk storm events.</td>
<td>Proposed</td>
<td>$300,000</td>
<td>No</td>
<td>7</td>
</tr>
<tr>
<td>Community Center Relocation, Town of Conklin</td>
<td>Construct community center at a flood-safe location. Building includes multi-purpose room, kitchen and Town Parks Department garage. Provides space for emergency operations and shelter during storm events.</td>
<td>Proposed</td>
<td>$1,200,000</td>
<td>No</td>
<td>10</td>
</tr>
<tr>
<td>Carlin Creek South Watershed Improvements Construction, Town of Conklin</td>
<td>Construction of stormwater diversion project for Carlin Creek including creation of new wetland area located mainly east of the Corporate Park and adjacent to the existing rail line. Most of the proposed wetland area is in an undeveloped portion of the floodplain. Reduction of impact to residential neighborhood, businesses, and school.</td>
<td>Featured</td>
<td>$1,840,000</td>
<td>No</td>
<td>7</td>
</tr>
<tr>
<td>Powe's Road Evacuation Route Flood Protection Construction, Town of Conklin</td>
<td>Implementation and construction of route and flood protection measures.</td>
<td>Featured</td>
<td>$1,100,000</td>
<td>No</td>
<td>3, 7</td>
</tr>
<tr>
<td>Progress Parkway / Hardie Road Sewer Extension, Town of Conklin</td>
<td>Design and extend sewer service from Powe's Road along Hardie Road terminating at Shaw Road to support new mixed-use development, including senior housing, outside of the floodplain.</td>
<td>Featured</td>
<td>$1,000,000</td>
<td>No</td>
<td>5</td>
</tr>
</tbody>
</table>
### Table 5.2 Master Table of Projects  
continued

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Short Description</th>
<th>Project Category</th>
<th>Estimated Cost</th>
<th>Regional</th>
<th>Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sanitary Sewer Extension Project, Town of Conklin</td>
<td>Extend sanitary sewer lines from Corporate Drive to Pride Manor Mobile Home Park (approximately 8 miles).</td>
<td>Additional</td>
<td>$4,650,000</td>
<td>No 5</td>
<td></td>
</tr>
<tr>
<td>Backflow Preventer Program, Village of Endicott</td>
<td>Installation of backflow preventer valves on individual homes.</td>
<td>Proposed</td>
<td>$135,000</td>
<td>No 7</td>
<td></td>
</tr>
<tr>
<td>Scatter Site Utility Improvements, Village of Endicott</td>
<td>Provide flood mitigation for the Endwell and Loder pump stations and install a generator at the River Terrace Pump Station.</td>
<td>Proposed</td>
<td>$710,000</td>
<td>No 12</td>
<td></td>
</tr>
<tr>
<td>Wastewater Treatment Plant Improvements, Village of Endicott</td>
<td>Provide flood mitigation measures at the wastewater treatment plant.</td>
<td>Proposed</td>
<td>$1,660,000</td>
<td>No 8</td>
<td></td>
</tr>
<tr>
<td>Water Supply Interconnection, Village of Endicott and Town of Vestal</td>
<td>Project will create additional access to potable water in the event the existing water supply is unavailable due to power outage or flooding of the existing well fields.</td>
<td>Proposed</td>
<td>$548,563</td>
<td>No 8</td>
<td></td>
</tr>
<tr>
<td>Huron Campus Flood Mitigation, Village of Endicott</td>
<td>Architecture and engineering of improvements from flood mitigation study for the Huron Campus.</td>
<td>Featured</td>
<td>$1,437,740</td>
<td>No 7</td>
<td></td>
</tr>
<tr>
<td>K-Mart Site Redevelopment, Village of Endicott</td>
<td>Planning and design for retrofit existing vacant commercial development to incorporate green infrastructure.</td>
<td>Featured</td>
<td>$2,026,022</td>
<td>No 7</td>
<td></td>
</tr>
<tr>
<td>Tri-Cities Airport Stormwater Improvements, Village of Endicott</td>
<td>Planning and design for Tri-Cities Airport Stormwater enhancement.</td>
<td>Featured</td>
<td>$184,138</td>
<td>No 7</td>
<td></td>
</tr>
<tr>
<td>Backflow Preventer Program, Village of Endicott</td>
<td>Install backflow preventer valves in individual residences.</td>
<td>Additional</td>
<td>$4,500,000</td>
<td>No 7</td>
<td></td>
</tr>
<tr>
<td>Inflow And Infiltration Program, Village of Endicott</td>
<td>Separate stormwater lines from the sanitary sewer system.</td>
<td>Additional</td>
<td>$183,000</td>
<td>No 12</td>
<td></td>
</tr>
<tr>
<td>Levee Certification, Village of Endicott</td>
<td>Levee certification.</td>
<td>Additional</td>
<td>$157,000</td>
<td>No 6</td>
<td></td>
</tr>
<tr>
<td>Redundant Power Supply, Village of Endicott</td>
<td>Install redundant power supply at Ranney Well.</td>
<td>Additional</td>
<td>$654,000</td>
<td>No 12</td>
<td></td>
</tr>
<tr>
<td>Stormwater Management Study, Village of Endicott</td>
<td>Prepare a stormwater management study.</td>
<td>Additional</td>
<td>$112,000</td>
<td>No 7, 12</td>
<td></td>
</tr>
<tr>
<td>Stormwater Management Study, Village of Endicott</td>
<td>Evaluate stormwater management alternatives at the G.W. Johnson and J.F. Snapp ballfields.</td>
<td>Additional</td>
<td>$183,000</td>
<td>No 7, 12</td>
<td></td>
</tr>
<tr>
<td>Anna Maria Ditch Stormwater Management, Village of Johnson City</td>
<td>Rehabilitate the Anna Maria Ditch stormwater system.</td>
<td>Proposed</td>
<td>$950,000</td>
<td>No 7</td>
<td></td>
</tr>
<tr>
<td>DPW Complex Resiliency Improvements, Village of Johnson City</td>
<td>Rebuild DPW administration offices and employee locker room on second story and construct vehicle maintenance building and garage for Village vehicles.</td>
<td>Proposed</td>
<td>$1,450,000</td>
<td>No 10, 12</td>
<td></td>
</tr>
<tr>
<td>Sanitary Sewer Pump Station Resiliency Improvements, Village of Johnson City</td>
<td>Upgrade sanitary sewer pump station.</td>
<td>Proposed</td>
<td>$208,000</td>
<td>No 12</td>
<td></td>
</tr>
<tr>
<td>Water Treatment Plant Resiliency Improvements, Village of Johnson City</td>
<td>Upgrade existing water plant complex to enhance resiliency.</td>
<td>Proposed</td>
<td>$980,000</td>
<td>No 8, 12</td>
<td></td>
</tr>
<tr>
<td>Oakdale Mall Rehabilitation, Village of Johnson City</td>
<td>Planning and design for retrofit existing commercial development to incorporate green infrastructure.</td>
<td>Featured</td>
<td>$1,927,244</td>
<td>No 7</td>
<td></td>
</tr>
<tr>
<td>Cloverleaf Bio-Retention/Flood Mitigation, Village of Johnson City</td>
<td>Architecture and engineering design of stormwater management system using interior space of cloverleaf interchange for detention.</td>
<td>Featured</td>
<td>$128,841</td>
<td>No 7</td>
<td></td>
</tr>
<tr>
<td>Finch Hollow County Retention Facility #1, Village of Johnson City</td>
<td>Remove accumulated sediment that affects capacity of stormwater retention facility.</td>
<td>Additional</td>
<td>$65,000</td>
<td>No 7</td>
<td></td>
</tr>
<tr>
<td>Grand Avenue Sewer Separation, Village of Johnson City</td>
<td>Separate stormwater lines from the sanitary sewer system to eliminate flooding at the intersection of Grand Avenue and Burbank.</td>
<td>Additional</td>
<td>$992,500</td>
<td>No 12</td>
<td></td>
</tr>
<tr>
<td>Helen Drive Sewer Separation, Village of Johnson City</td>
<td>Separate stormwater lines from the sanitary sewer system to eliminate flooding of Helen Drive.</td>
<td>Additional</td>
<td>$234,000</td>
<td>No 12</td>
<td></td>
</tr>
<tr>
<td>Stormwater Detention, Village of Johnson City</td>
<td>Install underground stormwater storage units at Johnson City School District athletic fields.</td>
<td>Additional</td>
<td>$35,000</td>
<td>No 7</td>
<td></td>
</tr>
<tr>
<td>Refuse Garage Relocation, Town of Union</td>
<td>Construction of new building outside of floodplain area.</td>
<td>Proposed</td>
<td>$2,500,000</td>
<td>No 10</td>
<td></td>
</tr>
<tr>
<td>Scatter Site Stream Bank Restoration, Town of Union</td>
<td>Restore stream bank at selected locations.</td>
<td>Proposed</td>
<td>$300,000</td>
<td>No 7</td>
<td></td>
</tr>
<tr>
<td>Stormwater Outflow Pipe Backflow Prevention, Town of Union</td>
<td>Place flag valves on stormwater outflows and create temporary stormwater storage areas.</td>
<td>Proposed</td>
<td>$950,000</td>
<td>No 7</td>
<td></td>
</tr>
<tr>
<td>Taft Avenue Sanitary Sewer Basin Flow Metering, Town of Union</td>
<td>Conduct sanitary sewer flow metering to isolate sewer line segments that are contributing to infiltration and inflow.</td>
<td>Proposed</td>
<td>$50,000</td>
<td>No 7, 8</td>
<td></td>
</tr>
<tr>
<td>Valleyview Drive Drainage Improvements, Town of Union</td>
<td>Upgrade the stormwater drainage system along Valleyview Drive to mitigate flooding.</td>
<td>Proposed</td>
<td>$1,247,533</td>
<td>No 7</td>
<td></td>
</tr>
<tr>
<td>Argonne Neighborhood and South Endwell Riverfront Trail, Town of Union</td>
<td>Planning and design to create passive recreational river trail using properties primarily acquired through FEMA buyout programs.</td>
<td>Featured</td>
<td>$307,676</td>
<td>No 7, 11</td>
<td></td>
</tr>
<tr>
<td>BAE Systems Floodwall Construction, Town of Union</td>
<td>Enhance floodwall protection in the Westover section of town to facilitate the redevelopment of the former BAE Systems district consistent with plans prepared as part of the Town’s LTCP process.</td>
<td>Featured</td>
<td>$774,622</td>
<td>No 6</td>
<td></td>
</tr>
<tr>
<td>Fairmont Park Protective Measures, Town of Union</td>
<td>Planning and design to create sustainable neighborhood with green space that doubles as additional stormwater storage capacity.</td>
<td>Featured</td>
<td>$369,265</td>
<td>No 7, 11</td>
<td></td>
</tr>
<tr>
<td>Project Name</td>
<td>Short Description</td>
<td>Project Category</td>
<td>Estimated Cost</td>
<td>Regional</td>
<td>Strategy</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------------------</td>
<td>---------------</td>
<td>----------</td>
<td>----------</td>
</tr>
<tr>
<td>Rental Housing Replacement, Town of Union</td>
<td>Construct 30 units of affordable rental housing to replace rental-housing stock lost during the flood event.</td>
<td>Featured</td>
<td>$4,500,000</td>
<td>No</td>
<td>5</td>
</tr>
<tr>
<td>Doris Avenue and Vestal Parkway Stormwater System Upgrades, Town of Vestal</td>
<td>Upgrade stormwater system.</td>
<td>Proposed</td>
<td>$375,000</td>
<td>No</td>
<td>7</td>
</tr>
<tr>
<td>Emergency Management Services Relocation, Town of Vestal</td>
<td>Construct EMS facility at a flood-safe location.</td>
<td>Proposed</td>
<td>$2,000,000</td>
<td>No</td>
<td>10</td>
</tr>
<tr>
<td>Fire Station 1 Flood-Proofing, Town of Vestal</td>
<td>Flood proof station from possible flood damage.</td>
<td>Proposed</td>
<td>$30,000</td>
<td>No</td>
<td>10</td>
</tr>
<tr>
<td>Hawthorne Street Drainage Improvements, Town of Vestal</td>
<td>Upgrade stormwater system.</td>
<td>Proposed</td>
<td>$300,000</td>
<td>No</td>
<td>7</td>
</tr>
<tr>
<td>Roberts Street Stormwater Pump Station Upgrade, Town of Vestal</td>
<td>Convert an out of service sewer station to a storm pump station.</td>
<td>Proposed</td>
<td>$650,000</td>
<td>No</td>
<td>7, 12</td>
</tr>
<tr>
<td>Stair Park Stormwater Detention Facility, Town of Vestal</td>
<td>Engineering study, design, and construction of stormwater detention facility on Town owned property south of Stair Park to help alleviate stormwater impacts of Fuller Hollow Creek on adjacent properties.</td>
<td>Proposed</td>
<td>$1,248,555</td>
<td>No</td>
<td>7</td>
</tr>
<tr>
<td>Castle Gardens Buyout Area Stormwater Detention, Town of Vestal</td>
<td>Planning and design to create a sustainable neighborhood in the Castle Gardens buyout area with stormwater detention.</td>
<td>Featured</td>
<td>$754,722</td>
<td>No</td>
<td>7</td>
</tr>
<tr>
<td>Cloverleaf Bio-Retention/Flood Mitigation, Town of Vestal</td>
<td>Architecture and engineering design of stormwater management system using interior space of cloverleaf interchange for detention.</td>
<td>Featured</td>
<td>$589,214</td>
<td>No</td>
<td>7</td>
</tr>
<tr>
<td>Town Square Mall Green Infrastructure Retrofit, Town of Vestal</td>
<td>Establishment of green infrastructure design criteria for retro-fitting existing major commercial shopping establishments.</td>
<td>Featured</td>
<td>$1,866,910</td>
<td>No</td>
<td>7</td>
</tr>
<tr>
<td>Anderson Road Drainage Improvements, Town of Vestal</td>
<td>Upgrade Storm pipe system.</td>
<td>Additional</td>
<td>$450,000</td>
<td>No</td>
<td>7</td>
</tr>
<tr>
<td>Brandywine Creek Storm Detention Facility Feasibility Study, City of Binghamton</td>
<td>Identify control points and provide flood control structures to mitigate inundation effects.</td>
<td>Additional</td>
<td>$100,000</td>
<td>No</td>
<td>7</td>
</tr>
<tr>
<td>Castleman Road Drainage Improvements, Town of Vestal</td>
<td>Upgrade Storm pipe system.</td>
<td>Additional</td>
<td>$200,000</td>
<td>No</td>
<td>7</td>
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<tr>
<td>Delano Avenue Drainage, Town of Vestal</td>
<td>Upgrade Storm pipe system.</td>
<td>Additional</td>
<td>$450,000</td>
<td>No</td>
<td>7</td>
</tr>
<tr>
<td>Echo Creek To Choconut Creek Restoration/Mitigations, Town of Vestal</td>
<td>Construct Echo Creek discharge outlet into the Choconut Creek.</td>
<td>Additional</td>
<td>$350,000</td>
<td>No</td>
<td>7</td>
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<tr>
<td>Generator For Ethel Place Storm Sewer Station, Town of Vestal</td>
<td>Install generator on existing storm pump station.</td>
<td>Additional</td>
<td>$10,000</td>
<td>No</td>
<td>12</td>
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<tr>
<td>Generator For Valley Road Storm Sewer Station, Town of Vestal</td>
<td>Install generator on existing storm pump station.</td>
<td>Additional</td>
<td>$10,000</td>
<td>No</td>
<td>12</td>
</tr>
<tr>
<td>Glenwood Road/Juneberry Road Drainage Improvements, Town of Vestal</td>
<td>Upgrade Storm pipe system.</td>
<td>Additional</td>
<td>$60,000</td>
<td>No</td>
<td>7</td>
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<tr>
<td>Imperial Woods Neighborhood Drainage Improvements, Town of Vestal</td>
<td>Upgrade Storm pipe system.</td>
<td>Additional</td>
<td>$250,000</td>
<td>No</td>
<td>7</td>
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<tr>
<td>Jensen Road to Vestal Parkway Drainage Improvements, Town of Vestal</td>
<td>Upgrade Storm pipe system.</td>
<td>Additional</td>
<td>$400,000</td>
<td>No</td>
<td>7</td>
</tr>
<tr>
<td>Southwood Drive To South Meadowbrook Drainage Improvements, Town of Vestal</td>
<td>Upgrade Storm pipe system.</td>
<td>Additional</td>
<td>$200,000</td>
<td>No</td>
<td>7</td>
</tr>
<tr>
<td>Tracy Creek Erosion Control Project, Town of Vestal</td>
<td>Construct erosion control improvements east of the bridge.</td>
<td>Additional</td>
<td>$50,000</td>
<td>No</td>
<td>7</td>
</tr>
</tbody>
</table>
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C. Public Engagement Process

Broad public outreach was an important component of the NYCR Broome Plan. Key elements of the public engagement process included publicized NYCR Planning Committee (Committee) meetings that were open to the public and public engagement events that provided the opportunity for public input at key milestones during the planning process. A wide range of media was used to inform the community of the NYCR Program and NYCR Broome plan, including the NYCR website, social media, electronic mail, and print advertising.

i. Broome Community Planning Meetings

The first step in the public engagement process was establishment of the Committee, whose members reflected Broome’s diverse population and represented residents, businesses, local and county governments, educational institutions, and community organizations. The volunteer members of the Committee, led by the Committee Co-Chairs, were active partners in development of the NYCR Broome Plan. Their involvement included a diverse range of activities that included preparing the plan’s vision statement, analysis and assessment of assets and risk areas, development of recovery and resiliency strategies, and formulation of proposed and featured projects. Committee members also served as a conduit for dissemination of information to the municipalities and public and as a sounding board for public input. The Committee also explored ways in which inter-municipal cooperation and coordination could enhance regional resiliency.

The Committee conducted seven public meetings during the development of the NYCR Broome Plan.

ii. Public Engagement Events

Public outreach included three widely advertised public engagement events. During each event the public was encouraged to participate and provide input to the NYCR Broome Plan.

The first public engagement event, held on October 15, 2013, introduced Broome residents to the NYCR Program and sought to obtain public input on specific topics to help Broome build back better. The Co-Chairs opened the public meeting by giving a brief explanation of the NYCR Program, explaining that it is a federally funded program to help restore communities throughout New York State devastated by recent catastrophic weather events and flooding. They described the roles of the Committee and the Consultant Team assisting preparation of the NYCR Broome Plan. The Co-Chairs outlined the goals and objectives of the program, to “rebuild better and safer based on community-driven plans that consider current damage, future threats to community assets, and the community’s economic future.” An open house format with stations staffed by members of the Committee and Consultant Team enabled public input to be obtained that was used to draft the NYCR Broome Plan and to establish direction and focus for the balance of the planning process.
The second public engagement event, held on November 18, 2013, was the Regional Resiliency Summit. The purpose of the Regional Resiliency Summit was to engage the public from three Susquehanna River communities (Broome, Tioga, and the Village of Sidney in Delaware County) in a day of information sharing on regional mitigation and floodplain management topics. Leading experts shared presentations on storm preparedness, changing weather patterns, recovery, and resiliency.

The event, held at the Binghamton University Innovative Technologies Complex, attracted almost 140 panelists and members of the public. Experts from government, academia, and the private sector discussed the viability of various approaches to flood control, helping to shape future efforts to devise realistic and effective NYRCR plans in the region.

Topics of discussion included:

- What’s Coming: Changing Weather Patterns and Regional Floodplain Management
- What Can Be Done: Local and Regional Mitigation Techniques
- Learning From Each Other – Communities Taking Action
- Presentation of NYCR Conceptual Plans for Broome, Tioga and Sidney

After the presentations, attendees were invited to join presenters, panelists and state agencies in an open house to continue the discussion and hear public comments. Open house display booths included:

- County Soil & Water Conservation Districts - Upper Susquehanna Coalition;
- Delaware County Planning Department;
- NYS Department of Environmental Conservation;
- NYS Environmental Facilities Corporation;
- National Weather Service;
- NYS Energy Research and Development Authority;
- NY Rising Communities Reconstruction Program; and
- NYRCR Broome, Tioga, and Sidney Communities (three tables).

During the Open House portion of the event, Committee members and the Consultant Team engaged in discussions with Summit attendees on the NYRCR Broome Plan’s strategies and projects, which were well received. The Summit was widely covered by multiple print and television outlets. Highlights were posted to a variety of social media, including Facebook, Tumblr, Twitter, and each presentation was posted to the NY Rising web site.
The third public engagement event was organized to review progress on the NYRCR Broome Plan and present project details. The Committee Co-Chairs opened the meeting with a review of the planning process conducted to date. This was followed by a detailed presentation from the Consultant Team on CDBG-DR eligibility of projects, strategies, risk assessment summary, and proposed and featured projects.

The featured projects presentation included a series of conceptual plans that address some of the long-term transformational aspects of the NYRCR Program. These plans include concepts that incorporate resiliency in design and green infrastructure that could be applied on a regional basis with specific plans that could be used as case studies.

A fourth event is scheduled to be held before May 12, 2014 to present the final NYRCR Broome Plan and discuss implementation of its proposed projects.

**iii. Additional Public Outreach**

In addition to advertised public meetings, stakeholders (i.e., residents, public and private agencies, community organizations, and local businesses) were encouraged to provide feedback to the Committee throughout the planning process using the NYRCR website and Facebook page. The Consultant Team and NYRCR Program staff met with municipal officials and agency staff to gain insight and awareness of public concerns. The NYRCR Program staff and Committee Co-Chairs made numerous public presentations and gave media interviews to publicize the NYRCR Program and Broome Plan.
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## D. Community Asset Inventory

### Table 5.3 Assets and Risk Assessment

<table>
<thead>
<tr>
<th>Asset Information</th>
<th>Landscape Attributes</th>
<th>Risk Assessment (100-year event)</th>
<th>Risk Assessment (500-year event)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Community Value</td>
<td>Hazard Score</td>
<td>Exposure Score</td>
</tr>
<tr>
<td>Huron Campus</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goodrich Implement Inc.</td>
<td>High</td>
<td>A</td>
<td>Large Business</td>
</tr>
<tr>
<td>BAE Systems</td>
<td>High</td>
<td>A</td>
<td>Employment Hub</td>
</tr>
<tr>
<td>Home Depot- River Plaza</td>
<td>Extreme</td>
<td>A</td>
<td>Large Business</td>
</tr>
<tr>
<td>Robson Electric Supply</td>
<td>Extreme</td>
<td>A</td>
<td>Large Business</td>
</tr>
<tr>
<td>Binghamton Highway Garage</td>
<td>High</td>
<td>B</td>
<td>Public Works Facilities</td>
</tr>
<tr>
<td>Calvin Coolidge School</td>
<td>N/A</td>
<td>B</td>
<td>Schools</td>
</tr>
<tr>
<td>City of Binghamton Engine 4</td>
<td>High</td>
<td>B</td>
<td>Emergency Operations / Response</td>
</tr>
<tr>
<td>City of Binghamton HQ &amp; State/County Offices</td>
<td>Moderate</td>
<td>B</td>
<td>Emergency Operations / Response</td>
</tr>
<tr>
<td>City of Binghamton Quint 3</td>
<td>N/A</td>
<td>B</td>
<td>Emergency Operations / Response</td>
</tr>
<tr>
<td>DOT Facility</td>
<td>High</td>
<td>B</td>
<td>Public Works Facilities</td>
</tr>
<tr>
<td>East Middle School</td>
<td>High</td>
<td>B</td>
<td>Schools</td>
</tr>
<tr>
<td>MaxArthur School</td>
<td>High</td>
<td>B</td>
<td>Schools</td>
</tr>
<tr>
<td>Our Lady of Lourdes Memorial Hospital</td>
<td>High</td>
<td>B</td>
<td>Primary / Regional Hospitals</td>
</tr>
<tr>
<td>Southview Post Office</td>
<td>Moderate</td>
<td>B</td>
<td>Government and Administrative Services</td>
</tr>
<tr>
<td>Superior Ambulance Service</td>
<td>Moderate</td>
<td>B</td>
<td>Emergency Operations / Response</td>
</tr>
<tr>
<td>The Greater Binghamton Health Center</td>
<td>N/A</td>
<td>B</td>
<td>Primary / Regional Hospitals</td>
</tr>
<tr>
<td>YMCA- Emergency Shelter</td>
<td>Moderate</td>
<td>B</td>
<td>Emergency Operations / Response</td>
</tr>
<tr>
<td>Conklin Fire Station 1</td>
<td>High</td>
<td>B</td>
<td>Emergency Operations / Response</td>
</tr>
<tr>
<td>Conklin Highway Garage</td>
<td>Extreme</td>
<td>B</td>
<td>Public Works Facilities</td>
</tr>
</tbody>
</table>
### Table 5.3 Assets and Risk Assessment

<table>
<thead>
<tr>
<th>Asset Information</th>
<th>Landscape Attributes</th>
<th>Risk Assessment (100-year event)</th>
<th>Risk Assessment (500-year event)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Asset</strong></td>
<td><strong>Risk Area</strong></td>
<td><strong>Asset Class</strong></td>
<td><strong>Risk</strong></td>
</tr>
<tr>
<td>Conklin Town Hall</td>
<td>Extreme</td>
<td>Government and Administrative Services</td>
<td>No, Locally Significant: County Haz Mit Plan</td>
</tr>
<tr>
<td>F. P. Donnelly School</td>
<td>High*</td>
<td>Schools</td>
<td>Yes, FEMA</td>
</tr>
<tr>
<td>Richard T. Starks Junior High School</td>
<td>Moderate</td>
<td>Schools</td>
<td>Yes, FEMA</td>
</tr>
<tr>
<td>Endicott Police &amp; Fire</td>
<td>N/A</td>
<td>Emergency Operations / Response</td>
<td>Yes, FEMA</td>
</tr>
<tr>
<td>Holy Nativity Lutheran Church and Emergency Shelter</td>
<td>High</td>
<td>Emergency Operations / Response</td>
<td>Yes, FEMA</td>
</tr>
<tr>
<td>James F. Snapp Middle School</td>
<td>High</td>
<td>Schools</td>
<td>Yes, FEMA</td>
</tr>
<tr>
<td>Seton Catholic High School</td>
<td>Moderate</td>
<td>School</td>
<td>Yes, FEMA</td>
</tr>
<tr>
<td>Union Volunteer Emergency Squad</td>
<td>High</td>
<td>Emergency Operations / Response</td>
<td>Yes, FEMA</td>
</tr>
<tr>
<td>Village of Endicott Street Department</td>
<td>Moderate</td>
<td>Public Works Facilities</td>
<td>Yes, FEMA</td>
</tr>
<tr>
<td>Johnson City Police Substation</td>
<td>N/A</td>
<td>Emergency Operations / Response</td>
<td>Yes, FEMA</td>
</tr>
<tr>
<td>Johnson City Fire Station 2 &amp; Recreation Complex</td>
<td>High</td>
<td>Emergency Operations / Response</td>
<td>Yes, FEMA</td>
</tr>
<tr>
<td>Johnson City Highway Garage</td>
<td>Extreme</td>
<td>Public Works Facilities</td>
<td>Yes, FEMA</td>
</tr>
<tr>
<td>Ann G McGuinness Intermediate School</td>
<td>N/A</td>
<td>Schools</td>
<td>Yes, FEMA</td>
</tr>
<tr>
<td>Broome County Head Start</td>
<td>High</td>
<td>Schools</td>
<td>Yes, FEMA</td>
</tr>
<tr>
<td>Charles F. Johnson Jr Elementary School</td>
<td>High*</td>
<td>Schools</td>
<td>Yes, FEMA</td>
</tr>
<tr>
<td>Linnieau W. Wood Elementary School</td>
<td>N/A</td>
<td>Schools</td>
<td>Yes, FEMA</td>
</tr>
<tr>
<td>Maine Endwell Senior High School</td>
<td>N/A</td>
<td>Schools</td>
<td>Yes, FEMA</td>
</tr>
<tr>
<td>NYS Police Endwell Barracks</td>
<td>High</td>
<td>Emergency Operations / Response</td>
<td>Yes, FEMA</td>
</tr>
<tr>
<td>Town of Union offices</td>
<td>High</td>
<td>Government and Administrative Services</td>
<td>No, Locally Significant: County Haz Mit Plan</td>
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<tr>
<td>Asset Information</td>
<td>Landscape Attributes</td>
<td>Risk Assessment (100-year event)</td>
<td>Risk Assessment (500-year event)</td>
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<td>-----------------------------------</td>
<td>---------------------------------------------------------------------------------------</td>
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<tr>
<td>Asset</td>
<td>Community Value</td>
<td>Hazard Score</td>
<td>Exposure Score</td>
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<tr>
<td>Asset</td>
<td>Damage Prevention measures</td>
<td>Exposure Score</td>
<td>Vulnerability Score</td>
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<tr>
<td>Asset</td>
<td>Asset elevation below flood elevation</td>
<td>Asset elevation less than two feet above BFE</td>
<td>Asset near point of confluence</td>
</tr>
<tr>
<td>West Endicott Fire</td>
<td>High* B Emergency Operations / Response</td>
<td>Yes, FEMA</td>
<td>High</td>
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<tr>
<td>Vestal Fire Company 1</td>
<td>High B Emergency Operations / Response</td>
<td>Yes, FEMA</td>
<td>High</td>
</tr>
<tr>
<td>Vestal Fire Company 3</td>
<td>High B Emergency Operations / Response</td>
<td>Yes, FEMA</td>
<td>High</td>
</tr>
<tr>
<td>Vestal Gov’t Offices &amp; Police</td>
<td>High B Emergency Operations / Response</td>
<td>Yes, FEMA</td>
<td>High</td>
</tr>
<tr>
<td>Vestal Volunteer Emergency Squad &amp; Playground</td>
<td>High B Emergency Operations / Response</td>
<td>Yes, FEMA</td>
<td>High</td>
</tr>
<tr>
<td>East Side Neighborhood-North of Robinson</td>
<td>High C Single Family Residence</td>
<td>No, Locally Significant: County Haz Mit Plan</td>
<td>High</td>
</tr>
<tr>
<td>East Side Neighborhood-South of Robinson</td>
<td>High C Single Family Residence</td>
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<tr>
<td>First Ward Neighborhood-West end</td>
<td>High C Single Family Residence</td>
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<td>High</td>
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<tr>
<td>Southside East Neighborhood</td>
<td>High C Multi-Family Residence</td>
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<tr>
<td>Southside West Neighborhood</td>
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<tr>
<td>State Street Neighborhood</td>
<td>High C Single Family Residence</td>
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<tr>
<td>Corning-Carrier Neighborhood- North</td>
<td>High C Single Family Residence</td>
<td>No, Locally Significant: Committee</td>
<td>High</td>
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<tr>
<td>Oakland &amp; Harry L Dr Neighborhood</td>
<td>High C Single Family Residence</td>
<td>No, Locally Significant: Committee</td>
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<tr>
<td>Weisweiler Neighborhood</td>
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<td>No, Locally Significant: Committee</td>
<td>High</td>
</tr>
<tr>
<td>Beaver St Pump Station</td>
<td>High D Wastewater</td>
<td>No, Locally Significant: County Haz Mit Plan</td>
<td>High</td>
</tr>
<tr>
<td>City of Binghamton Water Filtration Plant</td>
<td>High D Water Supply</td>
<td>No, Locally Significant: Committee</td>
<td>High</td>
</tr>
<tr>
<td>Frederick Street Pumping Station</td>
<td>High D Wastewater</td>
<td>No, Locally Significant: County Haz Mit Plan</td>
<td>High</td>
</tr>
<tr>
<td>Front Street Pump Station</td>
<td>Extreme D Wastewater</td>
<td>No, Locally Significant: County Haz Mit Plan</td>
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</tr>
<tr>
<td>McDonald Avenue Pump Station</td>
<td>High D Stormwater</td>
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</tr>
<tr>
<td>Sewer Pump Station</td>
<td>High D Wastewater</td>
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</tr>
<tr>
<td>Asset Information</td>
<td>Landscape Attributes</td>
<td>Risk Assessment (100-year event)</td>
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</tr>
<tr>
<td>-------------------</td>
<td>----------------------</td>
<td>-------------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>Susquehanna River Intake</td>
<td>Extreme D Water Supply No, Locally Significant: County Haz Mit Plan</td>
<td></td>
<td></td>
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<tr>
<td>Blue Ridge Park Wells (2)</td>
<td>High D Water Supply No, Locally Significant: County Haz Mit Plan</td>
<td></td>
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</tr>
<tr>
<td>Conklin Water Supply—Wells 5 &amp; 6</td>
<td>Extreme D Water Supply No, Locally Significant: County Haz Mit Plan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ocean Steel Corp Well</td>
<td>Moderate D Water Supply No, Locally Significant: County Haz Mit Plan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endicott Water Pollution Control Plant</td>
<td>Extreme D Wastewater No, Locally Significant: Committee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endicott Water Supply—Ranney Well</td>
<td>Extreme D Water Supply No, Locally Significant: Committee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endicott Water Supply Wells 5 and 28</td>
<td>High D Water Supply No, Locally Significant: Committee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NYSEG Electrical Substation</td>
<td>Moderate D Power Supply No, Locally Significant: Committee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tri-Cities Airport</td>
<td>High D Transportation No, Locally Significant: County Haz Mit Plan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harry L. Drive/Wegmans Bridge</td>
<td>High D Transportation No, Locally Significant: Committee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>JOEWW- Well 7, North Broad Street</td>
<td>Extreme D Water Supply No, Locally Significant: Committee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AES Windtower Power Generation Plant</td>
<td>Extreme D Power Supply No, Locally Significant: Committee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endicott Water Booster Station</td>
<td>Extreme D Water Supply No, Locally Significant: Committee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Johnson City Water Supply Facility and Wells</td>
<td>Moderate D Water Supply No, Locally Significant: County Haz Mit Plan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Johnson City Water Supply Facility and Well 5</td>
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<td></td>
</tr>
<tr>
<td>NYSEG Electrical Substation</td>
<td>Extreme D Power Supply No, Locally Significant: Committee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Town of Union Construction &amp; Debris Yard</td>
<td>Extreme D Hazardous Materials, Solid Waste, and Recycling No, Locally Significant: County Haz Mit Plan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Legion Post 1645</td>
<td>High E Cultural or Religious Establishments No, Locally Significant: County Haz Mit Plan</td>
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<tr>
<td>Broome County Veterans Memorial Arena</td>
<td>High E Museums, Performing Arts Centers, and Stadiums No, Locally Significant: Committee</td>
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<td>Catholic Charities</td>
<td>High E Cultural or Religious Establishments No, Locally Significant: County Haz Mit Plan</td>
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### Table 5.3 Assets and Risk Assessment

<table>
<thead>
<tr>
<th>Asset Information</th>
<th>Landscape Attributes</th>
<th>Risk Assessment (100-year event)</th>
<th>Risk Assessment (500-year event)</th>
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<tbody>
<tr>
<td><strong>Asset</strong></td>
<td><strong>Risk Area</strong></td>
<td><strong>Asset Class</strong></td>
<td><strong>Asset Subcategory</strong></td>
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<tr>
<td>Historical Ross Park Carousel</td>
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<td>E</td>
<td>Museums, Performing Arts Centers, and Stadiums</td>
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<td>Historical South Washington Street Parabolic Bridge</td>
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<td>E</td>
<td>Historic Landmarks and Facilities</td>
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<td>Ross Park Zoo</td>
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<td>Museums, Performing Arts Centers, and Stadiums</td>
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<td>Historical Conklin Town Hall</td>
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<td>E</td>
<td>Historic Landmarks and Facilities</td>
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<td>Maines Conklin Community Center</td>
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<td>Community Centers</td>
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<td>Central United Methodist Church</td>
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<td>Cultural or Religious Establishments</td>
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<td>Endicott Square Deal Arch</td>
<td>High</td>
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<td>Historic Landmarks and Facilities</td>
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<td>Union Presbyterian Church</td>
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<td>E</td>
<td>Cultural or Religious Establishments</td>
</tr>
<tr>
<td>Northside Park</td>
<td>Extreme</td>
<td>E</td>
<td>Parks and Recreation</td>
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<td>Historical Washingtonian Hall</td>
<td>Extreme</td>
<td>E</td>
<td>Historic Landmarks and Facilities</td>
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<td>Historical West Endicott Park Carousel</td>
<td>High</td>
<td>E</td>
<td>Historic Landmarks and Facilities</td>
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<td>West Endicott Park</td>
<td>High</td>
<td>E</td>
<td>Parks and Recreation</td>
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<td>Cultural or Religious Establishments</td>
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<td>BHA North Shore Towers</td>
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<tr>
<td>Bridgewater Center for Rehabilitation</td>
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<td>Elderly</td>
</tr>
<tr>
<td>Woodburn Court I</td>
<td>High</td>
<td>F</td>
<td>Low or very-low income</td>
</tr>
<tr>
<td>Asset Information</td>
<td>Landscape Attributes</td>
<td>Risk Assessment (100-year event)</td>
<td>Risk Assessment (500-year event)</td>
</tr>
<tr>
<td>-------------------</td>
<td>-----------------------</td>
<td>----------------------------------</td>
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<td>Woodburn Court II High</td>
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<td>Conklin Senior Housing High*</td>
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<td>Ideal Senior Living Center High*</td>
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<td>NYOPEDO Home High</td>
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<td>Johnson City Senior Center N/A</td>
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<td>Susquehanna Nursing &amp; Rehabilitation N/A</td>
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<td>Marian Senior Apartments N/A</td>
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<tr>
<td>The Hearth at Castle Gardens Extreme</td>
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<td>Vestal Nursing Center (Vacant) Extreme</td>
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<td>Vestal Park Rehabilitation and Nursing Center (Proposed) N/A</td>
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<td>Defensive flood protection measures</td>
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<tr>
<td>Asset elevation below base flood elevation</td>
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<tr>
<td>Floodway elevation less than two feet above BFE</td>
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<tr>
<td>Asset near point of confluence</td>
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</tr>
<tr>
<td>Asset near stormwater system discharge</td>
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<tr>
<td>Asset within floodway fringe and without adequate vegetated buffers</td>
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<td>Landscape Attribute Score (Yes=+0.5)</td>
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<tr>
<td>Hazard Score</td>
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</tbody>
</table>
E. End Notes

1 Flood Attenuation Opportunities In the Binghamton Area (Broome County, NY) Southern Tier Central Regional Planning and Development Board. February 2012. Page 1.

2 Susquehanna River Basin Commission.

3 Broome County Hazard Mitigation Plan, February 2013. Page 5.41-11.


5 Broome County Hazard Mitigation Plan, February 2013. Page 5.41-18.

6 Ibid. p. 54.1-21 and 54.1-22.1


12 Correspondence with Broome County Department of Planning. December 31, 2013.

13 Ibid.


15 Broome County Hazard Mitigation Plan, February 2013. Page 5.4.1-22.


18 Hertel, Alan. Executive Director of United Way of Broome County. Phone interview. December 9, 2013.


F. Glossary

CDBG-DR: Community Development Block Grant Disaster Recovery Committee
NYRCR: New York Rising Community Reconstruction

CRS: Community Rating System
DEC: New York State Department of Environmental Conservation
DOH: New York State Department of Health
DOT: New York State Department of Transportation
DOW: New York State Division of Water
DPW: Department of Public Works

DWSRF: Drinking Water State Revolving Fund
EFC: New York State Environmental Facilities Corporation
EMS: Emergency Medical Service
FEMA: Federal Emergency Management Agency
GIGP: Green Innovation Grant Program
HVAC: Heating, Ventilation, and Air Conditioning
LTCR: Long Term Community Recovery
NYRCR: New York Rising Community Reconstruction
NYS: New York State
RED: Southern Tier Regional Economic Development
RSF: Recovery Support Function
SEQR: State Environmental Quality Review
SHPO: State Historic Preservation Office
SPDES: State Pollutant Discharge Elimination System
STERPDB: Southern Tier East Regional Planning Development Board

USACE: U.S. Army Corps of Engineers