

NYRCR **Town of** **Chenango**

NY Rising Community
Reconstruction Plan

DECEMBER 2014

**NY RISING COMMUNITY
RECONSTRUCTION
PROGRAM**



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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 (NYRCR) Program, within the Governor’s Office of Storm Recovery (GOSR), empowers the State’s most impacted communities with the technical expertise and funding resources needed to develop thorough and implementable reconstruction plans to build physically, socially, and economically resilient and sustainable communities.

Program Overview

The NYRCR Program, announced by Governor Cuomo in April of 2013, is a more than \$700 million planning and implementation program 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

NYRCR 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.

Launched in the summer of 2013 and completed in March 2014, Round I of the NYRCR planning process included 50 NYRCR Planning Areas, comprising 102 storm-impacted localities. In January 2014, Governor Cuomo announced a second round of the planning process, serving an additional 22 storm-impacted localities. Four of these localities were absorbed into existing Round I NYRCR Planning Areas, bringing the number of localities participating in Round I up to 106; the other 18 localities formed 16 new Round II NYRCR Planning Areas. Between Rounds I and II, there are 66 NYRCR Planning Areas, comprising 124 localities. The program serves 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.

In Rounds I and II, the State allotted between \$3 million and \$25 million to each participating locality for the implementation of 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.

Each NYRCR Planning Area is represented 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 650 New Yorkers have represented their communities by serving on Planning Committees. Nearly 650 Planning Committee Meetings have been held, during which Planning Committee members worked with the State's team to develop community reconstruction plans, which identify opportunities to make their communities more resilient. All meetings were open to the public. An additional 250+ Public Engagement Events attracted thousands of community members, who provided feedback on the planning process and resulting 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 program's website (www.stormrecovery.ny.gov/nyrcr), providing several ways for community members and the public to submit feedback on the program and materials in progress.

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

The NYRCR Program does not end with this NYRCR Plan. Governor Cuomo has allotted over \$700 million for planning as well as implementing eligible projects identified in NYRCR Plans. NYRCR Planning Areas are also eligible for additional funds through the NY Rising to the Top Competition, which evaluates applications from Round II NYRCR Planning Committees across three categories—Regional Approach, Inclusion of Vulnerable Populations, and Use of Green Infrastructure. The winner of each category will be allotted a share of the competition's \$3.5 million to fund additional eligible projects.

In April 2014, Governor Cuomo announced that

projects identified in NYRCR Plans would receive priority consideration through the State's Consolidated Funding Application (CFA) process and charged the Regional Economic Development Councils (REDCs), which play an advisory role in the CFA process, to support NYRCR projects. In December 2014, Governor Cuomo announced that 24 NYRCR projects received nearly \$12 million in CFA funding. This announcement is an example of the Governor honoring his commitment to leverage the work of the NYRCR Planning Committees to incorporate resilience into other State programs and to find additional sources of funding for NYRCR projects. The NYRCR Program is also working with both private and public institutions to identify existing funding sources and to create funding opportunities where none existed before.

The NYRCR Program has successfully coordinated with State and Federal agencies to help guide the development of feasible projects. The program has leveraged the REDC State Agency Review Teams (SARTs), composed of representatives from dozens of State agencies and authorities, for feedback on projects proposed by NYRCR Planning Committees. The SARTs review projects with an eye toward regulatory and permitting needs, policy objectives, and preexisting agency funding sources. The NYRCR 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 the Chenango NYRCR Planning Committee, which is passionately committed to realizing a brighter, more resilient future for its community.

The NYRCR Plan

This NYRCR Plan is an important step toward rebuilding a more resilient community. Each NYRCR 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 NYRCR Plan are divided into three categories. The order in which the projects and actions are listed in this NYRCR Plan does not necessarily indicate the Planning Committee's prioritization of these projects and actions. Proposed Projects are projects proposed for funding through an NYRCR Planning Area's allotment 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 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. The Proposed Projects and Featured Projects found in this NYRCR Plan were voted for inclusion by 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 NYRCR Ethics Handbook and Code of Conduct.

As part of Round II of the NYRCR Program, the Chenango NYRCR Planning Area has been allotted up to \$3 million in CDBG-DR funds for the implementation of eligible projects identified in this plan.

While developing projects for inclusion in NYRCR Plans, 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 satisfy a Federally-designated eligible activity category, fulfill a national objective (i.e., meeting an urgent need, removing slums

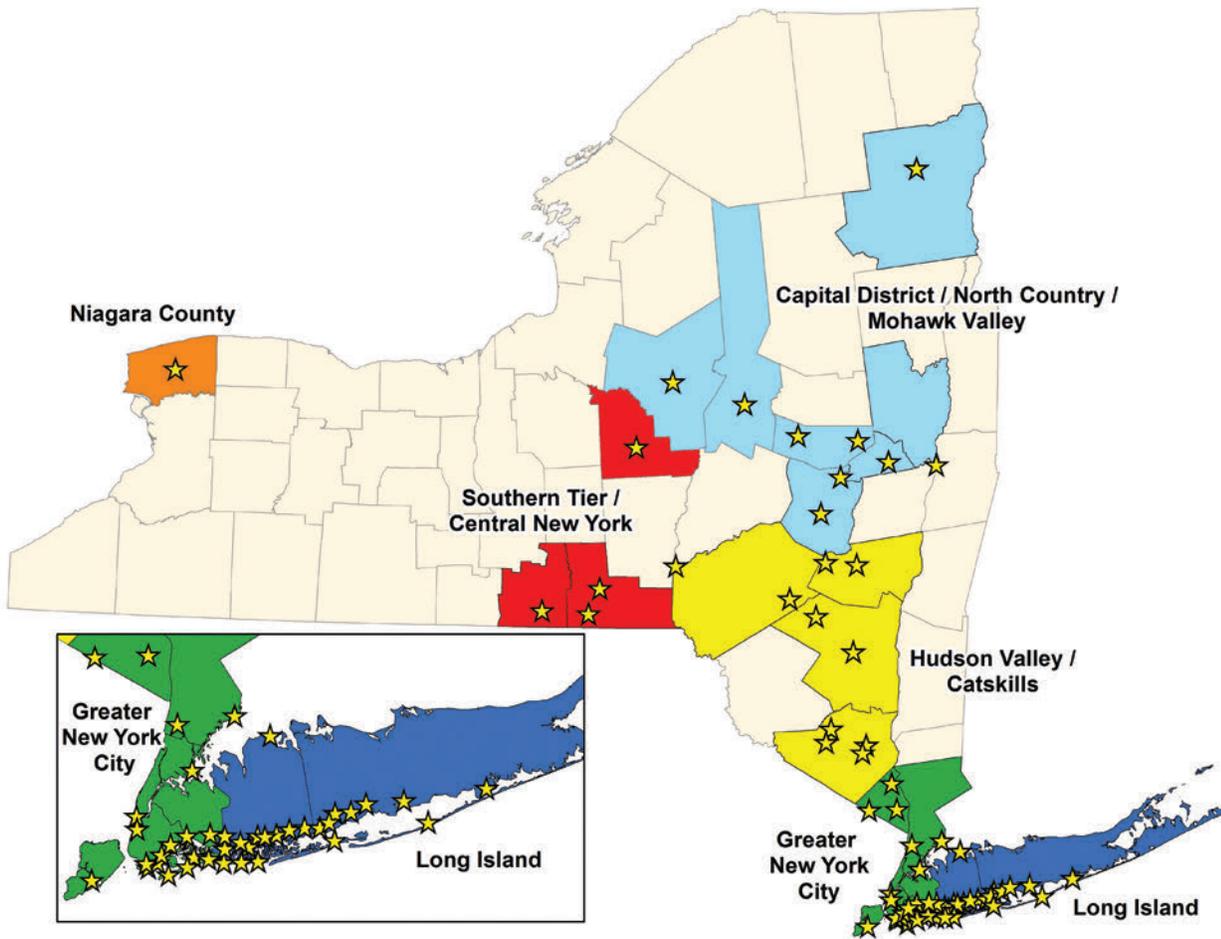
and blight, or benefiting low- to moderate-income individuals), and have a tie to the natural disaster to which the funding is linked. These are among the factors that GOSR will consider, in consultation with local municipalities and nonprofit organizations, when determining which projects and actions are best positioned for implementation.

The total cost of Proposed Projects in this NYRCR Plan exceeds the NYRCR Planning Area's CDBG-DR allotment 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 NYRCR Plan are subject to applicable Federal, State, and local laws and regulations, including the Americans with Disabilities Act. Inclusion of a project or action in this NYRCR Plan does not guarantee that a particular project or action will be eligible for CDBG-DR funding or that it will be implemented. Projects will be implemented on a staggered timeline, and the NYRCR Program will choose an appropriate State or local partner to implement each project. GOSR will actively seek to match projects with additional funding sources, when possible.

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



NY Rising Communities



Note: Map displays the 66 NYRCR Planning Areas from Rounds I and II. (Five of the Round I Planning Areas—Niagara, Herkimer, Oneida, Madison, and Montgomery Counties—are not funded through the CDBG-DR program.)

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Executive Summary

Overview

The Town of Chenango is tucked among the hills of Broome County in the Southern Tier region of New York. The Town sits along the Chenango River just north of the City of Binghamton. The Town is part of the Binghamton Metropolitan Statistical Area (MSA) and exists as part of the northern suburbs of the greater Binghamton area.

The Town of Chenango is mostly comprised of natural land among the rolling hills, agricultural land, and large residential parcels scattered through the western and northern parts of the Town. The heart of the town stretches along the Chenango River, however, and is located in the southern and eastern parts of the Town. This area contains the Town's primary commercial corridor, along Route 11 (Front Street), as well as several significant state highways. This "downtown" region is the most densely developed region in the town and contains most of the Town's commercial development as well as service providers. The area also contains the densest residential development within the Town.

In late August, the Town of Chenango was subject to the heavy rain from Hurricane Irene. This resulted in ground saturation during the storm. Ten days later Tropical Storm Lee hit the Town of Chenango. A combination of extremely heavy rain combined with the ground saturation from Hurricane Irene resulted in substantial flooding and the failure of stormwater management systems (SWMS) throughout the Town.

Tropical Storm Lee resulted in millions of dollars in commercial and residential property damage. The Town suffered significant impacts to infrastructure as well including damages to SWMSs, road washouts and erosion, and scouring along bridges, roads and culverts.

In order to address these issues and increase future resiliency against such events, the Town of Chenango was included as part of New York Governor Andrew M. Cuomo's NY Rising Community Reconstruction (NYRCR) Program. A committee was organized to represent the Town and help identify the impacts and critical needs of the community as a result of Tropical Storm Lee. The committee, in coordination with public participation, also identified community assets and developed strategies to begin to address the critical needs previously identified. This resulted in the identification of a variety of projects to address impacts of the storm while helping to ensure future resiliency.

Critical Issues

Over the course of several early NYRCR committee meetings, the Town of Chenango identified several factors that contributed to some of the impacts and posed challenges to preventing a similar situation in the future and creating resiliency. The critical issues contributing to these include:

- Disruption of the connectivity in the community and to the larger region;
- Damage and risk to businesses and the economic well-being of the community, particularly in the commercial corridor along Front Street;
- Damage and risk to critical infrastructure, including transportation, water utilities, and stormwater management facilities;
- Substantial flooding in residential neighborhoods; and
- Future risk for flooding of community assets and homes.



A Community-Driven Process

The NYRCR Program is designed as a community driven, bottom-up approach to addressing the impacts experienced due to Tropical Storm Lee. This began with an analysis of existing plans and studies relevant to the recovery and resiliency process. This process also involved significant public outreach, input and interaction throughout the entire plan development process. In addition, the committee and its consultants worked with key stakeholders to gather and verify information critical to the planning process.

The planning process involved a comprehensive outreach process. The committee held bi-weekly meetings that were open to the public at the Town Hall. This allowed the public to stay engaged in the process and with the committee throughout. As part of the public outreach process, the committee and its consultants utilized a variety of media outlets, attended public outreach events, provided promotional material, sent mailers, and provided advertising to keep the public informed of events and the plan's progress.

This culminated in a set of four public meetings held at different stages of the plan to ensure community involvement from beginning to end of the plan's development.

Vision Statement

Through open discussion, community and stakeholder input, a review of local goals and objectives, and through review of other local and regional plans, the Committee adopted the following vision statement. This vision statement was specifically written to address the particular needs, goals, and desires on the Town of Chenango.

“The Town of Chenango is a beautiful, quiet, and safe community that is part suburban and part rural. We take pride in the quality of our residential neighborhoods, vibrant business district, schools, and recreational

opportunities. We make a high priority of ensuring the safety and preservation of our private, commercial, and public property, while promoting our community as a great place to live, work, and raise a family.

We are a resilient community that prioritizes the concerns of our residents, businesses, and other property owners facing natural and man-made disasters. The Town is committed to working with its citizens, neighboring communities, and other public entities to provide a sense of security and well-being now, and in the future.”

A Blueprint for Implementation

The community and the Committee made a specific point during the planning process to identify issues, develop strategies, identify projects, and create a plan that will result in recovery from Tropical Storm Lee and make the Town more resilient against future storms. The Committee had a great desire to see that any projects stemming from this plan could be implemented and benefit the community in a realistic and manageable timeframe. To this end, the Town had some very specific issues it knew needed to be addressed early on in the process.

As the process continued, additional public input was obtained and engineers and other specialists became involved. Additional issues and projects came to the surface. The Committee, however, never lost track of the fact that the Town wanted projects that would provide real, measurable benefits to the community.

During the process, the committee recognized that there may be a variety of roadblocks that could inhibit or prevent certain projects from moving forward. The committee worked with the public through each of these items in order to develop projects that could be implemented while benefiting the community as a whole to the greatest extent possible.



After working through asset identification, community visioning, critical issue identification, strategy development, risk assessment, and several public engagement events, the Committee developed a finalized project list for the Town of Chenango. The projects were classified in three categories.

Proposed Projects – Projects are proposed for funding through a NYRCR Plan Area’s allotment of CDBG-DR funding.

Featured Projects – 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 NYRCR program.

Additional Resiliency Recommendations – Projects and actions that the Planning Committee would like to highlight and that are not categorized as Proposed or Featured Projects.

From Strategies to Implementable Projects

The Town’s projects grew from a core set of strategies developed by the committee in coordination with the public. These strategies evolved from the critical needs identified by the committee and public and were designed to help address those needs.

STRATEGIES

Strategy 1: Improve stormwater management facilities to better handle significant storm events, increase capacity and effectiveness, and help prevent or reduce risk and damage to persons and property.

Strategy 2: Maintain and improve key infrastructure components and facilities to ensure the safe and efficient functions of the Community, especially during and after disaster events.

Strategy 3: Ensure that adequate resources, services, and facilities are available to address emergency

response and disaster recovery needs.

Strategy 4: Preserve and protect the Town of Chenango’s natural, recreational, and cultural resources from manmade and natural threats and hazards.

Strategy 5: Protect and promote safe, quality housing for all residents in the Town.

Strategy 6: Develop local zoning, codes, and programs, and provide legal and other professional assistance to help municipal staff ensure public safety, preserve property, and limit disaster impacts to the greatest extent possible, while securing long-term resiliency in the Town.

Strategy 7: Promote business development and improvements to necessary infrastructure to support commercial business expansion.

PROJECTS

Smith Hill Creek (Wallace Road) Stormwater Management System

Redesign, rebuild, and improve the stormwater management system along Smith Hill Creek to improve stormwater management. This includes increasing culvert sizes and installing trash racks and channel improvements, and installing storm drains along Wallace Road that tie into the stormwater management system on Front Street. **(Proposed Project)**

Northgate Plaza Flap Gate Installation

Replace sections of the drainage pipes under Northgate Plaza, and install a flap gate on the outlet end of each of the two pipes. Construct a retention wall between the Weis Market site and the Waste Water Treatment Plant. **(Proposed Project)**

Fox Road Stormwater Improvements

Remove three existing culverts underneath Fox Road along Brooks Creek and replace with a bridge to allow for greater flow. **(Proposed Project)**



Grant Road Stormwater Pipe Replacement

Remove approximately 200 linear feet of galvanized stormwater pipe (3' diameter) and replace pipe with 3' diameter piping with access for clean-out midway along the pipe. **(Proposed Project)**

Nimmonsburg Neighborhood Stormwater Management System Master Plan

Conduct a comprehensive analysis of the Smith Hill Creek (Wallace Road) Stormwater Management System with recommendations for long-term solutions that permanently address flooding issues in the most efficient way. **(Proposed Project)**

Northgate Water Pump Station Upgrades

Raise electrical systems at Northgate Pump Station above flood levels. **(Proposed Project)**

McGirk's Sewer Lift Station Upgrades

Raise electrical systems above flood levels. **(Proposed Project)**

Route 12A Water Pump Station Upgrades

Raise electrical systems above flood levels and install a back-up generator. **(Proposed Project)**

Surveys, Site Analysis, and Testing for Well in the Northern Section of Town

Conduct studies and testing necessary for well siting and development. **(Proposed Project)**

Route 12A Sewer Lift Station Improvements

Raise electrical systems and install a flood wall around the pump station to prevent inundation from adjacent low areas, and allow access to the pump station during floods. The electrical panel also should be relocated inside the flood wall to improve access to electrical controls during maintenance operations. **(Proposed Project)**

Municipal Complex Back-up Generator

Install a back-up generator for municipal complex. **(Proposed Project)**

Regional Shelter Funding

Provide funds for a regional shelter feasibility study in coordination with Broome County and six Broome NYRCR Communities. **(Proposed Project)**

Bank Restoration and Erosion Prevention at Chenango Commons Golf Course

Restore an estimated 385 feet of stream bank to prevent further channel migration and to reduce sediment pollution in the Chenango River. **(Proposed Project)**

Community Rating System (CRS) Analysis

Identify opportunities and methods to achieve accomplishments in the NFIP's six core flood loss reduction areas. Provide education services on CRS and assist residents with resiliency. **(Proposed Project)**

Stormwater Enforcement and Legal Assistance

Provide assistance to the Town regarding ongoing enforcement issues, and assist with legal and other related services to address sites that contribute to stormwater issues. **(Proposed Project)**

Front Street Commercial Corridor Economic Development Analysis

Conduct a comprehensive economic development study with a market analysis for the Front Street commercial corridor. **(Proposed Project)**

New Well in the Northern Section of Town

Construct well, housing, and necessary piping. **(Featured Project)**



TOWN OF CHENANGO NYRCR PLAN PROJECTS BY STRATEGY

Project Name	Proposed Project	Featured Project	Strategy 1	Strategy 2	Strategy 3	Strategy 4	Strategy 5	Strategy 6	Strategy 7
Smith Hill Creek (Wallace Road) Stormwater Management System	X		X						
Northgate Plaza Flap Gate Installation	X		X						
Fox Road Stormwater Improvements	X		X						
Grant Road Stormwater Pipe Replacement	X		X						
Nimmonsburg Neighborhood Stormwater Management System Master Plan	X		X						
Northgate Water Pump Station Upgrades	X			X					
McGirk's Sewer Lift Station Upgrades	X			X					
Route 12A Water Pump Station Upgrades	X			X					
Surveys, Site Analysis, and Testing for Well in the Northern Section of Town	X			X					
Route 12A Sewer Lift Station Improvements	X			X					
Municipal Complex Back-up Generator	X				X				
Regional Shelter Funding	X				X				
Bank Restoration and Erosion Prevention at Chenango Commons Golf Course	X					X			
Community Rating System (CRS) Analysis	X							X	
Stormwater Enforcement and Legal Assistance	X							X	
Front Street Commercial Corridor Economic Development Analysis	X								X
New Well in the Northern Section of Town		X		X					



Photo is courtesy of Eric Thayer.



Section 1 Community Overview



Photo is courtesy of Eric Thayer.

Section 1: Community Overview

Getting From There to Here

In late summer 2011, the people living and working in the Town of Chenango, New York, could not have predicted the nightmare that would result from two back-to-back storms named Hurricane Irene and Tropical Storm Lee.

During Hurricane Irene in late August, record rainfalls across the Southern Tier of New York State resulted in rising water tables and significant ground saturation, including in Chenango. Less than two weeks later, when Tropical Storm Lee unleashed a second round of pounding rains, waterways quickly swelled and numerous local roads were swallowed by floodwaters all across Broome County, where the Town of Chenango (Town) is situated.

Roads collapsed over submerged culverts; stormwater system failures resulted in flooded residential and commercial properties; and first responders used boats to rescue people stranded in cars and homes, and on rooftops. While the Town of Chenango was spared from the wrath of Superstorm Sandy one year later, it was still a powerful reminder of the need to ensure that physical and economic community resiliency measures should be established to guard against future storm devastation.

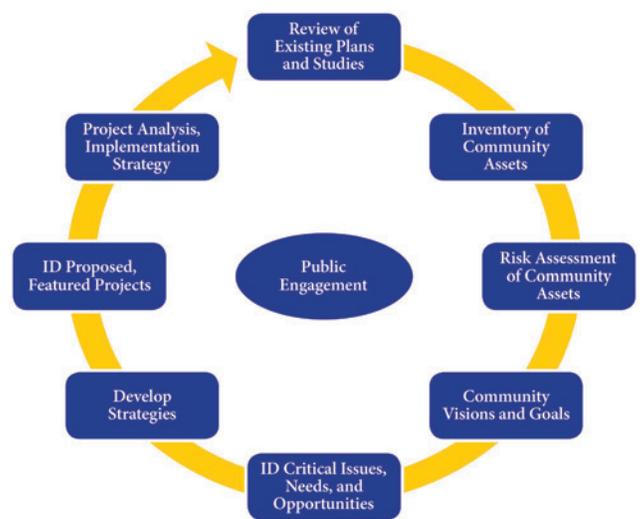
The NY Rising Community Reconstruction (NYRCR) Program provides additional rebuilding and revitalization assistance to communities severely damaged by Hurricane Irene, Tropical Storm Lee, and Superstorm Sandy. The NYRCR Program enables communities to identify resilient and innovative reconstruction projects and other needed actions, based on community-driven plans that consider current

damage, future threats, and the community’s economic opportunities. Communities that successfully complete a NYRCR Plan are eligible to receive funds to support the implementation of projects and activities identified.

Planning Process

The planning process to develop this Town of Chenango NYRCR Plan began with the formation of the Town of Chenango NYRCR Committee (Committee), consisting of local residents, business owners, municipal and county staff, and other community leaders. The Committee worked with the Consultant Team and New York State staff to collaboratively manage all components of the final Town of Chenango NYRCR Plan (Plan).

FIGURE 1.1 – PLANNING PROCESS





As an implementation-focused endeavor, the NYRCR planning process uses and builds on existing plans and studies to leverage prior work and to advance the recovery process. An initial, thorough review of existing planning documents identified existing planning work, as well as areas that required additional analysis and effort. NYRCR Plan components, supporting analysis, and subsequent recommendations focus on the six Recovery Support Functions (RSF), defined by the Federal Emergency Management Agency (FEMA).

- Community Planning and Capacity Building
- Economic Development
- Health and Social Services
- Housing
- Infrastructure
- Natural and Cultural Resources

The Committee conducted regular bi-weekly meetings with the Consultant Team, New York State (NYS) Department of State (DOS) planning staff, and the regional NYRCR Program lead. These meetings provided the venue to manage the overall process, assign tasks, determine the direction of the NYRCR Plan, and ultimately, to identify and select projects. The Town of Chenango NYRCR Plan process, conducted over a six-month period, incorporated numerous steps and stages discussed here.

FIGURE 1.2 – RECOVERY SUPPORT



PUBLIC ENGAGEMENT AND OUTREACH

Public input was solicited and incorporated into the planning process through diverse and continuous methods to ensure maximum engagement. This included: key stakeholder interviews; paper surveys distributed throughout the community; open house sessions; public comment cards; and four Public Engagement Events.

Several outreach methods helped to ensure attendance at the four Public Engagement Events, held at strategic progress points throughout the planning process. Outreach methods included:

- Water bill inserts;
- Constant Contact and email blast campaigns;
- Distribution of posters to businesses, local groups/ agencies, and the public;
- Media alerts;
- Newspaper advertisements;
- Notices on community and local agency websites;
- Posting on the Town website;
- Presence at local events; and
- Social media.

REVIEW OF EXISTING PLANS AND STUDIES

The planning process leveraged existing plans and studies to accelerate recovery, facilitate informed decision-making, and ensure that proposed implementation activities are consistent with other local and regional goals and objectives. The information gathered through this review process will help meet community needs, while assisting in recovery, providing long-term resiliency, helping to ensure safety, and reducing impacts of future storm events in the Town of Chenango.

INVENTORY OF CRITICAL COMMUNITY FACILITIES

All community facilities were identified and inventoried to ensure that the Town’s essential assets were incorporated into the Town of Chenango NYRCR Plan’s goals and direction.



RISK ASSESSMENT OF COMMUNITY ASSETS

Critical community assets were evaluated to determine their potential risk for damage or loss from future disaster events.

DEVELOPMENT OF NYRCR PLAN VISION AND GOALS

An overarching vision for the Town's future was vetted through a review process that included the Committee and the public. With that vision, a set of strategies was developed to guide the NYRCR Plan's development and advance the vision.

IDENTIFICATION OF CRITICAL NEEDS AND OPPORTUNITIES

The Town of Chenango NYRCR Plan identifies the full range of issues, needs, and opportunities necessary to achieve resiliency and community economic health and vibrancy. These include flood mitigation, damage and recovery needs, housing needs, economic development and business needs, and infrastructure repair and improvement needs, among others.

DEVELOPMENT OF STRATEGIES

After the Committee identified the Town's needs and opportunities, it also had to develop strategies to address community needs and to capitalize on available opportunities. In order to develop these strategies, local and regional plans, including disaster recovery plans, such as the Broome County NYRCR Plan, were analyzed to identify and ensure conformity with regional strategies.

After the review of these plans, the Committee developed broad strategies that addressed both resiliency needs and long-term goals and objectives from documents, such as the Town Comprehensive Plan.

IDENTIFICATION OF PROPOSED PROJECTS

An initial list of potential projects was developed. It is based on public input, community vision, identification of key needs and opportunities, development of recovery strategies, and hydrologic and engineering analysis.

PROJECT ANALYSIS AND CLASSIFICATION

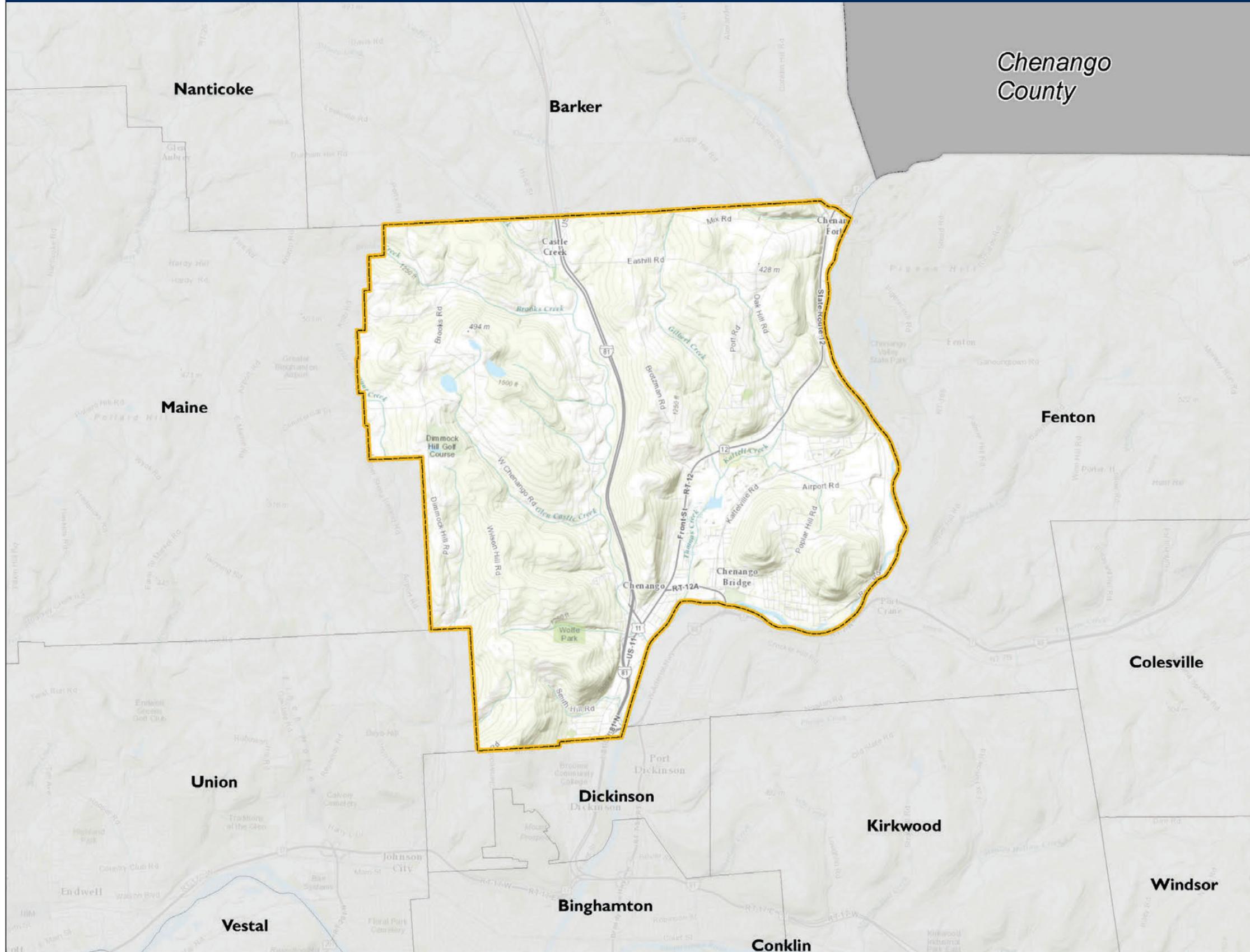
All identified projects were fully vetted to verify the merit of each project and to assist in classification. This included feasibility, cost-benefit, and risk assessments.

Geographic Scope of the Town of Chenango NYRCR Plan

The sources of historical flooding, the location of the Town's critical facilities affected by flooding, and the impacts of potential future threats were examined to help identify an accurate geographic boundary for the Town of Chenango NYRCR Plan. The Town's commercial core that stretches along Front Street, in addition to various residential neighborhoods and other critical land uses, were considered in the determination of the geographic scope of the Town of Chenango NYRCR Plan Area (Plan Area). A large portion of the Plan Area experienced severe economic damage from Hurricane Irene and Tropical Storm Lee. After analysis and discussion, the Committee decided that the entire municipal boundary of the Town of Chenango most accurately defines the Plan Area to meet local recovery needs.

The Town of Chenango is located in the north-central part of Broome County. It is situated on the west bank of the Chenango River, across from the Town of Fenton. Encompassing the entire municipality of the Town of Chenango, the Plan Area is comprised of 34 square land miles. Figure 1.3 depicts the geographic scope of the Plan Area.

NYRCR: Town of Chenango, Broome County
FIGURE 1.3 – OVERVIEW MAP



Legend

-  Town of Chenango Planning Area
-  Municipal Boundary



Data Sources:
NYS - Railroads, Waterbodies, Boundaries
ESRI - Topo





The Town of Chenango: A Snapshot

Following is a snapshot of the Town of Chenango, including an overview of its history and geographic features, population demographics, land uses, infrastructure resources, and public amenities. It is meant to provide a foundation for understanding critical issues, asset vulnerability, needs and opportunities, reconstruction strategies, and programs, and prospective projects that appear later in this NYRCR Plan.

History and Geography

The Town of Chenango is nestled among the hills of the lower Susquehanna River Valley, in Broome County, New York. Broome County is in the Southern Tier Region of New York State (Southern Tier), situated west of the Catskill Mountains and along the northern border of Pennsylvania. This community of some 11,000 people lies just north of the City of Binghamton. The Town sits along the western banks of the Chenango River. While the Town’s early history is that of an agricultural, riverfront community, it functions today as a Binghamton area suburb.

The Southern Tier is part of the Susquehanna Watershed, which stretches from central New York State to the Chesapeake Bay in Maryland, and includes more than 50 counties. The Chenango River, located within the Susquehanna Watershed, snakes its way for 90 miles through central New York State, until it merges with the Susquehanna River in the City of Binghamton, near the New York-Pennsylvania border.

While much of the central and northern portions of the Town are quite rural — consisting of agricultural land, wooded hills, and large residential parcels — the southern portion increases in density as part of the northern suburbs of the City of Binghamton. This places the Town of Chenango at the heart of the Binghamton Metropolitan Statistical Area (MSA).

The rolling hills, rivers, streams, and wooded areas in and around the Town provide an abundance of natural assets and recreational resources. Scenic landscapes lend themselves to hiking, biking, and other outdoor activities, and contribute to its attractiveness as a residential location. The Town of Chenango is home to many farms, some of which are several generations old, and have provided food and livestock goods for decades.



The rolling hills, rivers, streams, and wooded areas in and around the Town provide an abundance of natural assets and recreational resources. Photo is courtesy of Eric Thayer.

The Town of Chenango encompasses an area of approximately 21,170 acres, making it the third-largest town in Broome County. The Town includes the Hamlets of Castle Creek, Chenango Bridge, Nimmonsburg, Chenango Forks, and Kattelville.

Elevations throughout the Town range from 360-1,040 feet above sea level, and the resulting ridges and valleys contribute to the many scenic landscapes and vistas that characterize the region. Much of the Town lies within the Chenango Watershed, including substantial amounts of protected lands that contribute not only to unique ecosystems, but also to a robust aquifer that provides Chenango residents with a source of drinking water. Chenango’s access to the aquifer provides an ample water supply to the community; the Town’s pumps also provide water for the Town of Dickinson, located to the south.

Since its establishment, the Town of Chenango has gradually developed into a suburban community along its southern region, with agricultural land uses located along the southeastern and eastern perimeters, and through the central and north-central portions of the Town. Residential development has remained focused around the historic hamlets and near the major population centers. The rest of the Town remains rural land, consisting of wooded hills, valleys, and open space.

As development spread in Binghamton and the Town of Chenango grew, commercial and auto-oriented development began to appear along transportation corridors. These transportation routes expanded in capacity, with the main routes now consisting of NYS Routes 11 and 12/12A. Route 11 runs north and south through the central portion of the Town, essentially bisecting the community. Front Street extends about 1.5 miles north from the Town’s southern border. At that point, Route 11 splits and heads northwest, while Route 12 cuts northeast. Route 12 then splits again, just west of Chenango Forks, with Route 12 heading north and Route 12A heading east towards Chenango Bridge.



Interstate 81 and State Route 11 are significant to the commercial development in the Town of Chenango. Photo is courtesy of Eric Thayer.

The southern tip of the Town, along Route 11 (Front Street), has become the primary commercial corridor for the community. This commercial corridor was bolstered by the development of Interstate 81 and the construction of an exit/entrance ramp in the Town of Chenango. This highway exit has allowed much greater access to the downtown area and has helped spur commercial development. In addition, Interstate 81 allows for easy access to the Town from areas throughout Broome County and locations beyond the State of New York.



The Town’s commercial corridor contributes significantly to the local economy. Photo is courtesy of Eric Thayer.



The Town’s economy largely depends on its commercial corridor along Front Street (Route 11/12). The vast majority of local businesses in Chenango are located along this corridor, which extends between the Towns of Dickinson and Chenango. Several medium- to large-scale retail plazas with national chain stores, such as Staples and Lowe’s, have opened at the northern end of Front Street in the Town. The Gardens (a restaurant, hotel, and multiplex movie complex) and the State University of New York (SUNY) Broome County Community College are located at the southern end.

Unfortunately, much of this area is within FEMA-designated floodplains and is susceptible to flood damage during heavy rains or swelling of the Chenango River. In addition to the Front Street corridor, other major employers in the region include Binghamton University, Lockheed Martin (physically located in Tioga County), United Health Services, and government.

The draw of workers to the region has resulted in a modest increase in housing demand in Broome County; in turn, this has increased the demand for the development of new housing in Broome County. To meet this and other demands in the housing market, new residential construction has consisted primarily of higher-end housing that was built over the last decade in subdivisions and on individual lots along streets and rural roads that are off the major arterials.

This new development has occurred primarily in the Towns of Vestal, Chenango, and Union, and in the Village of Johnson City; it mirrors the types of development in municipalities with new commercial activity. New subdivision construction has occurred off Poplar Hill Road in the Town of Chenango, and new estate-style homes are scattered along Brotzman Road through the north-central portion of the Town.

Land Uses

Current land uses in the Town of Chenango reflect a long tradition of maintaining its rural character, while preserving the quality of its natural environment. The Town of Chenango’s 2005 Comprehensive Land Use Plan strives to direct growth to areas where efficient infrastructure exists, and to minimize adverse impacts on environmental resources. Table 1.1 summarizes the Town’s land uses, while Figure 1.4 depicts them.

The Town is currently reviewing and considering updates to the Comprehensive Land Use Plan. Several additions and modifications under consideration include: changes to zoning (new zones; modifications to existing zones; and removal of zones), which will result in land uses changes over time. In some cases, these changes are expected to expand commercial development in the community.

TABLE 1.1 – TOWN OF CHENANGO 2005 COMPREHENSIVE PLAN NEIGHBORHOOD AND LAND USE IDENTIFICATION

Front Street Corridor	<p>The Front Street corridor, from the Town of Dickinson town line to Route 12A, is the main, full-access traffic artery from the urban core of the Town of Chenango. It comprises the most densely developed commercial area in the Town. Commercial establishments include several shopping plazas, three hotels, numerous automobile maintenance/parts retailers, medical facilities, and a variety of restaurants.</p> <p>The Front Street corridor has two distinct development patterns. Portions of Front Street, north of the Interstate 81 overpass that have been developed since the initial advent of zoning ordinances in the Town, serve as examples of the results of proper planning and adherence to standards. The portion south of Interstate 81 reflects the lingering effects of the pre-zoning and pre-Interstate era, when Front Street (Route 11) was the major route south from upstate New York. This area is characterized by highway-oriented commercial strip development, much of which is constructed on small parcels. The change to a more orderly, cohesive commercial zone, such as that north of Interstate 81, can only be accomplished as new uses take over old, and current zoning standards are imposed. This trend is evident in projects such as the Lowe’s and Giant (now Weiss) Plazas.</p>
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TABLE 1.1 – TOWN OF CHENANGO 2005 COMPREHENSIVE PLAN NEIGHBORHOOD AND LAND USE IDENTIFICATION (CONT'D)

Route 12/12a Corridor	This section of Town (from Lowe’s Plaza to the intersection of 12A and Kattelville Road) has a great diversity of land uses. This is one of the few areas of commercial activity; additional uses include commercial and residential, as well as medical facilities and a privately owned outdoor recreational facility.
Route 11 Corridor (North)	The Route 11 corridor includes a north-bound ramp onto Interstate 81, a fire station, churches, several businesses, a mobile home park, and numerous single-family residences. The Penn View Drive area of Route 11 is the location of both a multi-family and a single-family subdivision. This corridor also serves as one of the routes to the Greater Binghamton Regional Airport.
Route 12	The portion of Route 12 located north of Route 12A is primarily dominated by low-density residential units. Additionally, several commercial establishments, a church and church school, the main entrance to the Broome County Highway Garages, the Town of Chenango Municipal Complex, and two mobile home parks are located in this area. Quinn Estates, a single-family, multi-housing complex, is also located along Route 12.
Nimmonsburg/ Morningside Heights	The section of this neighborhood that lies to the east of Front Street is dominated by low-to-moderate income, single and multi-family residences. A mobile home park is located on Riverview Road. To the west of Front Street is a moderate-to-upper income residential neighborhood. Norton Drive is the location of a large multi-family housing development.
Hinmans Corners/Broad Acres	This area, located on the eastern and western sides of the recently widened Front Street corridor, is an older residential neighborhood consisting of predominantly low-to-moderate income households. Many dwellings were rehabilitated recently, and a water system was installed through the Broad Acres neighborhood to the eastern side of Front Street with monies obtained through the Community Development Block Grant Program. This area now has public sewers and water service.
Chenango Bridge	Chenango Bridge comprises one of the largest and most densely developed residential areas of the Town, with average residential lot sizes ranging from 6,000–10,000 square feet. In addition to single-family and multi-family residences, a mix of other uses exists, including commercial, industrial, recreational, and public. The commercial core of this section is centered on the intersection of Kattelville and River Roads. Additionally, this area contains churches, an elementary school, a community park, a golf course, and an ice-skating rink. Poplar Hill Estates, and Meadowood and Saddlebrook Subdivisions are upper-income home developments in this area.
River Road/Airport Road Development Area	This area is the site of the some of the agricultural activity in the Town. This portion of the Town also contains the Town of Chenango School House Museum, churches, a mobile home park, the Chenango Forks School District’s schools, the Chenango Bridge Air Field, and moderate-to-upper income residential subdivisions.
Kattelville	An assortment of residential uses exists in Kattelville, including single and multi-family units, single mobile homes, and a mobile home park. Limited commercial activity is located at the crossroads of Route 12 and Prentice Road. Also included in this community are a riding stable, churches, and a veterinary clinic.
Castle Creek	Castle Creek is an unincorporated Hamlet, dominated by older residential uses and commercial development associated with the Interstate 81 interchange. The Castle Creek community consists of a fire station, churches, a community park, a post office, the Ukrainian Picnic Grounds, and several small businesses. A portion of the Castle Creek area is zoned Planned Development District commercial, although most of the area is zoned either agricultural or residential.
Chenango Forks	The portion of the unincorporated Hamlet of Chenango Forks that lies south of the Tioughnioga River is included in the Town of Chenango. Included in this area are residences, some commercial enterprises, the Kattelville Athletic Association, and fishing and boating access. The greater part of this community lies within the Town of Barker to the north.
West Chenango/ Dimmock Hill Roads Area	Green Brothers’ Orchard (representing the single-largest agricultural activity in the Town) and the Apple Dumpling Café are located in this area. Dimmock Hill Golf Club and the Mountain Trail Bowhunters Archery Club (two privately owned recreational facilities), and Hidden Hollow Campgrounds are also located within the area. Characterized by scattered single-family homes, this area provides eastern access to the Greater Binghamton Regional Airport and the Broome County Landfill.



The Town's current land uses, identified in its Comprehensive Plan, are shown in Figure 1.4. Much of the Town is comprised of vacant natural land and large residential parcels. The Town's commercial land use is concentrated in the southern portion of the Town along the Chenango River, with only a handful of commercial parcels identified outside of this corridor. There are also several large industrial sites identified in the east-central part of the community, but these are limited. While there are some quarry and supply facilities, they are not large-scale industrial employers.

The Chenango River, rolling hills, and the rural nature of the Town of Chenango provide a wealth of natural beauty and resources. These resources include woods, hiking areas, streams, marshes, and other natural features, which the Town has capitalized on through the development of parks, golf courses, and other recreational facilities.

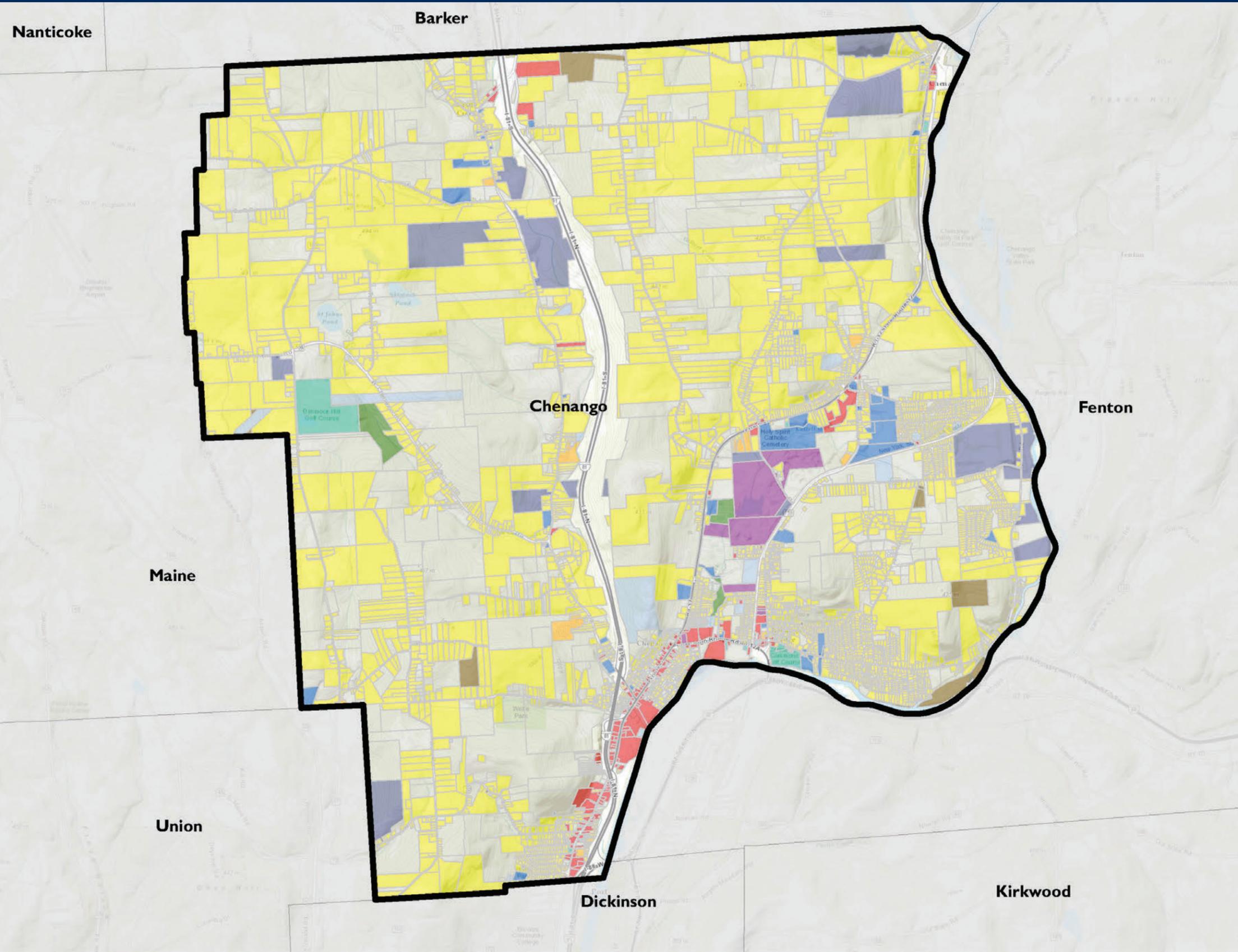
In addition, three wellhead protection zones are located within the Town limits, and four are along the southeastern border on the municipal line. Another water supply watershed, just west of the Town, is classified as a permanently protected open space for the long-term protection of the groundwater aquifer.

These natural resources and conservation areas are an important part of the Town's future livability, sustainability, and resilience, and are recognized as important assets throughout this Town of Chenango NYRCR Plan.



Water flows can be restricted in narrow channels that can be further inhibited by debris. Photo is courtesy of Eric Thayer.

NYRCR: Town of Chenango, Broome County
FIGURE 1.4 – LAND USE MAP



Legend



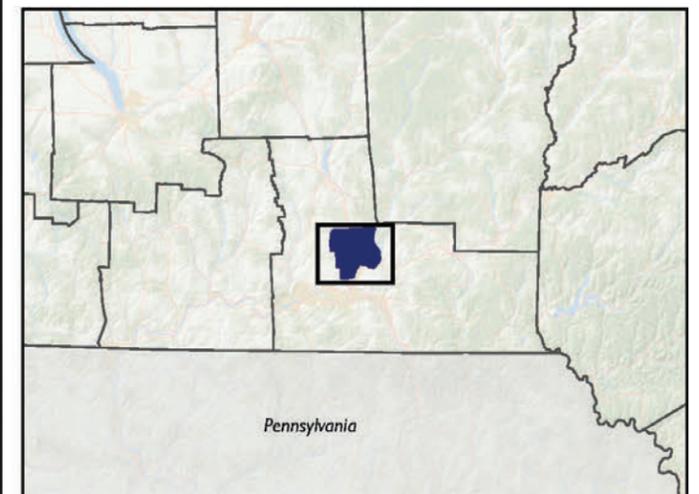
Town of Chenango Planning Area

Municipal Boundary

Land Use

- Residential
- Multi-Family Residential
- Commercial
- Industrial
- Vacant
- Agricultural
- Recreational
- Wild/Forest
- Community Services
- Public Services
- Other

Data Sources:
 NYS - Railroads, Water bodies, Boundaries
 Broome County GIS & Mapping Services - Land Use
 ESRI - Topo





The People of Chenango

POPULATION TRENDS

The Town of Chenango has experienced a general lull in population growth over the last decade. The population in Chenango, as of the 2010 U.S. Census, was 11,252, which was a 1.8% drop from the 2000 U.S. Census population of 11,454. In the 10-year period from 1990-2000, the population dropped by 7.0% (12,310 to 11,454). This trend in relatively stagnant population growth is similar to what is occurring across Broome County. Broome County experienced marginal population growth during the 10-year period between 2000 and 2010, with a total population increase of 0.03%, rising from 200,536 in the year 2000 to 200,600 in the year 2010. Commercial growth and expansion in the region has helped to retain and attract residents to the area.

TABLE 1.2 – TOWN OF CHENANGO POPULATION TRENDS

	Year			
	1980	1990	2000	2010
Population	12,233	12,310	11,454	11,252

Source: U.S. Census Bureau, 2010 Decennial Census
Note: Town totals include Village totals.

On average, the residents of the Town of Chenango are slightly older than those living in Broome County and New York State, where median ages are 40.4, 40.2, and 38.0 years, respectively. More than one-third of Chenango’s population is of prime working ages (between ages 20 and 50), with 59% being between 20 and 64. Only 17% of the Town’s population is 65 and older.

One of the key areas of population growth in the Town between the decade of 2000 and 2010 were persons between the ages of 20 to 24 years. There was a 27% population increase in this age range, possibly aided by the growth of Binghamton University and Broome County Community College.

This population group can play a key role in future local economic and community development. The presence of young, skilled people in the workforce contributes to economic growth and community prosperity.

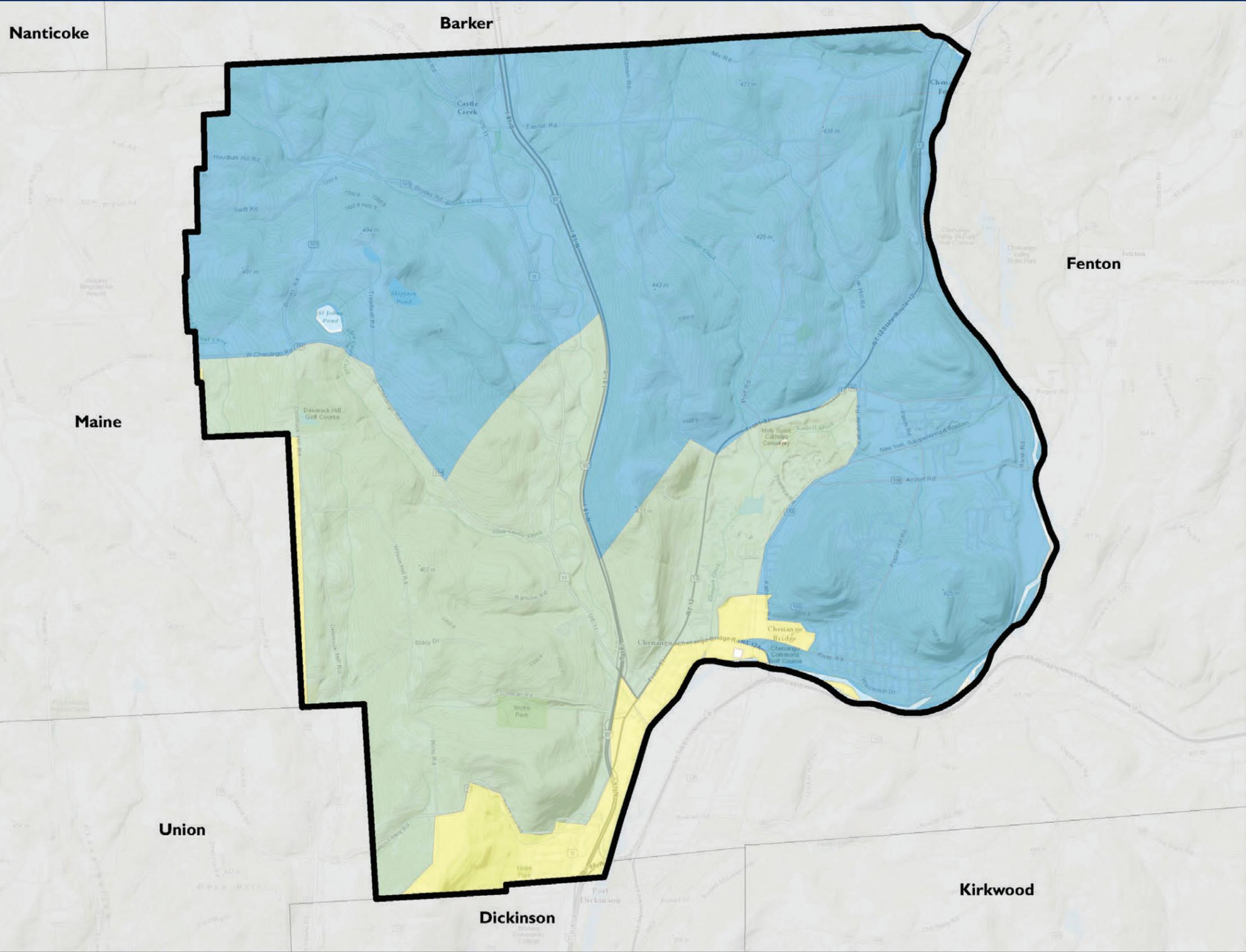
SOCIAL VULNERABILITY

To understand local resiliency and recovery issues, this Town of Chenango NYRCR Plan considers the vulnerability of the Town’s residents to natural hazards, such as flooding. Developed through a partnership with the University of South Carolina and the National Oceanic and Atmospheric Administration (NOAA), the Social Vulnerability Index (SOVI) measures the social vulnerability of populations to environmental hazards.

SOVI is a comparative metric that helps users examine differences in social vulnerability among population groups at the Census Block Group Level. SOVI graphically illustrates the geographic variation in social vulnerability. It shows differences in capacity for preparedness and response, as well as areas where resources might be used most effectively to reduce vulnerability. SOVI is also useful as an indicator to determine the level of recovery from disasters.

The Town of Chenango has several geographic areas of medium social vulnerability, according to the SOVI analysis, most notably, in the southern portion of the Town, and extending along Front Street up to Route 12A. These corridors contain a concentration of socially vulnerable residents, including the unemployed, low-moderate income individuals, people with disabilities, minorities, and the elderly. These areas also contain flood hazards that endanger the safety of residents. Figure 1.5 depicts the social vulnerability within the Town of Chenango.

NYRCR: Town of Chenango, Broome County
FIGURE 1.5 – SOCIAL VULNERABILITY



Legend



Town of Chenango Planning Area

Municipal Boundary

Social Vulnerability Index (SoVI)

Low

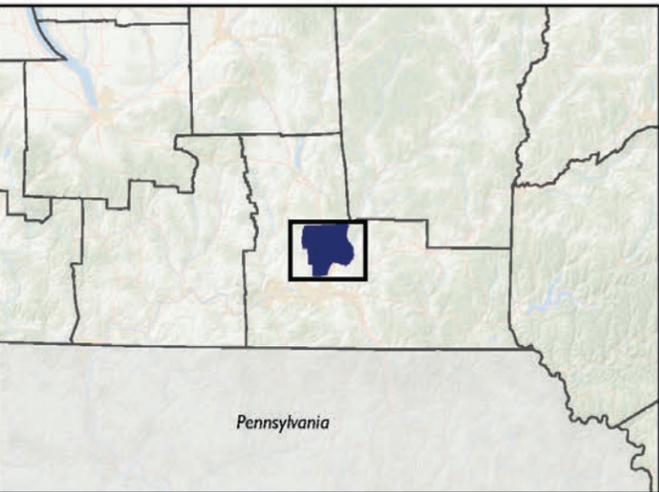
Medium-Low

Medium

Medium-High

High

Data Sources:
 NYS - Railroads, Water bodies, Boundaries
 ESRI - Topo
 NOAA - SoVI





Education, Income, and Community Desirability

According to the 2008-2012 U.S. Census American Community Survey's five-year estimates (Census/ACS), 92.9% of the Town's residents have a minimum education of a high school diploma or equivalency, compared to a Broome County average of 89.4%, and a New York State average of 84.9%. This indicates that a greater percentage of the Town's population has earned at least a high school education than either the County or State's populations. A greater percentage of the Town's population has also earned a bachelor's degree or higher (28.3%) than the County's population (25.9%). However, the Town has a lower percentage than the New York State average of 33%.

Census/ACS figures indicate that the unemployment rate among the Town's population aged 16 years and over was 7.8%, compared to 8.4% in Broome County, and 8.7% in the State. The Town's economy is a reflection of the diversity of jobs available in the region, which are easily accessible to residents. Available jobs span the employment spectrum among retail (16.9%) healthcare/education/social services (27.6%), and manufacturing (10.5%), and smaller sectors.

According to the Census/ACS, about 10% of the Town's population was at or below the poverty level, while both the County and the State were notably higher, at 16.5% and 14.9%, respectively. This indicates that residents are employed in higher-paying jobs that provide livable wages.

This data is reinforced by the fact that median household incomes are competitive in the Town of Chenango. According to the Census/ACS, the median household income in the Town of Chenango is approximately \$57,357, which is on par with the State estimate of \$57,683. However, when compared to Broome County, the median household income in the Town was more than \$10,000 greater than the County's median household income of \$45,856. Table 1.3 compares County and State income and education data with the Town of Chenango from 2008-2012.

While retail trade typically pays lower wages, other employment sectors in the Town offer very competitive salaries. These same jobs often require formal education or skills training.



Manufacturing sites, such as this Four-Square facility in Chenango, rely on an ample number of skilled workers. Photo is courtesy of Eric Thayer.

TABLE 1.3 – INCOME AND EDUCATIONAL ATTAINMENT STATE, COUNTY, AND TOWN COMPARISONS, 2008-2012

Geographic Area	Median Income		Educational Attainment for Population Age 25 and Over	
	Family	Household	% High School Graduate or Equivalent	% Bachelor's Degree or Higher
New York State	\$69,968	\$57,683	84.9%	32.8%
Broome County	\$59,317	\$45,856	89.4%	25.9%
Chenango	\$70,522	\$57,357	92.9%	28.3%

Education Data: U.S. Census Bureau, 2008-2012 American Community Survey 5-year estimates, Table DP02
 Income Data: U.S. Census Bureau, 2008-2012 American Community Survey 5-year estimates, Table DP03

Housing

The housing stock in the Town of Chenango consists primarily of owner-occupied, single-family units. Most people living in the Town are primary homeowners; however, there are some second-home property owners. The highest density of housing is located near the commercial corridor just off Front Street and Route 12A in areas such as the Broad Acres and Chenango Bridge neighborhoods.



The majority of housing stock in the Town of Chenango consists of single-family homes, as pictured here. This cell phone-captured photo is courtesy of Tetra Tech, Inc.

According to the 2008-2012 American Community Survey 5-Year Estimates, there are roughly 4,751 housing units in the Town; 4,572 (96.2%) of these units

were occupied at the time of the survey. A vast majority of those units (approximately 4,000) are single-unit, detached structures, with the remainder consisting of 137 one-unit attached structures, 830 multi-unit structures, and 223 mobile homes. The homeowner vacancy rate for the Town is 0.7%, compared with 2.1% in Broome County and 1.8% in New York State.

Most of the housing stock is made up of single-family homes that are predominantly owner occupied (79.8%), with the remaining 20.2% being renter occupied. This is significantly higher than the County’s owner occupancy rate of 66.3% and the State’s rate of 54.5%. The high rate of owner occupancy reinforces the economic stability of the community and indicates that a majority of the residents are invested in the community through property ownership.

The housing stock in the community is not particularly old. Approximately 54% of the housing stock was built between 1950 and 1979, indicating that more than half of the Town’s housing was built during this 29-year span. In addition to a strong “middle-aged” housing supply, values of homes within the Town of Chenango are quite affordable. The median value of an owner-occupied unit is \$129,600, which is higher than the County’s median value of \$105,600, yet substantially less than the State’s median home value of \$295,300. Table 1.4 compares general housing data for the Town of Chenango, Broome County, and New York State.



TABLE 1.4 – GENERAL HOUSING DATA, 2012

	Owner-Occupied Housing Units	Renter-Occupied Housing units	Owner-Occupied Vacancy Rate	Median Year Structure Built	Median Owner-Occupied Value	Median Gross Rent
New York State	54.5%	45.5%	1.8	1955	\$295,300	\$1,061
Broome County	66.3%	33.7%	2.1	1955	\$105,600	\$666
Chenango	79.8%	20.2%	0.7	1962	\$129,600	\$769

Infrastructure, Critical Community Services

TRANSPORTATION INFRASTRUCTURE

The Town of Chenango maintains approximately 68 miles of Town-owned paved and gravel roads. These roads are in need of constant maintenance, due to winter weather and snow plowing, along with damage from heavy rains, erosion, and flooding. Repeated flooding along many of these roads, particularly in residential neighborhoods near the Chenango River and at the southern end of the Town, has created significant evacuation and safety issues in the past.



Transportation corridors are vital to a community’s safety, access to jobs and services, and connectivity to local and regional destinations. Photo is courtesy of Eric Thayer.

In addition to local municipal roads, a number of County and State roads (approximately 120 miles), Interstate roads (including Interstate 81) and private roads transverse the Town of Chenango. Maintenance responsibilities for these roadways belong to other agencies, jurisdictions, or abutting property-owners. The condition of these roadways varies in their level of quality and condition. The major thoroughfares largely

enable the Town to function as a regional employment center, medical and educational corridor, and retail destination, and must accommodate the traffic generated by such uses.

Severe storms and flooding on roadways can cripple their functionality, thus stifling local and regional connectivity and dampening economic prosperity. Compromised transportation infrastructure limits the ability of first responders and others offering assistance from providing timely help when it is most needed during disasters and other emergencies.

In addition, impacts associated with severe weather and flooding often inhibit local businesses and service-providers from fully functioning. Workers, customers, and suppliers are often denied access to these businesses until floodwaters subside. Flooding along these transportation routes prevents residents and emergency service providers from securing necessary food staples, medical care, pharmaceutical supplies, and emergency and construction goods.

UTILITY INFRASTRUCTURE

Most of the well-established neighborhood centers in the Town of Chenango are served by basic municipal utility systems, including sewer and water. Local public water serves approximately 2,700 customers.

The Town’s municipal sewer systems serve the majority of businesses and residential areas, though select residential parcels in the north part of the Town rely on individual septic systems. A majority of rural and agricultural parcels throughout the Town also rely on individual septic systems.

Currently, the Town manages two active wastewater treatment plants (Penn View and Northgate) and one decommissioned plant (Quinn Estates). An additional private treatment plant is located in the Chenango Heights neighborhood.

Electricity and natural gas for the Town of Chenango is provided by New York State Electric and Gas. Above-ground power lines can be impacted by fallen trees on power lines during storm events. During Tropical Storm Lee, power was cut to several flooded neighborhoods to prevent fires and the potential of electrocution.

CRITICAL COMMUNITY SERVICES

The Town of Chenango is served by a network of community facilities and services, located both inside and outside the community. Critical community services include educational, police, fire, and medical services, as identified in Table 1.5.

TABLE 1.5 – CRITICAL COMMUNITY SERVICES	
Educational Services	Municipality
John R. Harshaw Primary School	Town of Chenango
Chenango Forks High School High School	Town of Chenango
Chenango Forks Middle School	Town of Chenango
Chenango Bridge Elementary School	Town of Chenango
Chenango Valley HS/MS	Town of Fenton
SUNY Broome Community College	Town of Dickinson
Binghamton University	Town of Vestal
Police Services	Municipality
State Troop C	N/A
Broome County Sherriff's Office	N/A
Fire Services	Municipality
Chenango Forks Station	Town of Chenango
Chenango Station	Town of Chenango
Chenango Bridge Station	Town of Chenango
Medical Services	Municipality
Chenango Ambulance Service	Town of Chenango
Greater Binghamton Health Center	City of Binghamton
Chenango Bridge Walk In	Town of Chenango
United Medical Assoc.	Town of Chenango
United Health Service Urgent Care	Town of Chenango
Lourdes Primary Care Facility	Town of Chenango
United Health Service Primary Care	Town of Chenango
United Health Services	Town of Binghamton



Economic Drivers

The Town of Chenango has generally sustained positive economic growth in recent decades, fueled by two main factors: a growing population of working-aged residents; and its location at the crossroads of major transportation routes, including Interstate 81, State Route 11, and State Route 12.



The Town of Chenango's economy is focused on sales and services related to retail businesses and professional offices. Photo is courtesy of Eric Thayer.

These transportation corridors have helped the Town to develop into an employment and commuting hub. Concentrated employment centers, located between traditional residential areas and more intensive retail complexes, service centers, are supported by transportation routes.

Strong local and regional employment centers, such as colleges and other institutions of higher learning, hospitals, County offices, and manufacturing facilities have helped to promote economic growth. They strengthen the region's economic core by providing stable, good-paying jobs in a variety of fields.

This diversity in employment has also helped to provide local economic stability, as job markets fluctuate.

These jobs, employers, and residents are then supported by a strong retail commercial core along Route 11 stretching south into Binghamton and easily accessible from Interstate 81.

ROBUST AND DIVERSE WORKFORCE

In recent years, the local economy has focused on sales and services, as retail businesses and professional offices have sprung up in the region. The Town benefits from a robust local workforce, with 35% of the population consisting of prime working-aged adults (aged 20-50 years).

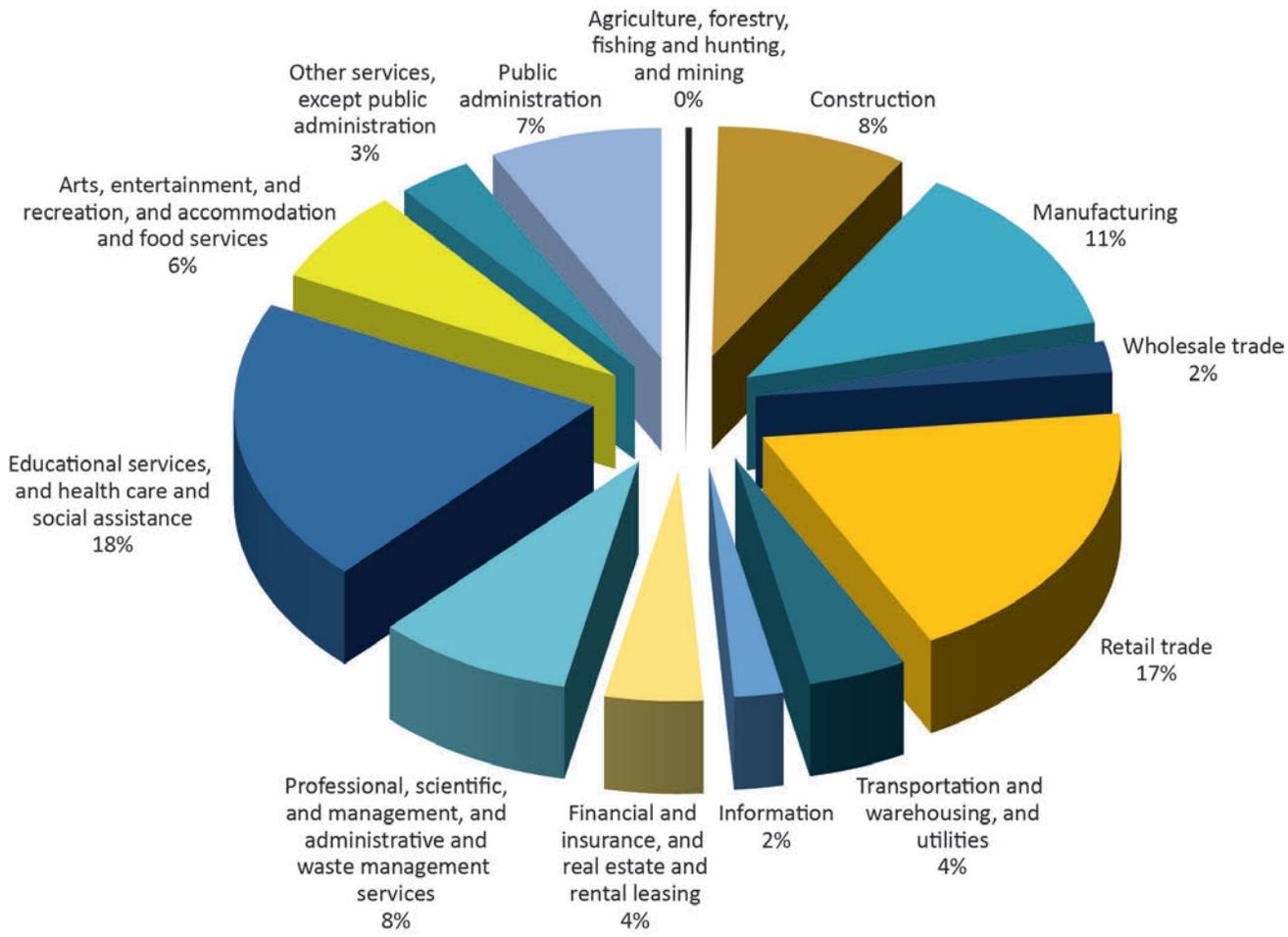
The U.S. Census categorizes fields of employment into 13 industries. Figure 1.3 depicts each of these industries, and the corresponding percentage of workers employed for the Town of Chenango. The educational services/healthcare/social assistance category represents the largest employer, accounting for jobs for more than one-fourth of the Town's workforce. Area employers in this industry include Lourdes Hospital, United Health Services, the Greater Binghamton Health Center, Binghamton University, local schools, and Broome Community College.



Pictured above is one of the health facilities that provides both services and jobs for residents of the Town of Chenango. Photo is courtesy of Eric Thayer.

The second-largest employment industry is retail trade, which represents 17% of the Town's workforce. Retail employers are concentrated on Route 11 (Front Street). The remaining jobs are distributed across multiple employment industries, indicating a diversified workforce and a wide range of employers. Workforce diversity contributes to the long-term resiliency and helps it to withstand market and business fluctuations.

FIGURE 1.3 – EMPLOYMENT BY INDUSTRY



REGIONAL ATTRACTIONS

The Town of Chenango’s proximity to major interstates and accessibility to I-81 has been a major catalyst for economic growth in the Town. The large-scale retailers,

service centers, and restaurants in the Town center have clustered strategically near the intersections of these transportation arterials, and benefit from convenient access to Front Street.



CURRENT CHALLENGES

Housing Affordability

While the Town of Chenango has experienced steady economic growth, its economic health should include a measure of how well the Town’s economy supports its workforce with living-wage jobs. Workers need jobs that enable them to afford life’s essentials, including housing. According to the U.S. Department of Housing and Urban Development (HUD), paying more than 30% of household income for housing costs qualifies a resident as “cost burdened,” and indicates difficulty in affording essential costs of life. This can include savings or expendable cash needed to cover evacuation and relocation expenses, and property repairs because of disasters.

According to the 2008-2012 American Community Survey data, 25% of homeowners with mortgages, 8% of homeowners without mortgages, and 49% of renters in the Town of Chenango spent 30% or more of their household income on housing.

Nearly one-half of renters and one-third of homeowners in the Town are considered to be cost-burdened.

FUTURE DEVELOPMENT POTENTIAL

A significant amount of future development potential remains in the Town, specifically on the commercial corridor along Front Street (Route 11/12) and Chenango Bridge Road (Route 12A). In the Town’s on-going 2014 updates to its 2005 Comprehensive Plan, there are several changes under consideration regarding future development.

- Adoption of an Energy Development Zone overlay district to permit gas wells, commercial windmills, and commercial solar collectors;
- Creation of a new zoning classification (Low Impact Commercial);



Pictured here is an example of the type of total stormwater system failure that was experienced in the Town of Chenango in the aftermath of Tropical Storm Lee. Pipe capacity was quickly overwrought and resulted in numerous washouts on local roads. This cell phone image is courtesy of the Town of Chenango.

- Elimination of the Planned Development District-Community Service (PDD-CS) and Planned Development District-Recreational (PDD-R) zones;
- Merging the Planned Development District-Commercial (PDD-C) zone with the Commercial Development (CD) zone;
- Changing several Planned Development (PDD-C) and agricultural parcels to Commercial Development (CD) to expand commercial business in the Town; and
- Re-orienting businesses along Front Street to allow the placement of parking and stormwater control further back on the parcels, nearer the river and locating businesses closer to the street.

Infill and redevelopment opportunities, combined with potential developable land in the northern section of Town, these opportunities highlight the importance of future investment in the Town’s infrastructure. These measures can also help to maintain existing capacity, accommodate future growth, minimize impacts from storm and emergency events, and ensure long-term resiliency.

Description of Storm Damage

Many sources provided historical information about previous occurrences and losses associated with severe storm and flooding events throughout the State of New York, Broome County, and the Town of Chenango. With a myriad of sources reviewed for the Town of Chenango NYRCR Plan, loss and impact information for these past events often varies. Therefore, monetary figures discussed here are based only on the available information referenced in this document. Figure 1.7 shows those historical areas of repetitive loss.

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 miles per hour. There was some minor damage in the far eastern part of the County, along with scattered power outages, but no major impacts. Hurricane Irene's rainfall saturated the soil and caused a moderate rise in the Susquehanna River that contributed to the major flooding that resulted from Tropical Storm Lee, which arrived only 10 days later.

The heavy rains and strong winds associated with Hurricane Irene devastated parts of New York State, beginning on the evening of August 28, 2011. During the height of the storm, over 40,000 people were without power; for some, the blackout lasted an entire week. On August 31, 2011, President Obama issued a major disaster declaration (DR-4020) for New York State and the counties impacted by Irene, including Broome County, where Chenango is situated in Broome County, 3-4 inches of rain fell, which caused some flooding in the areas along the Chenango River, but more importantly, saturated the soil. For the most part, the community suffered minimal immediate impact from Hurricane Irene. Some areas experienced minor flooding, but nothing that was not manageable or that damaged or posed a threat to life or property.

TROPICAL STORM LEE

Less than two weeks after Hurricane Irene passed through the Town, Tropical Storm Lee brought nearly one foot of rain and subsequent flooding across parts of central and southeastern New York State. The Town experienced high winds, heavy rains, and rushing floodwaters that carried dangerous debris. Rainfall totals beginning on September 7, 2011 ranged from 6-12-inches in Broome County, with accumulations of up to 8 inches within 48 hours.



High velocity sheet flow sheared away the roadside and train bridge, while carrying massive amounts of debris across local roads. This cell phone image is courtesy of the Town of Chenango.

As much as 12 inches of rain from Tropical Storm Lee led to massive flooding on the Chenango River and on larger tributaries, streams, and creeks. The deluged Chenango River overtopped levees and floodwalls along the Towns of Vestal and Union, and along the City of Binghamton.

In Broome County, flooding closed major interstates, isolated communities, and caused millions of dollars in damages. The Chenango River crested at more than 14 feet, making it the 4th highest crest in the river's history.

Broome County reportedly experienced over \$500 million in damages. The Town of Chenango suffered \$159,745 in infrastructure costs, \$30,847 in public



Flooded roads denied access to workers and patrons who could not reach local businesses that were forced to close. This cell phone image is courtesy of the Town of Chenango.

facilities/structures costs, \$137,805 in debris removal, and \$4,267 in fire/rescue services, totaling \$332,664. In addition to public costs, residents, businesses, and property owners incurred millions in damages and recovery costs.

On September 8, 2011, FEMA declared a second major disaster declaration (DR-4031) providing public assistance and individual assistance for recovery operations to communities in Broome County.

The rainfall inundation and resulting flooding had a significant impact on local infrastructure. Stormwater management systems were pushed beyond capacity due to torrential rain, heavy flows, and the accumulation of massive amounts of debris. These heavy flows caused extensive failures among stormwater management systems, roads, and embankments, many of which washed away.

Embankments along the Chenango River, Castle Creek, small streams, and local drainage swales suffered severe erosion, as the quantity and velocity of the sheet flows scoured these natural retention features. Castle Creek suffered excessive debris deposition and lost substantial amounts of embankment along portions of the waterway. This resulted in the Creek overtopping its banks and spreading out unimpeded through central and northern sections of the Town, hauling substantial amounts of debris along the way.



Streets became rivers following Tropical Storm Lee. This cell phone image is courtesy of the Town of Chenango.

The Broad Acres and Chenango Bridge neighborhoods in the Town also took significant hits. Floodwaters from the Chenango River reached Front Street and crossed it near Interstate 81, leaving homes under at least 4 feet of water. Businesses located along the east side of Front Street, from Interstate 81 north to Bishop Road, were impacted by floodwaters.

Flood damage did not discriminate; rather, roads turned into rivers and affected residential and business properties, alike. Structural damage to places of employment prevented workers and patrons from accessing businesses that were inaccessible and closed for several days – and even months, in some instances.

Flooding caused by Tropical Storm Lee is the worst on record for the Southern Tier.

Flooding also inundated the Chenango Commons Golf Course. Nearly the entire golf course was submerged under floodwaters that reached River Road and left the golf shop, restaurant/bar, and other connected businesses under several feet of water. Floodwaters throughout the community placed key infrastructure and utilities at risk. Water and sewer pump stations were either isolated or in some cases, inundated with floodwaters. Due to threats posed by floodwaters at the Northgate Plaza Water Pump Station, the facility was shut down as a precautionary measure. This limited water supplies to residents in both the Town of Chenango and the Town of Dickinson.



Flash flooding affected several neighborhoods in the aftermath of Tropical Storm Lee. This cell phone photo of a home in the Morningside Heights neighborhood is courtesy of the Town of Chenango.



Damages caused by flooding cost hundreds of thousands of dollars. Clean-up, property damage and debris removal lasted weeks and months, as residents pieced their lives back together. This cell phone image is courtesy of the Town of Chenango.

Flash flooding also occurred in downtown Chenango, as rain poured off hills to the west and quickly overtook local stormwater management systems. One of the areas that suffered the greatest impact was the Wallace Road/Morningside Heights neighborhood. Heavy rains draining from the hills to the west poured into the stormwater management system, where Wallace Road meets Morningside Drive. Stormwaters exceeded the system’s capacity and resulted in flooding throughout the neighborhood, despite not being in proximity to significant water bodies.

Individuals residing in this neighborhood are not located in an identified floodplain, and Smith Hill Creek, which runs through the area, is not a formally recognized waterway. As such, most, if not all of the residents in that location, do not maintain flood insurance and suffered direct financial impacts from the flooding.

In total, flooding from Hurricane Irene and Tropical Storm Lee destroyed 229 homes, damaged some 9,000 more, and caused approximately \$502.8 million in total property damages in Broome County. It was estimated that 24,000 people were evacuated in Broome County.



The Morningside Heights neighborhood was especially hard-hit from Tropical Storm Lee. This cell phone image is courtesy of the Town of Chenango.

NYRCR: Town of Chenango, Broome County
FIGURE 1.7 – DAMAGES MAP



Legend

-  Town of Chenango Planning Area
-  Municipal Boundary
-  Repetitive Loss

Data Sources:
 NYS - Railroads, Water bodies, Boundaries
 ESRI - Topo
 FEMA - NFIP

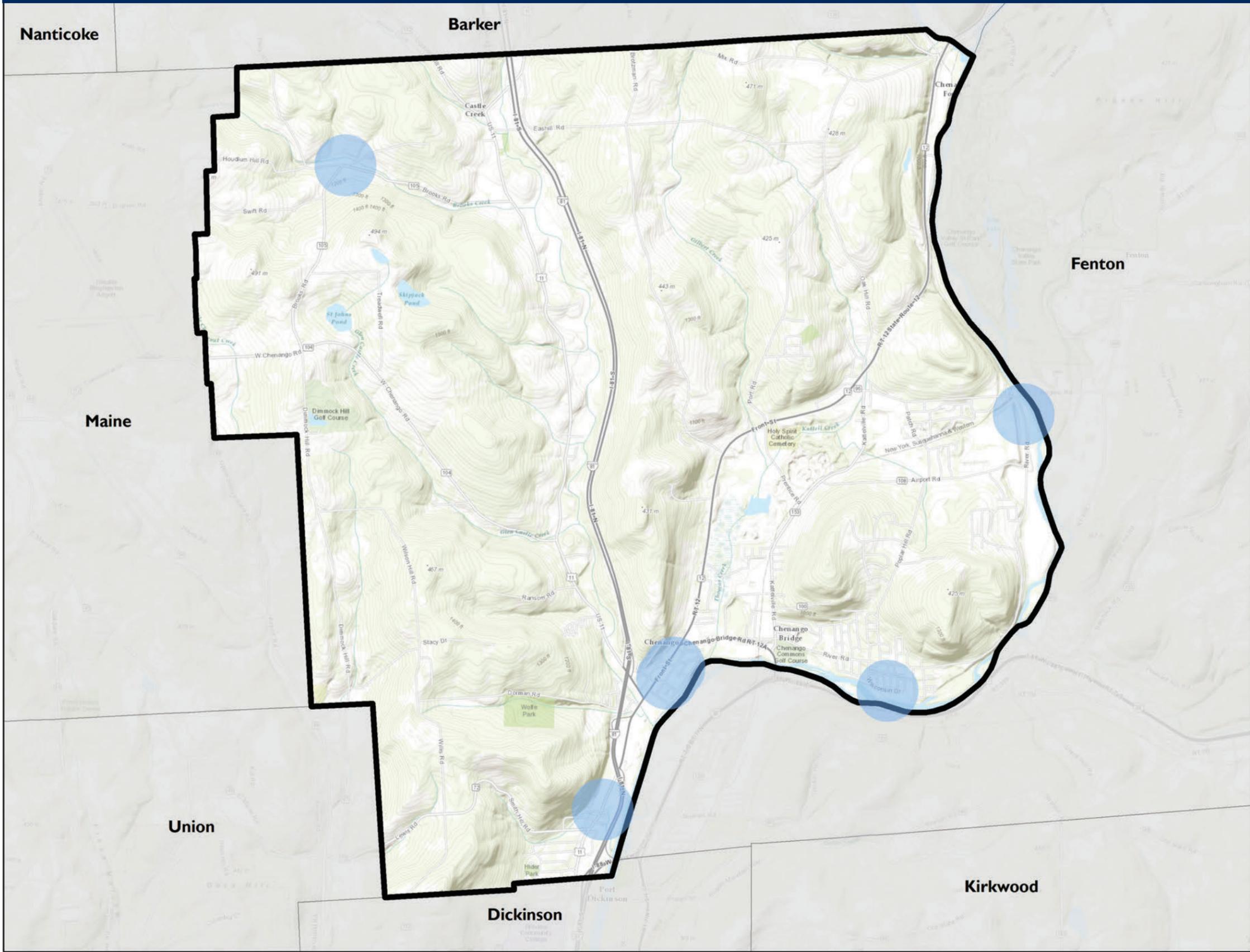
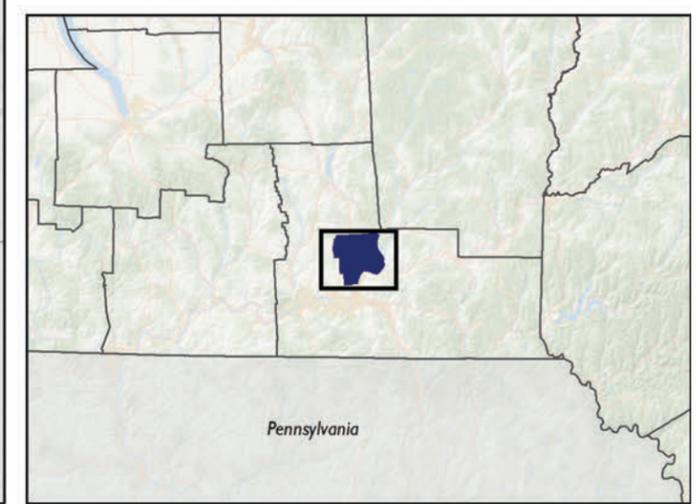




TABLE 1.6 – RECENT HAZARD EVENTS

Dates of Event	Event Type	FEMA Declaration Number	County Designated	Approximate Damage Assessment
April 2 - 4, 2005	Severe Storms, Flooding	DR-1589 (IA and PA)	Y	
June, August 2006	Severe Storms and Flooding	DR-1650	Y	The shelter at Chenango Fire Station was opened for evacuated residents. Numerous roads were closed for up to two days, and \$190,301 in infrastructure damages was recorded. Several homes in the Jacobs Highway area were flooded. The Town recorded a total \$35,615 in debris removal costs, and \$16,834 in emergency protective measures.
November 16 - 17, 2006	Flash Flood	DR-1670	Y	Residents from Fuller Road were evacuated, and utility service was unavailable on Dorman Rd., John Smith Rd., and Brookview Dr. for up to three weeks. Infrastructure damage totaled \$1,027,905, plus \$7,813 in public facility damages. A total of 125 private homes reported damages during the event, and \$120,260 in emergency services was provided for creek cleaning and debris removal.
April 14 - 18, 2007	April Nor'easter	DR 1692	N	N/A
June 19, 2007	Severe Storms and Flooding	DR 1710	N	N/A
December 11 - 31, 2008	Severe Winter Storm	EM 3299 DR 1827	N	N/A
August 8 - 10, 2009	Severe Storms and Flooding	DR 1857	N	N/A
April 26 - May 08, 2011	Flooding, Tornadoes, and High Winds	DR-1993	Y	Kelly Road was closed for approximately one week. Approximately \$105,293 in damages to culverts and ditch lines were recorded. A total of \$6,322 was spent on emergency protective measures.
August 26 - September 5, 2011	Hurricane Irene	EM 3328 DR 4020	Y	N/A
September 7 - 10, 2011	Remnants of Tropical Storm Lee	EM-3341 / DR-4031	Y	N/A
June 26 - July 12, 2013	Severe Storms and Flooding	DR-4129	Y	Several businesses closed due to flooding. Infrastructure damage, including two pump stations and numerous culverts, totaled \$159,745. Another \$30,847 in public facility/structural damages were recorded, as was \$137,805 in debris removal.
January 25, 2010	Flood	NA	NA	\$15,000 spent on emergency protective measures.

Source: Broome County Hazard Mitigation Plan

As shown in Table 1.6, the greater Chenango region has suffered from a series of flooding and winter storm events over the last 10 years. The storm events often involve heavy rain and/or riverine flooding which impact the community. These storm events have caused the community to incur a variety of personal losses and

costs associated with dealing with storm impacts. Personal costs to residences from one single event can total more than \$1 million, while clean-up, repairs, and reconstruction can cost the Town hundreds of thousands of dollars.



Critical Issues

Several critical issues surfaced during the Town of Chenango NYRCR planning process. The critical issues identified stem from direct impacts of these storm events, including:

- Erosion issues along the Chenango River;
- Flooding from overflow and swelling of the Chenango River;
- Flooding from stormwater flow coming off the hills to the west of the downtown; and
- Stormwater management systems that cannot adequately handle significant storm events.

The impacts of these storm events present a variety of obstacles for the community, including posing risks to the health and safety of residents, and to the structural integrity and safety of affected properties. The resulting critical issues from the effects of these storm events include:

- Disruption of the connectivity in the community and to the larger region;
- Damage and risk to businesses and the economic well-being of the community, particularly in the commercial corridor along Front Street;
- Damage and risk to critical infrastructure, including transportation, water utilities, and stormwater management facilities;
- Substantial flooding in residential neighborhoods; and
- Future risk for flooding of community assets and homes.

Disrupted Connectivity

Significant storm events cause flooding on local roads in the core of the Town. This core area consists of the community's commercial corridor and is the most densely developed portion of the Town. Most residents rely on the roads and infrastructure in this part of

Town to allow them to access jobs, goods and services, healthcare, and education. Flooding along roads and intersections severely inhibits or completely prohibits access to many of these resources.

Damage, Risk to Commercial Corridor

This critical issue presents the economic impact of flooding in the community. The financial toll on local businesses from flooding has resulted in damages amounting to millions of dollars.

Floodwaters damage structures, facilities, and their goods. Water damage can be extremely costly to clean-up, as dangers of mildew and other health hazards pose threats, even after the waters subside. During past storm events, there were immediate physical threats to people, goods, employment, business revenues, and community facilities, among others. For many, the financial impacts linger today.

Damage, Risk to Critical Infrastructure

The risks posed to the Town's infrastructure by storm events is two-fold. The first is the strain put on infrastructure systems during the events. Undersized systems and systems that do not work effectively or efficiently are damage-prone or at-risk of physical failure during these events. The second risk is the direct impact of floodwaters to infrastructure. Examples of infrastructure impacts from flooding include the inundation of municipal well stations, and the degradation of roads from erosion. Impacts to infrastructure assets affect both the Town and adjacent communities, and have included:

- Erosion, blowouts, and damaged stormwater management systems;
- Road washouts; and
- Water and sewer pump station inundation.



Pictured at left is a view of a walking bridge at Dorman Road Creek at Manny's Auto Repair Shop during "blue skies." Note the dense vegetation that ordinarily grows below the bridge. At right is the same walking bridge in the post-Lee environment, when massive debris deposition filled the canal, almost to the bottom of the bridge, where there is ordinarily a 10-foot clearance. These cell phone images are courtesy of the Town of Chenango.

Damage to transportation infrastructure can have a region-wide impact since it provides access to homes, services, and businesses. In addition, some of the infrastructure facilities, such as the Northgate Pump Station, provide direct water service to neighboring communities. The Northgate Pump Station provides water service to the Town of Chenango and its neighbor to the south, the Town of Dickinson, which includes SUNY Broome Community College. Damage to this facility from floodwater inundation or lack of access during a flood event would not only directly impact Chenango, but Dickinson and the college, as well.

Residential Flooding

Another critical issue affecting the Town of Chenango is the flooding that occurs in residential neighborhoods during storm events. This includes some of the following:

- Neighborhoods immediately adjacent to the Chenango River, including Broad Acres neighborhood along Jacobs Highway;
- The residential neighborhood located at the southern tip of the Town just west of Front Street, from Wallace Road south (flooding is caused by

an undersized stormwater management canal and culvert system, combined with substantial drainage from the hills immediately to the west); and

- The Fuller Road neighborhood, due to the undersized stormwater canal and culvert beneath Front Street at the southern end of the neighborhood.

Flooding in these neighborhoods caused damage to residential properties. The presence of floodwaters also posed a threat to public safety due to the risk of fires and electrocution. Neighborhoods west of Front Street are not identified as being in recognized flood zones, which prevents businesses and homeowners from receiving federal NFIP subsidies on their flood insurance.

Since these residences and businesses are not in an identified flood area, they often do not maintain flood insurance and may not carry it, since there is no perceived flood threat. This results in extremely costly recovery efforts for residents and business owners who must pay costs out-of-pocket.

Risk to Community Assets

The number-one priority issue identified for the Town of Chenango in the 2014 Broome County Multi-Jurisdictional Hazard Mitigation Plan was damages and impacts caused by flooding. The Town's abundant water resources, which have historically fueled agricultural activities and currently provide a sustainable resource of clean drinking water for Chenango residents, also places the Town's built environment at a continuous risk of flood damage.

Agricultural, commercial, and residential development has altered waterways, has occurred in and around the floodplain, and increased impervious surfaces that intensify surface water run-off. This has resulted in magnified flood risk and erosion in the Town's many waterways.

An aerial map was examined by the Committee and the Consultant Team to identify areas at greatest risk to future flood events. The Committee agreed that the most pressing flooding issues occur along the Chenango River, as well as along Castle Creek, which parallels Interstate 81 and affects the business corridor. In addition, sheet flows off hills to the west of Front Street filled creek beds with debris and gravel in the post-Irene/Lee environment, causing floodwaters to spill onto streets and into properties. While flooding from the river impacts portions of the community closest to the Chenango River, it does not pose the same level of risk as flows from the hills. The flooding along the Chenango River occurs more gradually, has greater natural buffers and barriers to impede flooding, and impacts development that is located at greater distances from the flood source than those areas experienced flash flooding and sheet flow from the surrounding hills.

Areas of Repetitive Impact

FRONT STREET

Flooding occurred along the Chenango River, extended up along the eastern side of Front Street (Route 11), and severely backed up at Fuller Road. This resulted in substantial flooding in the Fuller Street neighborhood.

CASTLE CREEK PARK AREA

Recreational buildings have suffered continual flooding; one was removed after Tropical Storm Lee due to continual flooding and damage, leaving only the concrete pad foundation. The existing baseball field is in use, but erosion along Castle Creek's banks deteriorated the streambed and threatens the ball field. Remaining structures are used for storage. Moreover, Castle Creek is full of debris that has not been removed. Flooding along the Creek consistently floods agricultural land and has resulted in the deposition of debris to such an extent that the Creek now lacks a defined "bed" in several sections.

CHENANGO RIVER FLOOD ZONES

Buildings have consistently flooded and the Town has systematically acquired some of the parcels and cleared the lots. Many parcels are still owned by local residents and are in danger of flooding.

A lack of updated Flood Insurance Rate Maps (FIRM) is also problematic. These maps were developed as part of the National Flood Insurance Program (NFIP) to identify the areas of impact from flooding. The areas of impact identified on the maps include land that has a 1% annual chance of flooding (100-year flood level) and land with a 0.2% annual chance to flood (500-year flood level). The flood hazard regions on these maps identify those areas, typically in the 100-year floodplain, that are eligible for participation in the NFIP.

Accurate identification of these flood hazard areas not only qualifies property owners for access to flood insurance, but also delineates geographic areas where other Federal, State, and local funding may or may not be available due to flood threats.

Lack of Stream and Debris Management

Over time, deposits of gravel, illegal residential dumping of yard debris, and streambank erosion have led to increased flood risk and damage to residential and commercial properties throughout the Town.



Specifically reported damages and repetitive damages from past floods have occurred in numerous other locations in Town.

The Chenango River has often jumped its banks during periods of heavy water flow. Many residents in this area continue to pile vegetative debris and other waste along the banks of the waterway, which often defines the rear property boundary. Field crews examining the river bank found trash and yard waste, including discarded Christmas trees and brush. The initial flood risk is compounded when floodwaters interact with large amounts of residential debris, which are carried downstream and impede full-flow capacity.

Past efforts to ensure regular property-owner maintenance and debris removal from this drainageway have been partially successful, as recent field inspections of the channel found debris collected from the floodway in piles further up the stream bank. Unfortunately, those efforts to remove the debris from the channel must involve complete removal from the flood fringe. Otherwise, the piles of cleared debris will remain flood hazards for future high water events.

Strategies for Town resiliency strike a balance between the health of the natural environment, including riverine ecosystems, and flood protection for community homes, businesses, and assets.

Community Vision

A vision statement for the Town of Chenango was developed to reflect community values, issues, needs, and opportunities. It serves as the foundation for projects and implementation strategies identified in the Town of Chenango NYRCR Plan.

Through collaborative discussions, stakeholder engagement, review of existing plans and studies, and a

VISION STATEMENT

“The Town of Chenango is a beautiful, quiet, and safe community that is part suburban and part rural. We take pride in the quality of our residential neighborhoods, vibrant business district, schools, and recreational opportunities. We make a high priority of ensuring the safety and preservation of our private, commercial, and public property, while promoting our community as a great place to live, work, and raise a family.

We are a resilient community that prioritizes the concerns of our residents, businesses, and other property owners facing natural and man-made disasters. The Town is committed to working with its citizens, neighboring communities, and other public entities to provide a sense of security and well-being now, and in the future.”

focused intent towards holistic community recovery, the Committee adopted the following vision to guide the recovery and resiliency effort for the Town of Chenango.

Relationship to Regional Plans

As they identified and developed a list of projects for the Town of Chenango, the Committee performed outreach to regional organizations (such as the Broome County Planning and Economic Development Department) and regional economic development agencies, to discuss project ideas and opportunities for collaboration, and to identify any required regulatory approval processes.

Critically important to this process was the assessment of available resources provided to the Committee by regional entities. This included current datasets, feasibility assessments, and financial and regulatory resources to support project implementation. This collective process was supported and furthered through coordination with the State Agency Resource Team (SART).

REVIEW OF EXISTING PLANS AND STUDIES

The Town of Chenango has participated in and developed a series of plans and studies in recent years that guide the growth and development of all aspects of the Town. These numerous plans and studies address Town and regional issues, including infrastructure, community facilities, housing, economic development, tourism, environmental protection, and stewardship. By reviewing and incorporating these existing documents, the Committee was able to build on relevant data, methodologies, stakeholder engagement, and consensus that led to recommendations incorporated in the Town of Chenango NYRCR Plan.

Perhaps most importantly, the prior efforts associated with these plans helped position the community to use the Town of Chenango NYRCR Plan development process to focus on particular needs not sufficiently addressed in existing documents, such as flood-specific needs and acute economic and infrastructure challenges. Table 1.7 summarizes the existing plans and studies reviewed and incorporated into this planning process. It also includes an indication of the key components that will help to implement the Town of Chenango NYRCR Plan.

TABLE 1.7 – SUMMARY OF EXISTING PLANS AND STUDIES

Resource	Relevance	Key Components for NYRCR Planning Process
Draft Town of Chenango Comprehensive Plan (2014)	<ul style="list-style-type: none"> Establishes a vision for the future growth, development and protection of the Town. Provides implementation actions for all areas of the community, including (but not limited to) infrastructure, community facilities, housing, economic development, and natural/cultural resources. 	<ul style="list-style-type: none"> Community vision. Detailed community, demographic, economic data goals and recommendations for all areas of community and economic development. Critical issues; past, current and recommended projects/initiatives.
Broome County Industrial Development Agency and Local Development Corporation Strategic Action Plan (2014-2016)	<ul style="list-style-type: none"> Serve as a catalyst to create and pursue opportunities that will strengthen the County’s economic development infrastructure, such as physical infrastructure, broadband, shovel-ready sites, qualified workforce, thriving and supportive business climate, financial resources, and attractive quality of life. 	<ul style="list-style-type: none"> Helped identify economic development and redevelopment priorities to be taken into consideration during the project identification process.



TABLE 1.7 – SUMMARY OF EXISTING PLANS AND STUDIES (CONT'D)

Resource	Relevance	Key Components for NYRCR Planning Process
<p>Broome County Comprehensive Plan Building our Future (2013)</p>	<ul style="list-style-type: none"> • Provides a comprehensive analysis on the status of the Town, while developing goals and strategies for the long-term progress of the community, including: <ul style="list-style-type: none"> • Cultural Resources; • Housing; • Land Use; • Infrastructure; • Open Space; • Water Resources; • Economy; • Workforce; • Target Industry Analysis; and • Real Estate. • This resulted in an evaluation of incentives and economic development recommendations based on community goals. This was presented in an Action Plan to help provide future guidance for the Town. 	<ul style="list-style-type: none"> • Incorporate the Vision Items identified in the Comprehensive Plan into the Town’s NYRCR Plan and resulting projects. The Comprehensive Plan’s Vision Items included: <ul style="list-style-type: none"> • Vision Item 1 – Making Broome County an Inviting Place To Live, Work, and Play • Vision Item 2 -Engaging Our Students and Young Professionals • Vision Item 3 – Taking Pride in Our Urban and Village Centers • Vision Item 4 – Taking Pride in Our Scenic Beauty • Vision Item 5 – Investing In Our Legacy Sites • Vision Item 6 – Making a Commitment to High Standards in Services • Vision Item 7 – Making a Commitment to High Standards in Building Design and Renovation • Vision Item 8 – Becoming More Resilient • Vision Item 9 – Investing in Our Workforce, Entrepreneurship, and Innovation • Vision Item 8 was divided into 17 strategies designed to help increase resiliency regarding business retention, expansion, economic development, infrastructure improvements, natural resource management, and flood hazard mitigation.
<p>Broome County Intermunicipal Waterfront Public Access Plan (December 2011)</p>	<ul style="list-style-type: none"> • River communities worked together to establish a united vision for economic development, riverfront access, and environmental stewardship. 	<ul style="list-style-type: none"> • The Town of Chenango focused on Chenango Forks, Rt. 12 Park-and-Ride, Chenango 100 Fen Loop Trail; Chenango River West Bank, and River Rd. improvements.
<p>Town of Chenango Comprehensive Emergency Management Plan (January 2013)</p>	<ul style="list-style-type: none"> • Other planned and ongoing mitigation projects and activities include obtaining records of the elevation of new or planned structures, implementing drainage improvements, planning of new stormwater collection systems, and Town codes. 	<ul style="list-style-type: none"> • Research funding opportunities for back-up power support at disaster response command center for Town Hall. It is the intention of this municipality to incorporate mitigation planning as an integral component of daily municipal operations.
<p>Broome NY Rising Community Reconstruction Plan (2014)</p>	<ul style="list-style-type: none"> • Six neighboring Broome County municipalities participated in Round I of the NYRCR program to develop a joint plan that focused on collaboration and regional approaches to recovery and resiliency. • Regional priorities included a regional Susquehanna watershed initiative and a regional shelter feasibility study. • These six Broome municipalities partnered with 5 Tioga County municipalities and the Village of Sidney in Delaware County to host a Regional Resiliency Summit and develop the proposed regional Susquehanna watershed initiative. They also won a \$3 million competitive award for regional collaboration, which is proposed to be used for the watershed initiative. • The six Round I municipalities included: <ul style="list-style-type: none"> • City of Binghamton; • Town of Conklin; • Town of Union; • Town of Vestal • Village of Endicott; • Village of Johnson City 	<ul style="list-style-type: none"> • The Round I Broome NYRCR Plan helped to identify some of the regional and local assets and helped guide project identification for the Town of Chenango. • The Town of Chenango is part of the Susquehanna watershed and will have the opportunity to engage in, and benefit from, the regional watershed initiative as it moves forward. • The Chenango NYRCR planning committee and this plan support the regional shelter project.



TABLE 1.7 – SUMMARY OF EXISTING PLANS AND STUDIES (CONT'D)

Resource	Relevance	Key Components for NYRCR Planning Process
DMA 2000 Hazard Mitigation Plan Update– Broome County, NY (February 2013)	<ul style="list-style-type: none"> This Plan includes a comprehensive risk assessment and hazard identification process, and specifically assisted in identifying hazards in the Town of Chenango. The Plan also developed specific mitigation procedures to address these hazards. The Plan specifically identified hazard vulnerabilities, current and future mitigation actions, and developed more than 30 hazard mitigations initiatives. 	<ul style="list-style-type: none"> The Plan identified flood hazards and impacts that provided additional direction and clarity during the planning process. The Plan identified past mitigation actions and those the community is undertaking or is considering. Review of the mitigation strategies helped to identify areas of flood impact in the Town.
Southern Tier Regional Economic Development Council Strategic Plan and Progress Reports	<ul style="list-style-type: none"> The Plan was developed by the Regional Economic Development Council of the Southern Tier to help restore the Southern Tier to a competitive economic market. The Plan identifies the key economic drivers and conditions, the regional opportunities and challenges identify regional priority projects, and initiatives and implementation strategies that will be undertaken to accomplish Plan’s vision. The Plan also recognizes the devastating impacts the flooding from Tropical Storm Lee, in 2011, had on the economy of the region and recommends strategic focus on efforts that will allow the region to recover from the flooding and enhance its economy. 	<ul style="list-style-type: none"> Several strategies in the Plan aligned with goals defined in the Town’s Comprehensive Plan. Strategies to strengthen the region’s economy mirror goals of the Town and helped guide the planning process. Strategy 5 from the Southern Tier Strategic Economic Development Plan, 2011-2016 – “Strengthen the Southern Tier’s Economic Development Backbone,” provides a strong connection to the Town’s NYRCR Plan. Through the public outreach and information-gathering exercises conducted during the development of the NYRCR Plan, the Chenango NYRCR Committee has identified several projects that can be linked to the priorities of the Southern Tier Regional Economic Development Council. Many of the Town’s initial goals and economic development plans, including Front Street redevelopment and the construction of a new Town well to support increased commercial development, directly support strategies identified in the Plan.
Broome County Community Health Assessment (2013-2017)	<ul style="list-style-type: none"> The assessment provided a wealth of information regarding the health, safety and general wellness of the community. 	<ul style="list-style-type: none"> Provided additional demographic, health and socioeconomic data regarding the residents of the Town of Chenango.



Photo is courtesy of Eric Thayer.

Section 2

Assessment of
Risk and Needs



Photo is courtesy of Eric Thayer.

Section 2: Assessment of Risk and Needs

Description of Community Assets and Assessment of Risk

Introduction and Overview

The Town of Chenango NYRCR Planning Committee (Committee) worked with its Consultant Team, community stakeholders, and the public to develop a comprehensive inventory of assets in the targeted geographic area, which includes the entire Town. The Committee compiled sufficient and accurate information to assess risk to assets under current and future conditions in the planning horizon. The Committee remained actively engaged throughout the inventory and risk assessment process, collaboratively reviewing all aspects of the assessment and collectively approving the results.

Inventory Process

DATA COLLECTION

The process began with the New York State Department of State (NYS DOS) Risk Assessment Work Group facilitating development of a comprehensive list of datasets (from numerous public and private sources) that were provided to the Committee. These included NYS DOS Geographic Information Systems (GIS) data, as well as Broome County GIS data sources. These resources constituted a preliminary inventory of assets to build upon through stakeholder outreach, public input, and Committee deliberations. The preliminary datasets were analyzed and verified via consultation with Committee Members. The Committee sought additional input from the Town of Chenango Community (Community) stakeholders and the public as part of the asset identification process.

COMMUNITY MAP PORTAL

To accurately and comprehensively identify and compile assets, the Consultant Team utilized an interactive GIS web-mapping portal created from information provided by the State and Broome County (Figure 2.1). The Committee nominated two representatives to review the assets identified and provided through the community map portal. After verifying this information, the Committee supplemented it through additional information provided by Committee Members, stakeholders, and the general public.

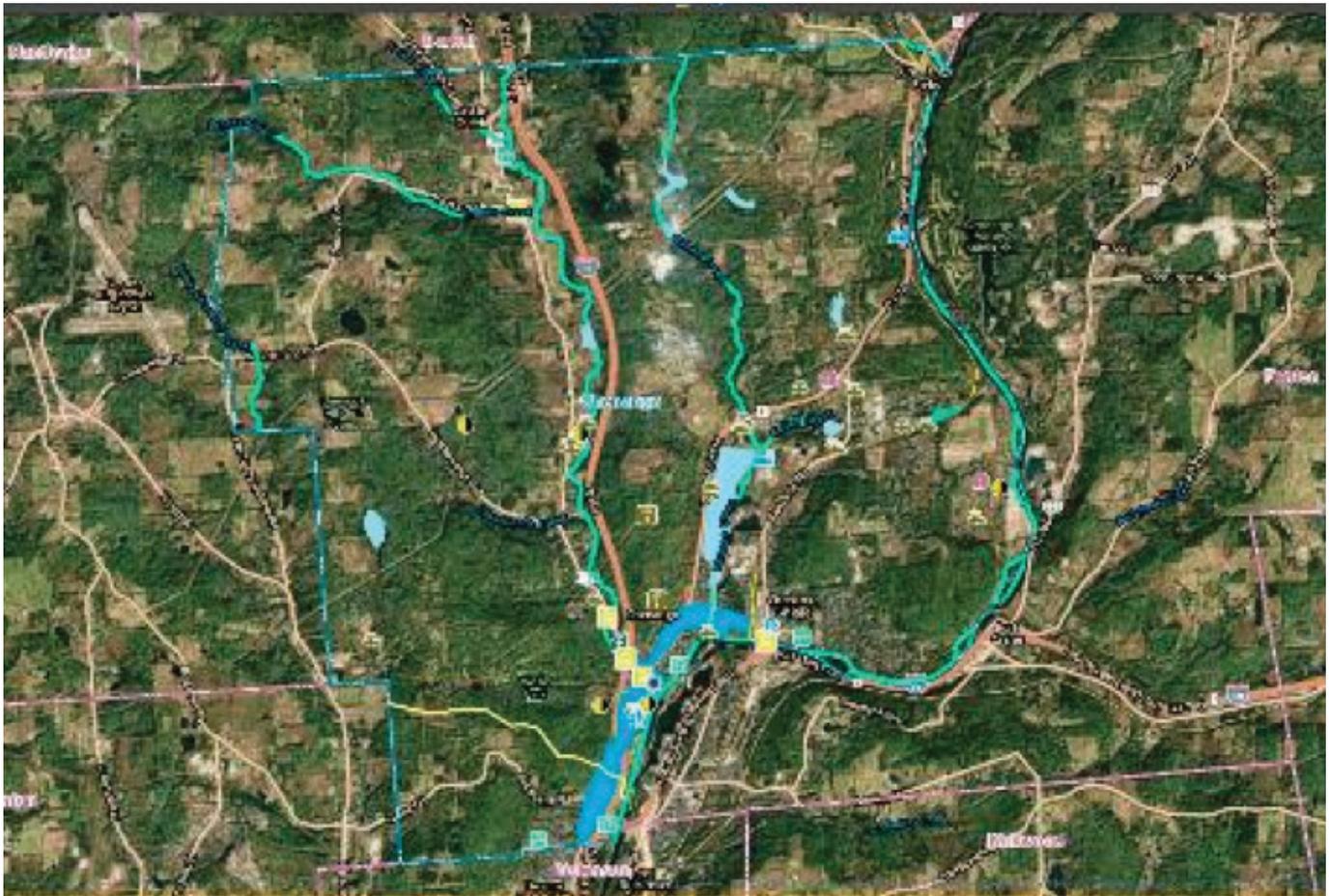
This portal allowed Committee Members to visualize, interact with, edit, and add assets. It also allowed capture and use of local knowledge to populate and refine the asset inventory information.



Chenango Town Hall was the regular venue for Committee Meetings and Public Engagement Events held throughout the planning process. Photo of Town Hall sign is courtesy of Eric Thayer.



FIGURE 2.1 – INTERACTIVE GIS WEB-MAPPING PORTAL (CHENANGO)



The portal allowed Committee members to interactively verify, identify, and detail community assets and critical facilities.

ASSET CLASSIFICATION

The Committee reviewed and classified the identified assets into six categories, in accordance with the National Disaster Recovery Framework. These categories, along with examples, are described in Table 2.1.

Assets were also classified as either “critical” or “non-critical” facilities. As defined by the Federal Emergency Management Agency (FEMA), critical assets consist of features that create or extend the useful life of structures as well as facilities that provide important community services. These assets include, but are not limited to, healthcare facilities, emergency operation

TABLE 2.1 – ASSET CATEGORIES

Asset Class	Examples
Community Planning and Capacity Building*	This RSF comprises plans, management functions, and recovery activities, not physical assets.
Economic	Office buildings, business and industrial parks, manufacturing facilities, warehouses, storage facilities, groceries, restaurants, banks, lodging, storefronts, downtown center, and seasonal/tourism destinations.
Health and Social Services	Schools, healthcare, daycare, elder care, emergency operations, government and administrative services, media and communications, police, fire, and rescue.
Housing	Single-family and multi-family dwellings, supportive housing/group homes, senior housing, and affordable housing.
Infrastructure Systems	Pedestrian, bicycle, and vehicular ways; transit; bridges; airports; rail; ports; ferries; gas stations; water supply; stormwater; wastewater; solid waste; recycling; and power generation facilities.
Natural and Cultural Resources	Natural habitats, wetlands and marshes, recreation facilities, parks, public access, open spaces, agricultural areas, religious establishments, libraries, museums, historic landmarks, and performing arts venues.

* Because this RSF does not comprise physical assets, the Community-identified assets for the NYRCR Plan were not assessed according to this category. However, needs and opportunities for this RSF were still considered, due to the importance of this function. Source: NYS DOS, 2013

centers and emergency response providers, power generation facilities, and educational facilities.

A non-FEMA-designated critical facility may be deemed critical: (1) by the Committee if the asset is locally significant; (2) by other federal agencies, state and local officials; or (3) by the NYRCR Committee and members of the local public. Together, these two ‘tiers’ of critical assets give the community a better picture of overall risk.

A COLLABORATIVE APPROACH TO ENGAGING THE PUBLIC

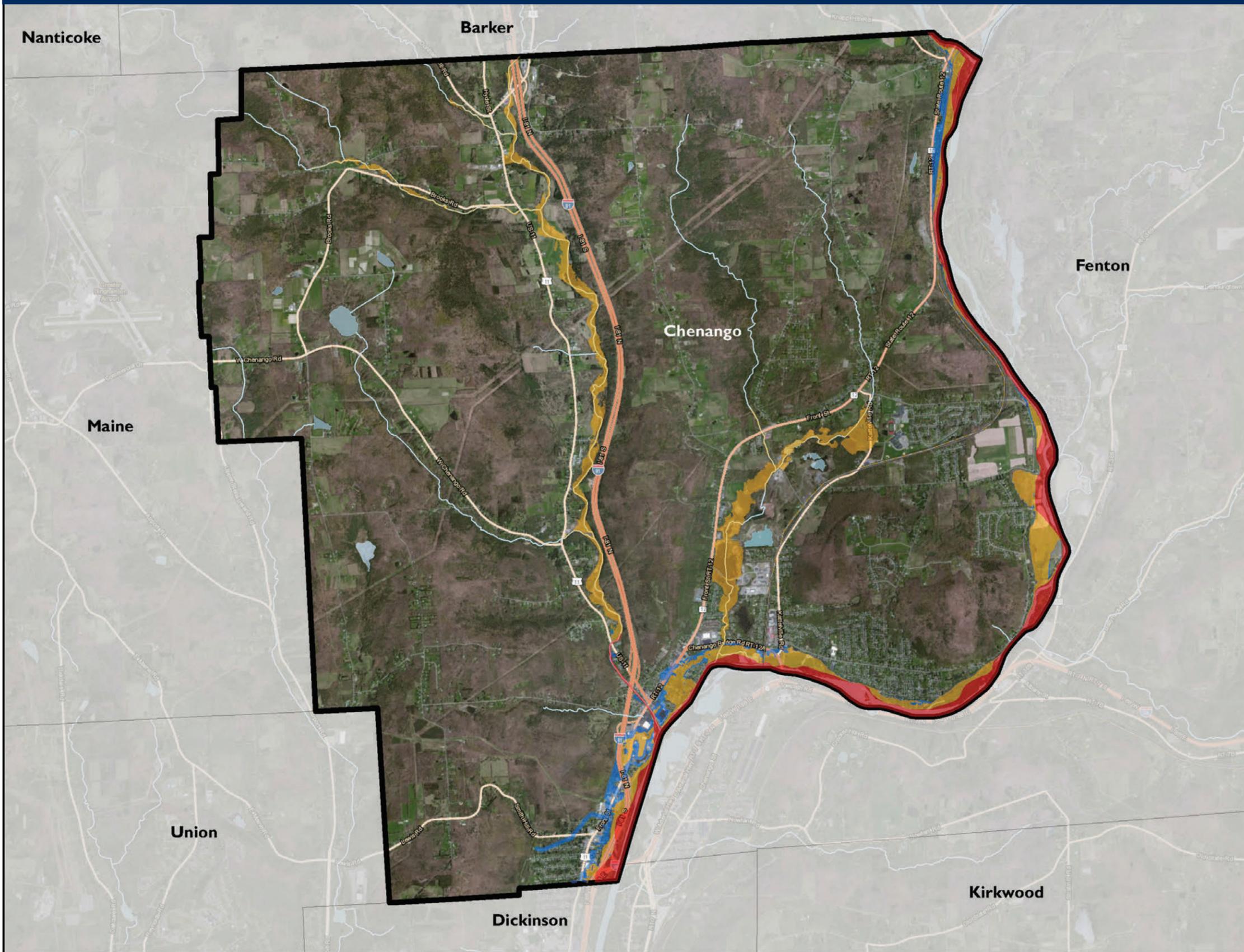
To capitalize on the wealth of local knowledge that could not be captured by examination of existing information and GIS datasets, the Town worked with its Consultant Team and the State to develop a variety of outreach methods. The Town also hosted several Public Engagement Events to obtain public input regarding asset identification.

During these meetings, the public learned about the program and community background, as well as the need for and purpose of identifying community assets as part of the analysis of impacts. The meetings included breakout sessions, which featured aerial photos, similar to those available through the portal, with key geographic features identified. The Consultant Team, supported by members of the Committee and State staff, clarified and defined areas of concern to local residents and businessmen, as well as obtained information regarding impacts of events and the type and location of assets.

DESCRIPTION OF RISK AREAS

After the initial identification and classification of assets, the assets needed a thorough review of geographic scope and hazard history to determine which areas have been and will continue to be affected by flooding to determine the assets’ overall risk level. The Town of Chenango NYRCR Plan based the three categories of risk area for riverine communities on the current Flood Hazard Area (FHA) and the FEMA National Flood Insurance Policy (NFIP) severe repetitive loss (SRL) data.

NYRCR: Town of Chenango, Broome County
FIGURE 2.2 – RISK AREA MAP



Legend

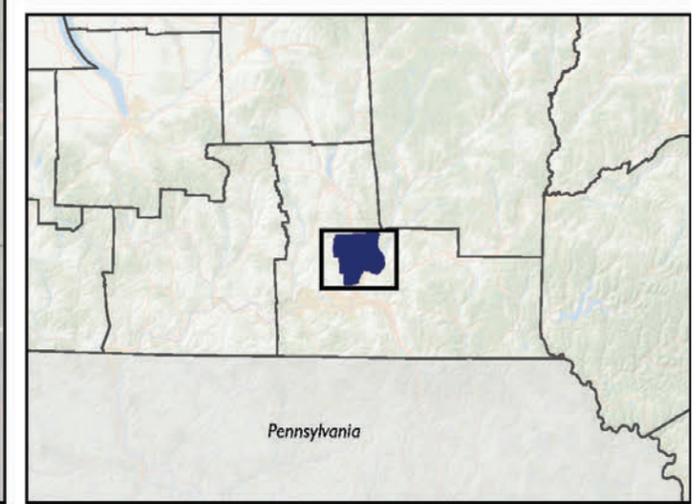
- Town of Chenango Planning Area
- Municipal Boundary

Risk Area

- Extreme
- High
- Moderate



Data Sources:
NYS - Railroads, Water bodies, Boundaries
ESRI - Aerial
FEMA - Risk Area
NYRCR – Risk Area





These risk area categories reflect frequency and likelihood of flood inundation. In descending order of risk magnitude, they range from “Extreme” to “High” to “Moderate.”

Figure 2.2 shows the risk areas in the Town of Chenango NYRCR Planning Area (Planning Area).

Description of Community Assets

The following section describes the Town’s identified assets by Recovery Support Function (RSF) and provides additional information regarding each asset or group of assets. The RSFs used here are adopted from FEMA’s National Disaster Recovery Framework, where they serve as the coordinating structure for key areas of federal emergency assistance, as well as the structural roadmap for this NYRCR Plan.

Figures 2.3 through 2.7 illustrate the assets’ locations by RSF within the Planning Area and the extent of the defined risk area.

ECONOMIC ASSETS

As part of the asset identification process, the Committee identified six economic assets. The Town’s economic assets are presented in Figure 2.3; however,

two of the large businesses are located so close together that they may appear as one asset on the map.

The Town’s commercial corridor serves as a business/employment center for the Town of Chenango. This area asset includes the commercial businesses along Front Street and Chenango Bridge Road. It encompasses properties along Front Street from the southernmost municipal boundary north until it splits with Chenango Bridge Road (Route 12A). The corridor then extends along Chenango Bridge Road until it reaches the New York, Susquehanna, and Western Rail line. This asset includes most of the Town’s businesses and service providers.

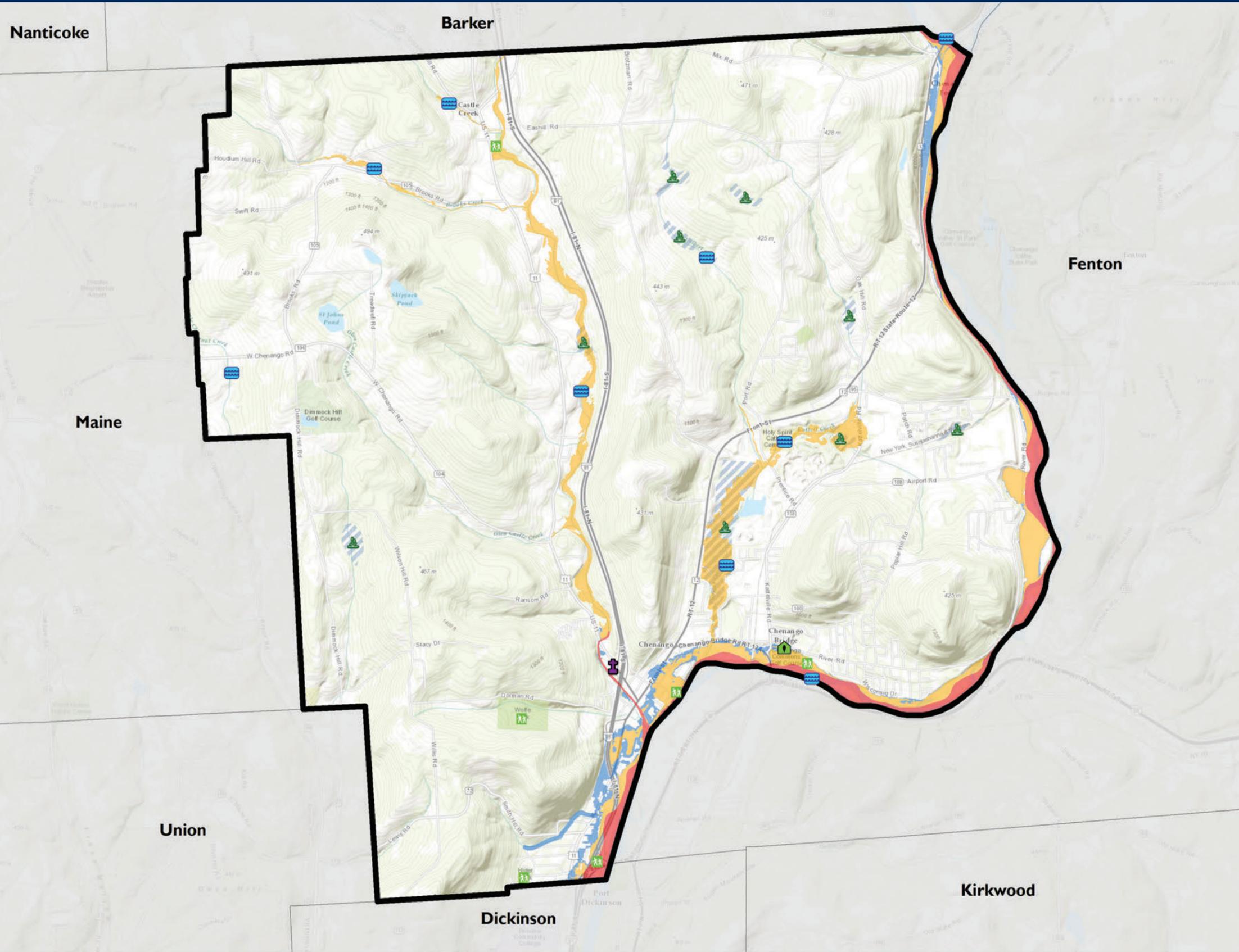
The Town considers Lowe’s, Northgate Plaza, and Chenango Commons as assets with significant commercial employment opportunity.

All three assets reside within or in immediate proximity to the commercial corridor, with Lowe’s and Northgate Plaza on the east side of Front Street and directly within the corridor and with Chenango Commons (McGirk’s) on the eastern side of Chenango Bridge and the northern banks of the Chenango River. Each of these facilities serves as a major employer in the Community.



Shown here is a commercial strip mall along Front Street. Photo is courtesy of Eric Thayer.

NYRCR: Town of Chenango, Broome County
FIGURE 2.3 – ECONOMIC ASSETS



Legend

- Town of Chenango Planning Area
- Municipal Boundary

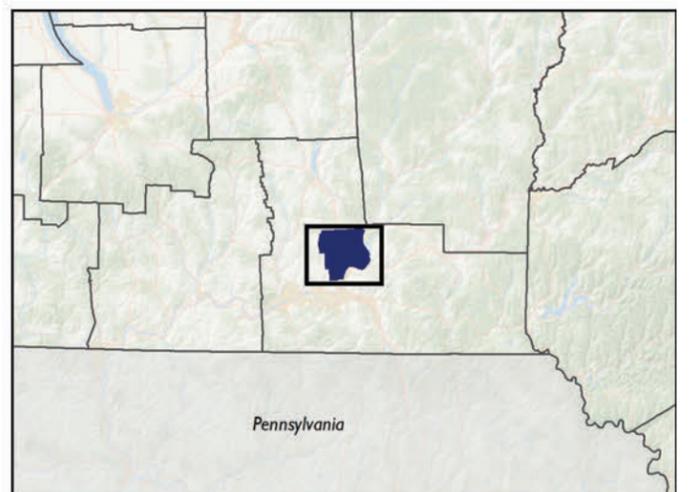
Risk Area

- Extreme
- High
- Moderate

Assets

- Wetlands and Marshes
- Cultural or Religious Establishments
- Parks and Recreation
- Museums, Performing Arts Centers, Stadiums
- Water Bodies
- Wetlands and Marshes

Data Sources:
 NYS - Railroads, Waterbodies, Boundaries
 FEMA - Risk Area
 NYRCR - Assets, Risk Area
 ESRI - Topo





Lowe’s is a single business asset while Northgate Plaza and Chenango Commons contain a concentration of commercial businesses in each location. The Community also identified Northgate Plaza as an asset due to the site’s redevelopment potential. The plaza has suffered occupancy issues over the years, and the community hopes to redevelop the site to bring in a larger commercial employer with improved up-to-date facilities.

HEALTH AND SOCIAL SERVICE ASSETS

This asset category includes items that serve a variety of public functions, from health treatment facilities to general-purpose shelters in public schools or from post offices to town halls.

During a flood event, these facilities typically function as critical disaster response and recovery centers, and proper identification of these assets serves an essential need for successful disaster management and preparedness.

This category also includes many critical assets, including fire protection, police services, hospitals, and emergency operations facilities. Flooding in parts of the Town hindered and even completely prevented access

by some residents to health and social services because of impassable and damaged roads and bridges.

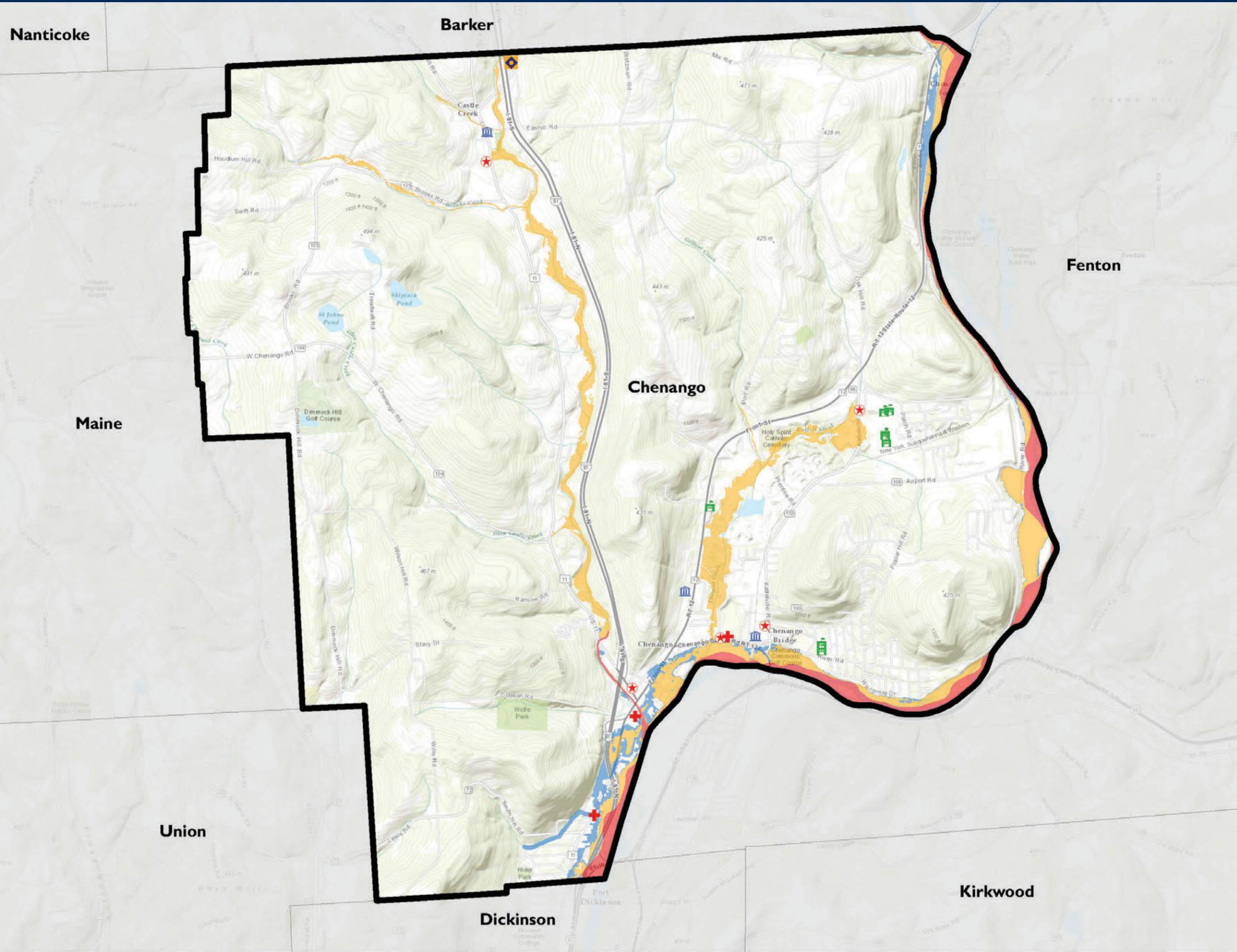
The committee identified 19 facilities, displayed in Figure 2.4. Specific health and social service assets for the Town of Chenango include fire stations and ambulance service facilities. The Town contains four fire stations and one ambulance facility distributed throughout the community. These facilities provide emergency response and fire protection services for the entire Town. The assets have a particularly strong value in regards to storm events as they provide rescue and hazard mitigation services. Some of these facilities also serve as local shelters during disasters.

The Town of Chenango contains five schools providing K-12 education services. These consist of one private school, providing pre-kindergarten (PK) through 12th grade education, and four public schools, consisting of a primary school, elementary school, middle school and a high school. These schools contain a combined student body of approximately 2,000 students. Several of these schools also act as shelters for the community during disaster events.



Shown here is the Chenango Ambulance Service, Inc. Photo is courtesy of Eric Thayer.

NYRCR: Town of Chenango, Broome County
FIGURE 2.4 – HEALTH AND SOCIAL SERVICE ASSETS

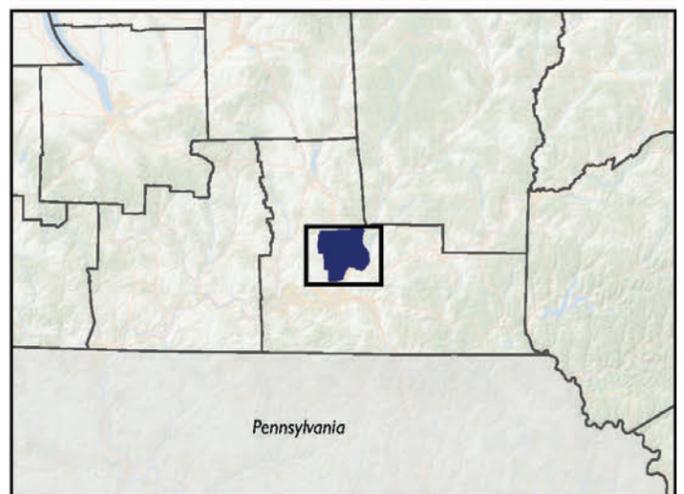


Legend

- Town of Chenango Planning Area
- Municipal Boundary
- Risk Area**
- Extreme
- High
- Moderate
- Assets**
- Schools
- Emergency Operations/Response
- Government and Administrative Services
- Healthcare Facilities
- Public Works Facilities



Data Sources:
 NYS - Railroads, Waterbodies, Boundaries
 FEMA - Risk Area
 NYRCR - Assets, Risk Area
 ESRI - Topo





The Committee, with public input, also designated several healthcare facilities as Community assets. These assets are critical to the Community in that they provide necessary health services. Additional Community assets include two local churches, two post offices, a state public works facility, and the Town Hall.

INFRASTRUCTURE ASSETS

Infrastructure assets encompass resources such as pedestrian, bicycle, and vehicular ways; transit routes; bridges; airports; rail; gas stations; water supply wells; stormwater systems, wastewater treatment plants, and solid waste management facilities; and recycling centers.

Infrastructure assets identified by the Committee include freight rail line, communication towers, water and sewer pump stations, and bridges, among other facilities.



Shown here is the Chenango Bridge. Photo is courtesy of Eric Thayer.

Much of the Town's concerns revolve around flood impacts on public utilities or limited access to the Town's water and wastewater pumps and treatment facilities.

Many of these facilities are either in areas prone to flooding or in areas that can become easily isolated and difficult to reach, rendering service to these facilities during such events extremely difficult. If service interruptions occur during a severe storm, repair crews

cannot always reach the facility and residents may remain without the public service (e.g., water, sewer, electricity) for a greater extent of time.

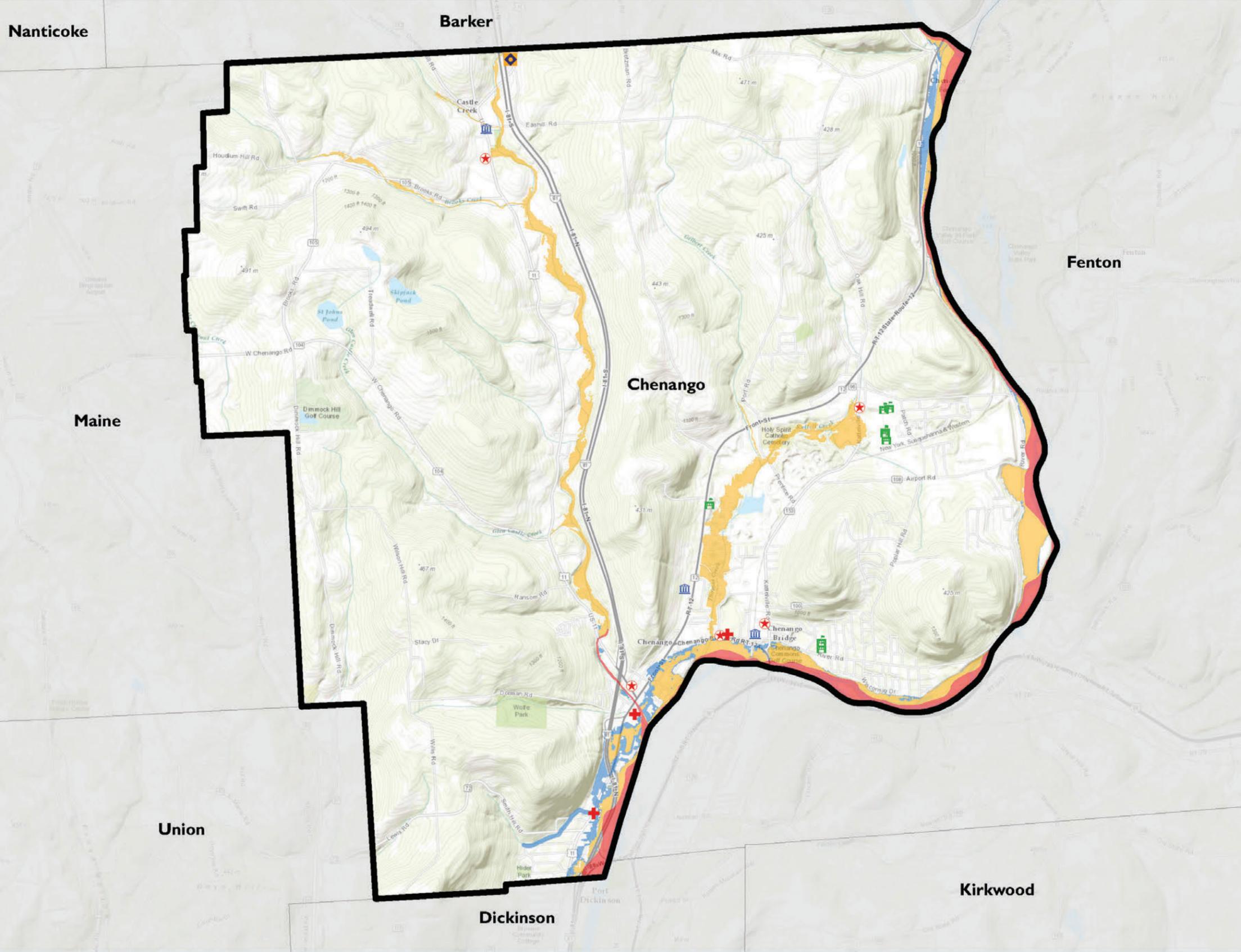
This poses a threat not only to the Town but also to neighboring communities, especially in the case of the Northgate Pump station. This pump station provides water to the Town of Dickinson and the State University of New York (SUNY) Broome College. Thus, the risk of flood damage resulting in the malfunction or inability to access the facility during a storm event would impact these entities as well.

Moreover, infrastructure failures during a major storm event would immediately threaten the Community, particularly if the failures were of key assets, such as the Community's major bridges or the SWMS located along Smith Hill Creek. Smith Hill Creek has a history of flood control failures—it is undersized and improperly designed to manage the amount of water generated during these events. The failure of this historic system contributed to consequential residential flooding in 2011, resulting in costly damages that amounted to hundreds of thousands of dollars to address clean-up and property loss.

The majority of assets with high community value consists of water supply, wastewater/sewer facilities and transportation structures (i.e., bridges), and transportation corridors. Public comment and Committee feedback distinctly demonstrate the desire for secure access to clean municipal water and reduction in the threat posed by failing infrastructure systems (including SWMSs).

The Committee identified a total of 44 facilities in this Infrastructure Assets category, as visualized in Figure 2.5.

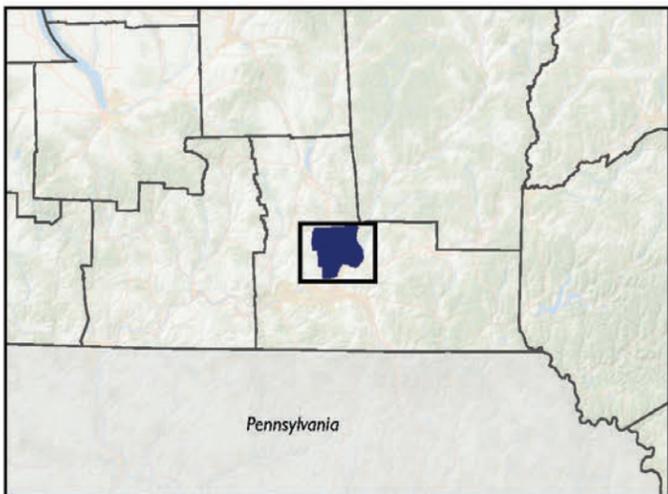
NYRCR: Town of Chenango, Broome County
FIGURE 2.5 – INFRASTRUCTURE ASSETS



Legend

- Town of Chenango Planning Area
- Municipal Boundary
- Risk Area**
- Extreme
- High
- Moderate
- Assets**
- Schools
- Emergency Operations/Response
- Government and Administrative Services
- Healthcare Facilities
- Public Works Facilities

Data Sources:
 NYS - Railroads, Waterbodies, Boundaries
 FEMA - Risk Area
 NYRCR - Assets, Risk Area
 ESRI - Topo





NATURAL AND CULTURAL RESOURCE ASSETS

Natural and cultural resources offer an important component to the Town’s quality of life, presenting scenic, recreational, and environmental benefits as well as protection of other community assets from potential flood impacts. The Committee identified 26 assets in this category, as depicted in Figure 2.6. Many of these assets lie within high-risk areas, because they are water-based features, such as wetlands, creeks, and rivers.

Nine water bodies and their associated floodplains were identified as assets with high community value. The identified water bodies consist of the Chenango River, Tioughnioga River, Potato Creek, Gilbert Creek, Brooks Creek, Kattell Creek, Little Choconut Creek, Castle Creek, and Thomas Creek. These water bodies play conflicting roles in that they can contribute to riverine flooding but their floodplains also provide necessary water storage when the streams overtop their banks.

Several NYS-regulated wetlands, located in the central and eastern regions of Town, were identified as assets. These wetlands play a critically important role as they function as natural sponges that trap and slowly release surface water, rain, snowmelt, groundwater, and flood water.

Six community parks offer the Town’s residents opportunities to enhance their quality of life via a wide range of recreational activities that include baseball, basketball, bicycling, cooking, fishing, football, horseshoes, outdoor concerts, jogging, picnics, playground activities, and soccer.

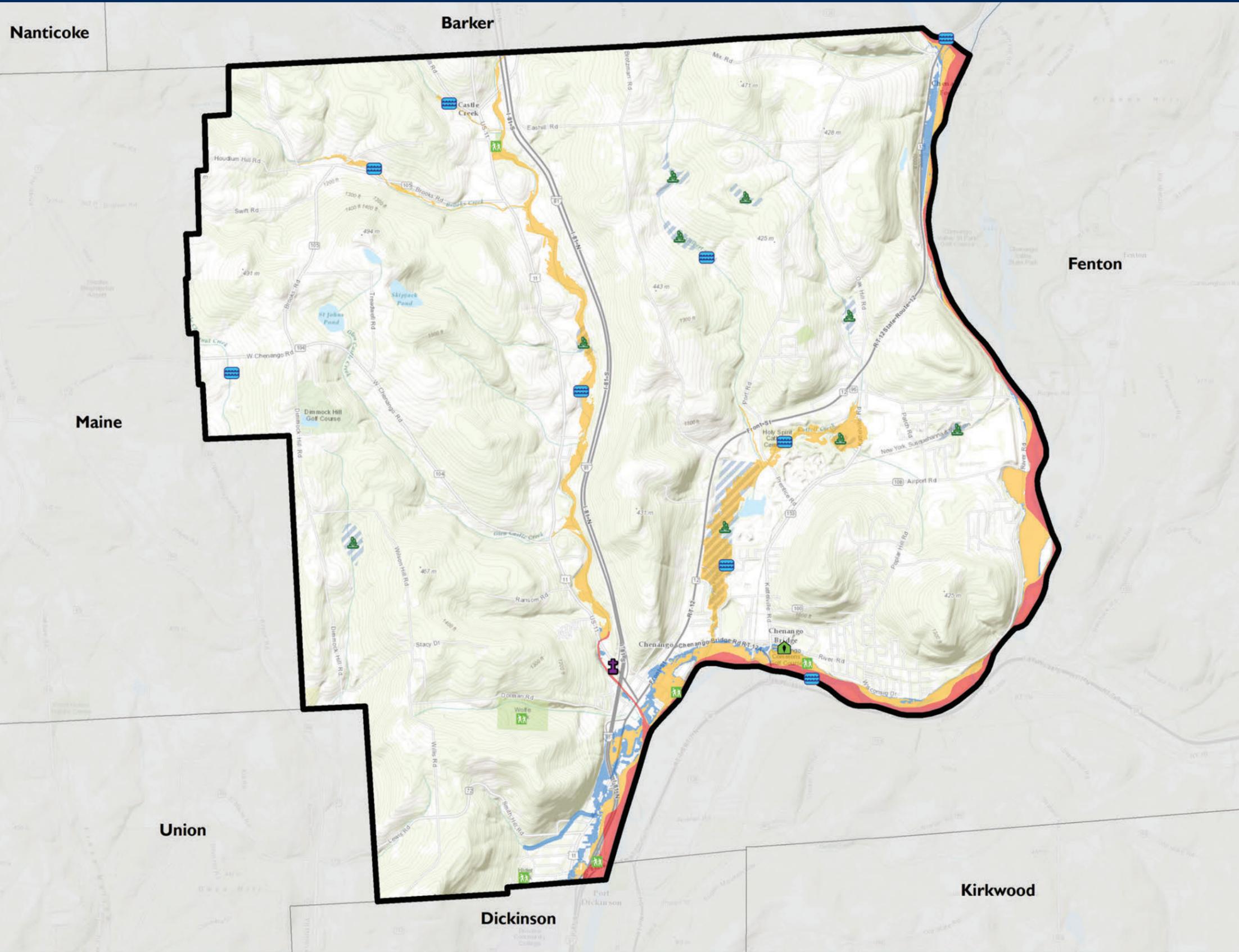
Several of the Town’s parks—particularly Castle Creek park—reside in areas of substantial risk and have undergone significant impacts and damage from historic flood events.



Left: Castle Creek Park baseball field showing impacts from Tropical Storm Lee. Photo courtesy of the Town of Chenango.

Right: Castle Creek Park ball fields, looking towards Castle Creek. Photo courtesy of Tetra Tech, Inc.

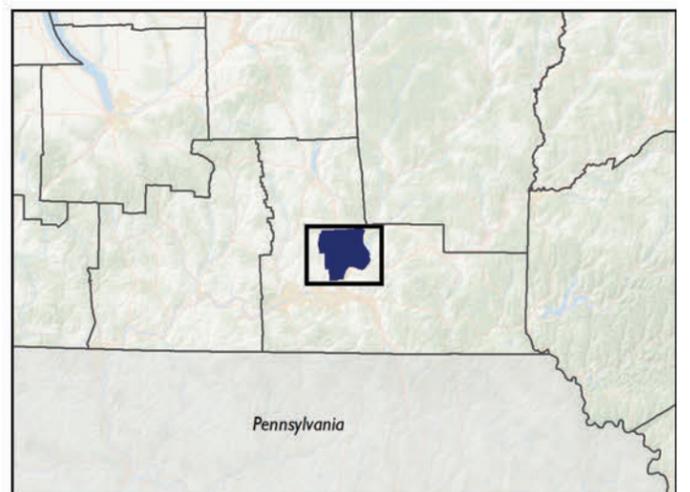
NYRCR: Town of Chenango, Broome County
FIGURE 2.6 – CULTURAL AND NATURAL RESOURCE ASSETS



Legend

- Town of Chenango Planning Area
- Municipal Boundary
- Risk Area**
- Extreme
- High
- Moderate
- Assets**
- Wetlands and Marshes
- Cultural or Religious Establishments
- Parks and Recreation
- Museums, Performing Arts Centers, Stadiums
- Water Bodies
- Wetlands and Marshes

Data Sources:
 NYS - Railroads, Waterbodies, Boundaries
 FEMA - Risk Area
 NYRCR - Assets, Risk Area
 ESRI - Topo





HOUSING ASSETS

The Committee identified two housing assets during the asset identification process. These supportive housing facilities primarily serve persons with functional or access needs.

Both housing facilities are located on higher ground outside of the flood-prone areas. Due to the location of these facilities, they do not suffer impacts from flooding or accessibility issues from those storm events resulting in flooding.

The Town, however, does suffer flood risks to its housing stock from riverine flooding, overtopping of creeks, and the failure of some SWMSs. While specific housing assets were not identified in these risk areas due to a lack of consistent sea level rise (SRL) data, residential neighborhoods suffer significant property damage and incur substantial losses during flood events. By addressing risks to other assets identified in this document, the resulting benefits would also help reduce or eliminate flood risks to these neighborhoods.

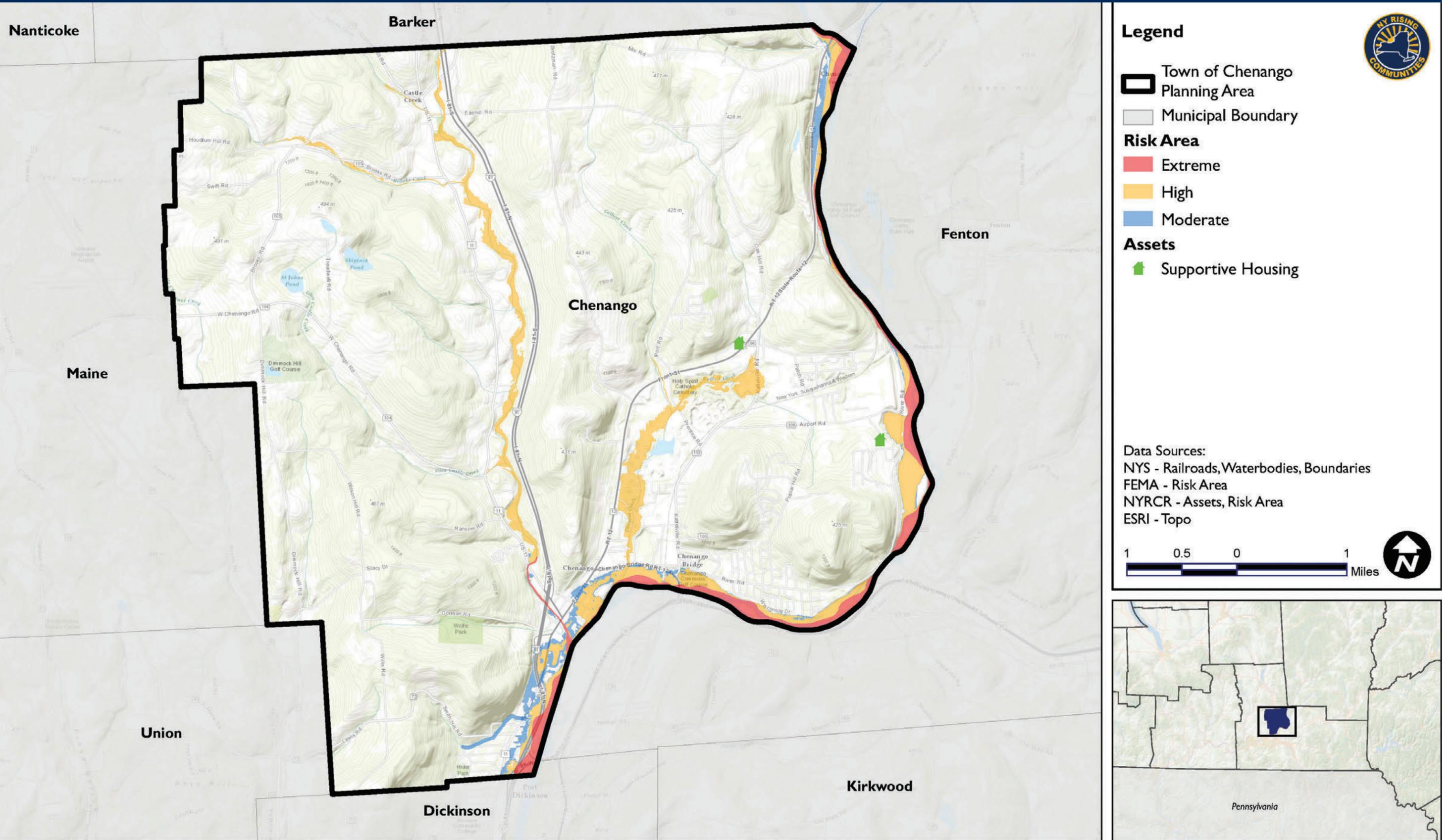
Housing assets are shown in Figure 2.7.



Damaged property items out for waste pick up in the Morningside Heights neighborhood. Photo is courtesy of the Town of Chenango.



Photo of highway along corn fields in fall is courtesy of Eric Thayer.





Assessment of Risk to Assets and Systems

The Town conducted a hydraulic analysis of the Chenango River and creeks in the Planning Area through the use of an existing Hydrologic Engineering Centers –River Analysis System (HEC-RAS) model modified to include current physical characteristics. This analysis provided context for understanding the underlying causes of flooding and sediment transfer in the area. It also evaluated existing flood conditions to identify the effects of specific obstructions within these waterways.

In order to understand the underlying causes of flooding, a hydraulic analysis was completed for the portion of the Chenango River in the Town of Chenango, along with Castle Creek and Thomas Creek, using existing HEC-RAS models that were modified to include current physical characteristics, such as obstructions, road crossings, and other major structures. The existing flood conditions were evaluated to identify the effect of specific obstructions located in the floodplain.

The existing HEC-RAS models for the Chenango River and Thomas Creek were combined to account for backwater effects from the Chenango River into Thomas Creek. A bridge over Route 12A, near the downstream end of Thomas Creek, was also added to the HEC-RAS model.

For Castle Creek and other smaller creeks in the Town of Chenango, high flow velocities cause streambank and highway embankment erosion that results into flooding problems (FEMA, Town of Chenango, 1981).

An existing HEC-RAS model for Castle Creek was available. This model was modified to add existing road crossings on the upstream end and for Brooks Creek, a tributary stream to Castle Creek. Flooding on Castle Creek includes Castle Creek Park, located on the west bank of Castle Creek, just south of the confluence with Potato Creek.

DESCRIPTION OF METHODOLOGY

The NYS DOS provided the Town with a Risk Assessment Tool that determined risk levels for the Town’s assets. The assets and their associated community value were

based on Community and Committee feedback. The Risk Assessment Tool is designed to assess and quantify the risk to individual community assets through built-in formulas that calculate an overall risk score category based on three factors: hazard, exposure, and vulnerability. The tool calculates a score for each of these factors and combines the scores to represent the relative risk of each asset in the community to one another.

The Risk Assessment Tool calculation combines scores for the three factors shown in the formula below. Each factor in this equation is calculated automatically, based on appropriate inputs and are assigned as follows:

$$\begin{array}{l}
 \text{HAZARD} \\
 \times \text{EXPOSURE} \\
 \times \text{VULNERABILITY} \\
 \hline
 = \text{RISK}
 \end{array}$$

- **HAZARD SCORE:** Assigned for each asset based on a 100-year storm event occurring within the next 100 years.
- **EXPOSURE SCORE:** Determined by the risk area where the asset is located and by local landscape attributes that influence the potential for storm impacts. This score reflects how landscape features can moderate damage to individual assets.
- **VULNERABILITY SCORE:** Reflects the level of impairment or consequences that assets may experience from a hazard event, and reflects the ability of the asset to resist damage from the hazard.

Details on the Town of Chenango NYRCR risk assessment appear in Section 5: Additional Materials.



100-year Floodplain

A one hundred-year floodplain (or 1% annual chance floodplain) can be described as a bag of 100 marbles, with 99 clear marbles and one black marble. When someone pulls the black marble from the bag, it represents a 100-year flood event. The marble is then placed back into the bag and shaken up again before another marble is drawn.

It is possible that the black marble can be picked one out of two or three times in a row, demonstrating that a 100-year flood event could occur several times in a row (Interagency Floodplain Management Review Committee, 1994).

INTERPRETATION OF RISK

Risk scores help to identify assets with elevated potential to undergo storm damage. Some factors to consider for each asset in developing a community risk management strategy include:

- Contribution to life safety;
- Whether the asset is a critical facility;
- Value of asset to the community;
- Environmental services provided;
- Economic contribution of the asset;
- Whether alternatives are available; and
- Capacity of the asset to adapt.

The Consultant Team evaluated risks from both a 100 year storm (1% annual chance) and a 500-year event (0.2% annual chance) perspective, which represent higher-intensity storm events. The analysis categorized each calculated risk as severe, high, moderate or residual risk.

Severe Category

If possible, both exposure and vulnerability should be reduced for assets in this category. Relocation of these assets should be considered as a priority option.

High Category

Risk scores in the high category indicate conditions that could lead to significant negative outcomes from a storm.

Actions should be taken to reduce vulnerability, such as elevating or flood-proofing the asset to help avoid a long-term loss of function.

Moderate Category

Risk scores in this category pose moderate-to-serious consequences, but adaptation may be a lower priority based on exposure or because vulnerability remains relatively low. It is recommended that a combination of measures should be considered to reduce exposure or vulnerability.

Floodplain vs. Floodway

*A **floodplain** is defined as the land adjoining the channel of a river, stream, ocean, lake, or other watercourse or water body that becomes inundated with water during a flood. Most often floodplains are referred to as 100-year floodplains. A 100-year floodplain is not the flood that will occur once every 100 years, rather it is the flood that has a 1% chance of being equaled or exceeded each year. Thus, the 100-year flood could occur more than once in a relatively short period of time (Delaware County Hazard Mitigation Plan Update 2013).*

*A **regulatory floodway** means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height. Communities must regulate development in these floodways to ensure that there are no increases in upstream flood elevations (FEMA 2014).*



Residual Category

Risk scores in the residual category occur when both exposure and vulnerability remain relatively low. This situation suggests floods would pose minor or infrequent consequences. Note that risk is never completely eliminated. Some residual risk still remains, even after management measures have been implemented. It is recommended to monitor conditions and adapt, as necessary.

For further information regarding risk scores, refer to Section 5: Additional Materials.

ASSESSMENT RESULTS

The Town has identified assets distributed throughout the Planning Area; however, there is a concentration of assets situated in or within immediate proximity to the more densely developed core or downtown stretch along Front Street (Route 11) and along Chenango Bridge Road (Route 12).

As depicted in the Asset Maps, the majority of the Town has development within or near the floodplain,

with several commercial and residential neighborhoods actually in the floodway. Figure 2.8 provides a visual indication of the Town’s Risk Areas. In this figure, the legend defines asset risk level as irregular polygons since assets are not consistent in shape on the map. Point assets are indicated by dots, while area assets, such as the Front St. Commercial Corridor, are indicated by irregular shapes.

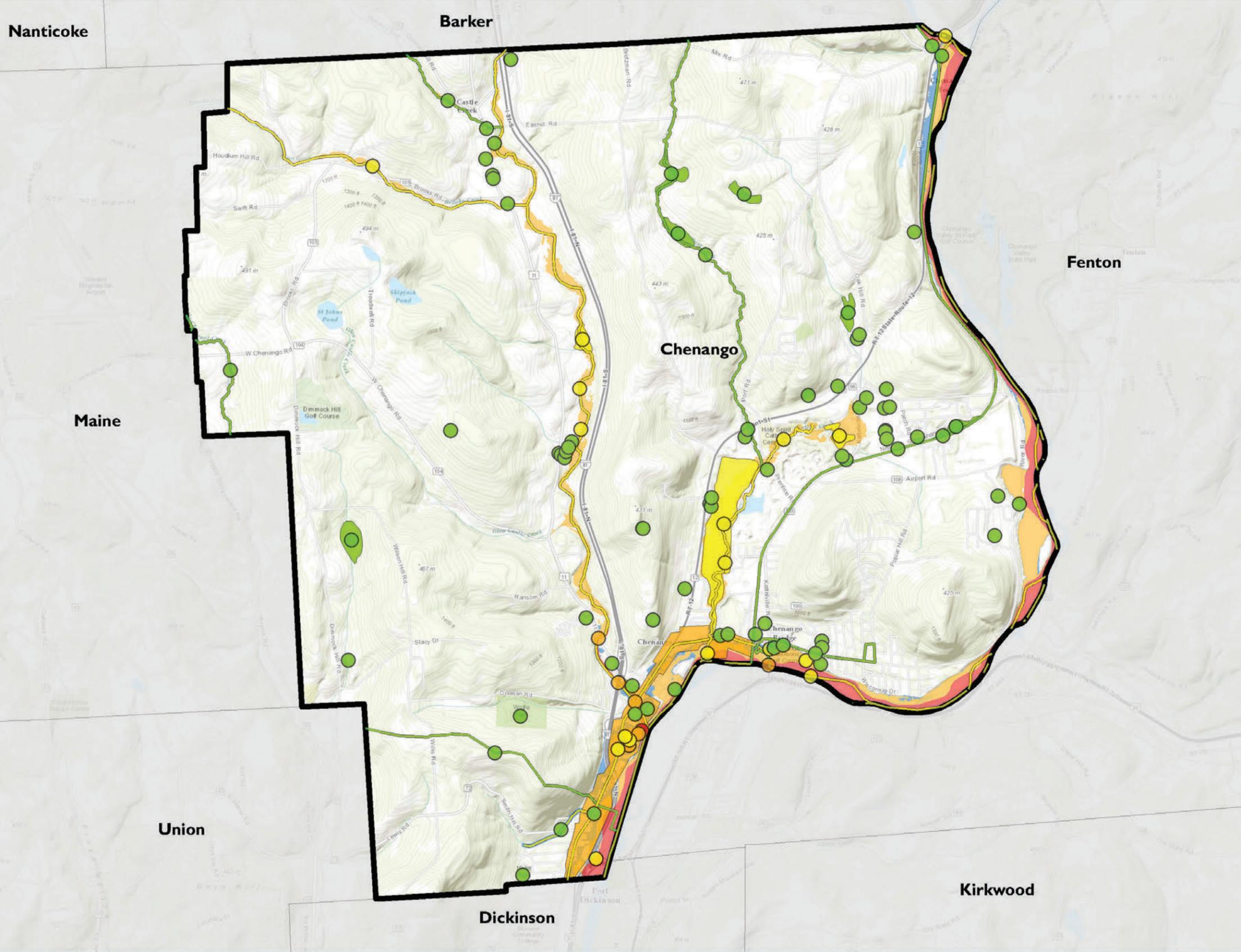
The Chenango River acts as the primary contributing factor to flooding in the Town of Chenango. However, the sheet flow and drainage from surrounding hills, which inundates creeks and local stormwater systems often poses as great or greater of a threat to the Community.

Because much of this flooding occurs in areas without defined or recognized formal waterways, flood or risk areas can go unrecognized for long periods of time. To address this issue, the consultant’s engineers undertook field research to acquire data that would support analyses and risk assessments of these sites.



Pictured here is a high-water level at the Chenango Bridge. Photo is courtesy of the Town of Chenango.

NYRCR: Town of Chenango, Broome County
FIGURE 2.8 – RISK SCORE MAP

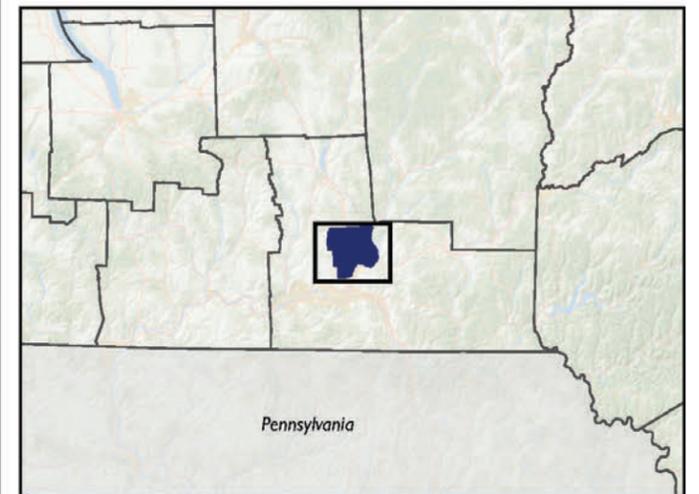


Legend

- Town of Chenango Planning Area
- Municipal Boundary
- Risk Score**
- Severe
- High
- Moderate
- Residual
- Risk Area**
- Extreme
- High
- Moderate

Note:
 Assets are represented as points, polygons and lines.

Data Sources:
 NYS - Railroads, Waterbodies, Boundaries
 FEMA - Risk Area
 NYRCR - Assets, Risk Area
 ESRI - Topo





As indicated in Figure 2.8, the “downtown” or commercial corridor of Front Street and Chenango Bridge Road contain a number of assets with severe and high risk scores during a 100-year event.

These assets include Northgate WWTP (severe), the Commercial Corridor (high), Kattell Creek (high). Route 11 Bridge over Castle Creek (high), Interstate 81 Bridge over Castle Creek (high), and Route 12 Bridge over Castle Creek (high).

ECONOMIC

As depicted in Table 2.2, the commercial corridor yielded a high 100- and 500-year risk score. The Northgate Plaza and Chenango Commons (McGirk’s) yielded moderate risk scores.

Assets such as Chenango Commons maintain an elevation almost equal to that of the Chenango River. While McGirk’s may only have a moderate flood risk score, approximately four feet of water inundated the area during Tropical Storm Lee. This damage necessitated the closure of the facility for roughly six months while repairs and improvements were made.

Another significant concern focuses on the commercial strip and concentration of businesses near the confluence of Castle Creek and the Chenango River. Despite a slightly higher elevation, this location poses additional risk to nearby assets from both flooded waterways and the substantial threat of Castle Creek

“backing up” due to massive debris deposition at the mouth of the creek.

This area also has flooding risks associated with the existing stormwater management system, which collects water from Front Street and Northgate Plaza, funnels it through an underground piping system under the plaza, and carries it directly into the Chenango River. When the river rises, floodwaters push back into the drainage system, which lacks functioning flap gates, resulting in overflow pushing out through drainage grates at street level.

This moderate rating indicates that while substantial changes or relocation may not be necessary, preventative and protective measures should occur to reduce exposure or vulnerability. This might include construction of barriers to prevent significant inundation of facilities by flood water.

The Town actively seeks to increase development and to redevelop portions of its commercial corridor.

This includes extending the commercial corridor north along Front Street and redeveloping underutilized lots and strip malls in the downtown. The Town has focused on attracting large commercial developers and employers into the area to redevelop the commercial strip between Front Street and the Chenango River. The Town understands current and future needs to secure local employment, as well to maintain accessibility to local services and goods.

TABLE 2.2 – ECONOMIC ASSETS

Asset/Asset Type	Asset Subcategory	100-Year Risk Score	500-Year Risk Score
Commercial Corridor	Downtown Center	High	High
Chenango Commons	Employment Hub	Moderate	Moderate
Northgate Plaza	Employment Hub	Moderate	Moderate
Lowe’s	Large Business	Residual	Residual
Rose Pit	Industrial, Warehousing and Manufacturing	Residual	Residual
Route 12 Mine	Industrial, Warehousing and Manufacturing	Residual	Residual

Source: NYS DOS, NYRCR

HEALTH AND SOCIAL SERVICE ASSETS

The Town has no Health and Social Service assets in an area of significant 100- or 500-Year flood risk; however, the Chenango Ambulance Service, Inc.; Our Lady of Lourdes Primary Care facility; United Health Service Urgent Care; and United Health Service Primary Care are all in close proximity to such areas. The United Health Service Primary Care facility, at the confluence of Castle Creek and the Chenango River, has had standing floodwaters at the rear of the property. Our Lady of Lourdes Primary Care faces a similar situation, as moderate flood zones completely surround the facility. In fact, the facility becomes completely inaccessible when floodwaters prohibit use of Front Street along this section of the commercial corridor.

The Chenango Ambulance Service, Inc., and United Health Service Urgent Care facilities lie within approximately 400 feet of one another, and they are separated from the identified flood zones by only the 25 to 30 feet that makes up Chenango Bridge Road (Route 12A). Because Front Street and Chenango Bridge Road become impassable due to floodwaters during storm events, the Town’s most significant concern regarding these assets is their potential inaccessibility during flood events.

Healthcare and safety assets cannot perform their critical functions and services if staff and residents in need of aid cannot reach the facilities.

Table 2.3 itemizes risk scores for the Town’s Health and Social Service assets.

TABLE 2.3 – HEALTH AND SOCIAL SERVICE ASSETS

Asset/Asset Type	Asset Subcategory	100-Year Risk Score	500-Year Risk Score
Castle Creek Post Office	Government and Administrative Services	Residual	Residual
Central Baptist Christian Academy	Schools	Residual	Residual
Chenango Ambulance Service, Inc.	Emergency Operations/Response	Residual	Residual
Chenango Bridge Elementary School	Emergency Operations/Response and School	Residual	Residual
Chenango Bridge Fire Station 1	Emergency Operations/Response	Residual	Residual
Chenango Bridge Fire Station 2	Emergency Operations/Response	Residual	Residual
Chenango Fire Station 1	Emergency Operations/Response	Residual	Residual
Chenango Bridge Methodist Church	Emergency Operations/Response	Residual	Residual
Chenango Bridge Post Office	Government and Administrative Services	Residual	Residual
Chenango Fire Station 2	Emergency Operations/Response	Residual	Residual
Chenango Forks High School	Emergency Operations/Response and School	Residual	Residual
Chenango Forks Middle School	Emergency Operations/Response and School	Residual	Residual
John R. Harshaw Primary School	Emergency Operations/Response and School	Residual	Residual
NYS DOT Facility	Public Works Facility	Residual	Residual
Our Lady of Lourdes Primary Care	Healthcare Facilities	Residual	Residual
Town of Chenango Town Hall	Government and Administrative Services	Residual	Residual
United Health Service Urgent Care	Healthcare Facilities	Residual	Residual
United Health Service Primary Care	Healthcare Facilities	Residual	Residual
Valley Christian Reformed Church	Emergency Operations/Response	Residual	Residual

Source: NYS DOS, NYRCR



INFRASTRUCTURE ASSETS

Based on information provided by the Community and Committee, the Northgate WWTP holds a severe risk from flooding during a 100-year flooding event. Other infrastructure assets ranked at moderate or residual risk.

Notably, several pump stations, including the Northgate pump station, remained inaccessible and submerged under more than four feet of water during Tropical Storm Lee. This poses great concern both to the Town and its neighbor to the south, the Town of Dickinson, which relies on water provided by the Northgate pump station.

In addition to water and wastewater facilities, the risk analysis identified key Community bridges as ranking at

a moderate risk. Major regional and local transportation routes, including Interstate 81, Route 11, Route 12, and Route 12A, run across the Town’s creeks and the Chenango River at several places.

Flood damage caused by erosion, severe debris deposition, or debris impacting or clogging choke points along the waterways creates noteworthy threats to these assets. This would not only disrupt local accessibility and continuity of transportation, but in the case of Interstate 81, it could affect a major transportation corridor in the northeast.

Table 2.4 lists risk scores for the Town’s Infrastructure assets.



Photo of electric station nearly cover by flood waters is courtesy of the Town of Chenango.



Photo of pumps courtesy of the Town of Chenango.

TABLE 2.4 – INFRASTRUCTURE SYSTEMS RISK SCORES

Asset/Asset Type	Asset Subcategory	100-Year Risk Score	500-Year Risk Score
Northgate WWTP	Wastewater	Severe	Severe
Chenango Bridge Road – Bridge	Transportation	High	Moderate
I-81 Bridge over Castle Creek	Transportation	High	Moderate
Route 11 Bridge over Castle Creek	Transportation	High	Moderate
Route 12 Bridge over Castle Creek	Transportation	High	Moderate
Front Street Bus Route	Transportation	Moderate	Residual
McGirk’s Pump Station	Wastewater	Moderate	Moderate
New York, Susquehanna, and Western Railway	Transportation – Railroad	Moderate	Residual
Northgate Well	Water Supply	Moderate	Moderate
Northgate Well pump house	Water Supply	Moderate	Moderate
Pennview Well	Water Supply	Moderate	Moderate
Route 12A Well	Water Supply	Moderate	Moderate
Wallace Road Stormwater Management System	Stormwater Management	Moderate	Residual
Applewood Well	Water Supply	Residual	Residual
Building #1 Well (Glenview Apts.)	Water Supply	Residual	Residual
Building #2 Well	Water Supply	Residual	Residual
Building #2 Well 2A	Water Supply	Residual	Residual
Building #3 Well	Water Supply	Residual	Residual
Building #4 Well	Water Supply	Residual	Residual
Building #5 Well	Water Supply	Residual	Residual
Chenango Heights Well	Water Supply	Residual	Residual
Chenango Heights WWTP	Wastewater	Residual	Residual
Chenango Northgate WWTP	Wastewater	Residual	Residual
Chenango Street Bus Route	Transportation	Residual	Residual
Communications Tower #1	Telecommunications	Residual	Residual
Communications Tower #2	Telecommunications	Residual	Residual
Communications Tower #3	Telecommunications	Residual	Residual
Church Well	Water Supply	Residual	Residual
Dimmock Hill Pump	Water Supply	Residual	Residual
Fendick’s Camp	Wastewater	Residual	Residual
Gas Pipeline	Liquid Fuels – Pipeline	Residual	Residual
Lower Lots Well	Water Supply	Residual	Residual
Maplewood Well	Water Supply	Residual	Residual
Route 11 Bridge over Brooks Creek	Transportation	Residual	Residual
Runacre Well	Water Supply	Residual	Residual
School Well	Water Supply	Residual	Residual
Town of Chenango Sewer Dist. #10	Wastewater	Residual	Residual



TABLE 2.4 – INFRASTRUCTURE SYSTEMS RISK SCORES (CONT'D)

Asset/Asset Type	Asset Subcategory	100-Year Risk Score	500-Year Risk Score
Upper Lots Well	Water Supply	Residual	Residual
Well #1 (Farrell Dr.)	Water Supply	Residual	Residual
Well #1 (LMHP #1)	Water Supply	Residual	Residual
Well #1 (LMHP #2)	Water Supply	Residual	Residual
Well #1 (Marian Terr.)	Water Supply	Residual	Residual
Well #2	Water Supply	Residual	Residual
Well #3	Water Supply	Residual	Residual
Well #3	Water Supply	Residual	Residual

Source: NYRCR, NYS DOS

According to the Town of Chenango NYRCR guidance and methodology, Northgate WWTP has a significant need for mitigation measures, including possible relocation of the facility.

The threat of inundation at this site and potential secondary hazards of wastewater treatment disruption, and release of wastewater into the floodwaters, can pose a serious threat to the Community.

The inundation of Smith Hill Creek and its associated SWMS offers another considerable risk to the Community. In addition to complete system failure during Tropical Storm Lee, the SWMS has also suffered failures on several occasions since then, including a “blow-out” at the end of the system during a storm event in August 2014.

The flood damage resulting from the Smith Hill Creek SWMS system failure during Tropical Storm Lee cost residents approximately \$1 million in personal recovery costs and property losses.

The massive impacts and common issues associated with this system failure require consideration of a comprehensive analysis of the Smith Hill Creek and its SWMS, despite its relatively low risk assessment rating. This comprehensive analysis may include consideration of a complete system rebuild and upgrades to increase capacity handling, to manage drainage velocities, and

to provide debris control through incorporation of retention areas and “green” infrastructure, in addition to other best management practices (BMP).

NATURAL AND CULTURAL RESOURCE ASSETS

Only one community asset, Kattell Creek, was identified with high 100- and 500-Year risk scores. As Tropical Storm Lee’s effects indicate, however, the Chenango River, Castle Creek, and those assets immediately adjacent to these waterways still have a significant flood risk. These waterways have experienced substantial bank erosion during heavy storm events due to their high flow velocities. As a result, Castle Creek and several other waterways expand onto and into private and public properties, increasing the flood threat at these locations. Erosion along these creeks and the Chenango River also currently threatens other assets, such as McGirk’s/Chenango Commons Golf Course.

Moreover, heavy flows have resulted in substantial debris deposition that has raised the creek beds significantly; this reduced clearance allows floodwaters to more easily push over the banks of these waterways. If the Community does not undertake maintenance and preventative measures to address these flood-contributing factors, the overtopping of the banks with shallower waterways will become more probable with each successive storm.

Erosion and flooding along these waterways have resulted in impacts on several community parks, including Castle Creek and Broad Acres Parks.

Floodwaters have caused direct damage to facilities and equipment, have swept away fencing and equipment, and have left large amounts of heavy stone and gravel across play areas and ball fields.

Table 2.5 itemizes risk scores for the Town’s Natural and Cultural Resources assets.

TABLE 2.5 – NATURAL AND CULTURAL RESOURCES RISK SCORES			
Asset/Asset Type	Asset Subcategory	100-Year Risk Score	500-Year Risk Score
Kattell Creek	Water Bodies	High	High
Brooks Creek	Water Bodies	Moderate	Moderate
Castle Creek	Water Bodies	Moderate	Moderate
Chenango River	Water Bodies	Moderate	Moderate
NYS DEC Castle Creek Wetlands	Wetlands and Marshes	Moderate	Moderate
NYS DEC Kattell Creek Wetlands	Wetlands and Marshes	Moderate	Moderate
NYS DEC Thomas Creek Wetlands	Wetlands and Marshes	Moderate	Moderate
Otsiningo Park	Parks and Recreation	Moderate	Moderate
Thomas Creek	Water Bodies	Moderate	Moderate
Tioughnioga River	Water Bodies	Moderate	Moderate
Broad Acres Park	Parks and Recreation	Residual	Residual
Castle Creek Park	Parks and Recreation	Residual	Residual
Chenango Bridge Park	Parks and Recreation	Residual	Residual
Chenango Ice Rink	Museums, Performing Arts Centers, Stadiums	Residual	Residual
Gilbert Creek	Water Bodies	Residual	Residual
Hidehr Park	Parks and Recreation	Residual	Residual
Jason Drive Wetlands	Wetlands and Marshes	Residual	Residual
Little Choconut Creek	Water Bodies	Residual	Residual
NYS DEC Gilbert Creek Wetlands	Wetlands and Marshes	Residual	Residual
NYS DEC North of Gilbert Creek Wetlands	Wetlands and Marshes	Residual	Residual
NYS DEC Port Rd. and East Hill Rd. Wetlands	Wetlands and Marshes	Residual	Residual
NYS DEC Wetland, Isolated	Wetlands and Marshes	Residual	Residual
NYS DEC Wetlands	Wetlands and Marshes	Residual	Residual
Potato Creek	Water Bodies	Residual	Residual
Saint Christopher’s Church	Cultural and Religious Establishments	Residual	Residual
Wolfe Park	Parks and Recreation	Residual	Residual

Source: NYS DOS, NYRCR



Local wetlands help manage flood events by creating areas of water retention and flow reduction and by serving as sites for debris collection. Monitoring conditions at these sites and developing plans to ensure their long-term functionality may help to identify actions that can secure or even improve their ability to assist in flood control. Evaluating the existing waterways and exploring options to increase wetlands, marshes, and retention areas along these systems could greatly benefit the natural environment, add to local outdoor amenities, and provide additional flood storage.

Options to increase wetlands or retention basins include the possible redevelopment/conversion of certain properties. Ideal areas for such conversion include local parks that (1) are proximate to flood-prone areas and (2) experience repeated impacts. The Town could replace these converted parks because it has an abundance of land which is both easily accessible and located away from flood threats.

Besides reducing the possibility of flooding in these parks, changing the locations for designated parks could also lead to secondary benefits. Residents may actually increase their use of Town parks if the Town selects sites with increased accessibility. Conversion of park sites also eliminates repetitive maintenance and repair costs associated with flood events at these sites. Additionally, this mitigation action contributes to downstream protection as these sites become flood control/storage assets for the community.

Providing additional flood storage in the floodplain would likely alter surface water elevations during flood events. Several parks are within the floodway, and if redeveloped, would provide significant additional flood storage.

To maintain a viable attractive community, the Town must preserve and ensure the safety of residences within the Community.

Large-scale flooding leading to extensive costs to residents must be addressed to ensure long-term functionality, appeal, and resiliency of the Town.

HOUSING ASSETS

Neither of the identified housing assets contained any significant flood risk. The Committee utilized a holistic approach, however, when investigating potential mitigation solutions. Addressing issues such as the substandard SWMS along Smith Hill Creek and the resultant flooding would reduce impacts on nearby residential neighborhoods.

Flooding from Tropical Storm Lee damaged approximately 80 homes in the Wallace Road/ Morningside Drive neighborhood. While individual housing assets were not identified in this neighborhood, the Community should not ignore larger-scale, long-term impacts on residential neighborhoods. Continued damages could result in abandonment of neighborhoods, reduced tax base, and urban blight as vacant properties are left unmaintained.

Table 2.6 lists the risk scores for the Town’s Housing assets.

TABLE 2.6 – HOUSING ASSETS RISK SCORES

Asset/Asset Type	Asset Subcategory	100-Year Risk Score	500-Year Risk Score
Broome Group Home 11698	Supportive Housing	Residual	Residual
Group Home 11929	Supportive Housing	Residual	Residual

Source: NYS DOS, NYRCR



Assessment of Needs and Opportunities

The needs and opportunities presented in this Town of Chenango NYRCR Plan arose as a result of the Community planning process and provide a basis for proposed strategies, projects, programs, and policies. The Committee developed these needs and opportunities through analyses of damages caused by Tropical Storm Lee, ongoing risks to assets, lost economic opportunities attributed to damages, insufficient local capital for rebuilding and economic expansion, and by recognition of needs already existing when the storm hit.

An integral aspect of the needs and opportunities process involved the identification of strategies and preliminary project ideas. The Committee then sorted relevant and quality needs and opportunities by RSF, according to each of the six RSFs that serve as the structural roadmap for this NYRCR Plan. The opportunities do not necessarily address each need on an item-by-item basis, because several strategies may be necessary to address a need in entirety.

Community Planning and Capacity Building

The Town of Chenango's commercial corridor lies in the most flood-prone area of the community. Due to this factor, the Town may want to consider long-term planning and preparation for ongoing flood issues in the region. Such measures would include evaluating existing zoning, codes, regulations, and ordinances to ensure protection of SWMSs to the greatest extent possible and establishing safeguards to preclude significant risk to properties from future flooding. The Town may also consider more substantial long-term alternatives, such as refocusing or shifting development from flood-prone areas.

RECOVERY SUPPORT FUNCTION: Community Planning and Capacity Building

This RSF relates to the Community's ability to implement storm recovery activities and to plan how to mitigate effects of future storms. The RSF addresses an overall limited capacity of the Town to support and permit appropriate reconstruction and redevelopment that would produce flood-resilient infrastructure based on up-to-date risk information, flood-proofing best practices, and long-term goals and visions.

COMMUNITY PLANNING AND CAPACITY BUILDING NEEDS AND OPPORTUNITIES

Need: Provide local property owners with information and education on how they can contribute to proper stormwater management and on how they can assist in ensuring the efficiency and long-term viability and resiliency of those systems.

Need: Ensure that zoning properly addresses long-term flood issues and promotes community resiliency.

Need: Ensure that local codes adequately protect SWMSs and natural stormwater retention systems, including swales, basins, wetlands, and marshes.

Need: Ensure local codes and ordinances are consistent with long-term economic development goals and with efforts at flood mitigation and resiliency.

Opportunity: Review options and facilities available to address short-term sheltering needs.

Opportunity: Evaluate local codes/ordinances, and make any changes necessary to help reduce risks to SWMSs from local property owner and residential activities.

Opportunity: Evaluate zoning, codes, and ordinances to ensure that these consider and address flood impacts and resiliency; then modify and amend as needed. Consider options, such as rezoning to include Riverine-C (commercial) or Riverine-R (residential) in flood-prone areas.

Opportunity: Analyze and consider options to promote development and to relocate high-density commercial development farther north along Route 11, in areas less prone to flooding.



Economic Development

Business growth has stagnated in the Town of Chenango for several years, evoking a major concern from Community residents. Much of the Town is rural, and those areas of dense development in the commercial corridor include many vacant storefronts. A few minor additions and changes to the business landscape have occurred, but much has remained the same.

This stagnancy, combined with a continually declining population, has forced the Community to reevaluate its business environment. The Town has been trying to attract additional, larger-scale commercial development to its downtown for several years.

With consideration to long-term growth and business resiliency, the Town may want to consider thoroughly evaluating plans to expand and attract businesses to the community.

In addition to marketing to commercial businesses, the Town must ensure that all development and redevelopment meets the long-term goals and strategies related to flood hazard mitigation and potential land-use reorganization.

Preservation and expansion of business would not only ensure that the Planning Area maintains the goods and services it needs, but also provides local jobs and general amenities. These benefits play a necessary role in rendering the Community attractive and appealing to current and future residents.

Tropical Storm Lee flooding had a direct negative effect on the local economy in its ability to cause business and service interruptions both during and after the storm event. While larger or corporate businesses may have procedures in place for responding to such a situation, many smaller local businesses did not.

These businesses did not know what actions to take during the flooding to preserve necessary records and to prepare for post-flooding recovery.

After the event, many local businesses did not know who to call or where to begin the recovery effort.

The Town could provide training, outreach, and materials to assist and protect local businesses. These materials would explain how to prepare and maintain records that can survive a storm event, and they would describe what to do in the hours and days immediately after a storm event.

RECOVERY SUPPORT FUNCTION: Economic Development

The primary economic concern after a disaster is returning economic and business activities to a state of health. Recovery periods present unique opportunities for developing new economic strengths that result in a more sustainable and economically robust community. Communities that strategically design an economic development strategy and support these elements in their planning processes are more likely to capitalize on opportunities for economic improvement, such as those available via recovery programs like the NYRCR program.

ECONOMIC NEEDS AND OPPORTUNITIES

Need: Prevent continuity issues for local businesses that are impacted from significant storm events.

Need: Reduce impacts to commercial corridor from riverine flooding.

Need: Promote business development and redevelopment within the commercial corridor.

Need: Improve the economic viability of the Community and expand the Town's economic base.

Need: Increase occupancy and rebrand Northgate Plaza.

Opportunity: Provide outreach and/or training to local businesses to address issues regarding disaster recovery and business continuity.

Opportunity: Develop a downtown redevelopment plan.

Opportunity: Review local zoning and ordinances to ensure that these conform to and promote economic development goals.



ECONOMIC NEEDS AND OPPORTUNITIES (CONT'D)

Opportunity: Provide business support and training to small local businesses.

Opportunity: Extend commercial development north along Front Street to expand economic opportunities.

Opportunity: Redesign/reorient the layout of the commercial corridor to locate buildings farther from the river and closer to Front Street; place parking and open space closer to the river.

Opportunity: Provide outreach, information, and training in support of local businesses.

Opportunity: Review options for extending commercial development north along Front Street to promote economic development along this corridor.

Opportunity: Consider incentives to promote business development and job growth in the Community.

RECOVERY SUPPORT FUNCTION: Health and Social Services

After a disaster, one of the more immediate considerations is to determine whether public health, healthcare facilities, and essential social service needs have been restored.

To develop appropriate strategies and management measures, the Committee reviewed existing Town assets that support vulnerable populations and identified key needs critical to protecting the health and wellbeing of all residents in a post-disaster environment. Transportation infrastructure failures and access interruption create the main hindrances to the provision of basic care at a level appropriate during and following floods.

Health and Social Services

Flooding in the Town severely limits access to many health and social services. These assets primarily lie along the Town's major transportation routes, including Route 11, Route 12, and Route 12A. Unfortunately, all of these roads contain a substantial risk of flooding during significant storm events.

The Town can address this issue by either (1) evaluating assets and consciously shifting and relocating assets to areas not prone to these dangers, or (2) undertaking steps to address these flood issues to prevent recurrences in the future.

Given the nature and magnitude of riverine flooding, management of floodwaters alone may not constitute a comprehensive solution.

HEALTH AND SOCIAL SERVICE NEEDS AND OPPORTUNITIES

Need: Ensure adequate access to schools, medical facilities, and other services after flood event.

Need: Ensure short-term sheltering is available in the Community.

Opportunity: Evaluate roads and travel routes to these facilities, and identify potential flood mitigation measures or transportation options to ensure local access to such facilities.

Opportunity: Explore options/opportunities for short-term sheltering.



Housing

The Town offers its residents good, affordable housing stock that maintains high occupancy. Over the course of Public Engagement Events and outreach activities, the Committee and the public did not identify any substantial needs regarding identified housing assets.

Despite a lack of identified needs specific to housing assets, the Committee has maintained a clear and continuous focus on increasing safety and reducing the threat of flooding to homes and residents of the Town.

Areas such as Broad Acres and the Wallace Road/Morningside Drive neighborhoods in the Town experience repeated impacts from flood events. In places such as Broad Acres, buy-out programs and home elevation requirements offer the only potential solutions, due to the proximity of the homes to the Chenango River.

In regards to the Wallace Road/Morningside Drive neighborhood, the Town of Chenango must address the flooding associated with Smith Hill Creek and its undersized, outdated, and inefficient SWMS. Although technically an infrastructure improvements project, the Smith Hill Creek SWMS failures cause some of the most widespread residential flooding impacts in the Community. This need presents an opportunity to conduct a comprehensive analysis focused on rebuilding the system to incorporate BMPs, which could help limit or possibly even eliminate flood hazards to residences.

Flooding occurs in different parts of the Town for a variety of reasons. Factors such as proximity to the Chenango River, SWMS failures, and residential effects on SWMS efficiency all contribute to flood issues in the Planning Area. To preserve the housing stock and livelihoods of residents, the Town must continue to monitor flood issues and address issues as they evolve.

As only two housing assets have been identified, the Committee chose to develop needs and opportunities for general housing issues in the Community.

RECOVERY SUPPORT FUNCTION: Housing

Local housing goals include identifying and addressing the Town’s flood issues to prevent or limit future impacts from flooding.

These goals presume treatment of the Town’s entire housing stock as an asset, and that specific needs will be addressed as they arise.

HOUSING NEEDS AND OPPORTUNITIES

Need: Reduce or eliminate flood risk to housing to the greatest extent possible.

Opportunity: Acquire those properties near the Chenango River as they become available to be reused in a manner that reduces or eliminates risk to property.

Opportunity: Provide comprehensive review and analysis of SWMSs.

Opportunity: Identify funding sources for stormwater management improvement projects.

Opportunity: Consider flood-proofing options for homes in hazard areas.



Infrastructure

The Planning Area contains several SWMSs of insufficient size or capacity for large stormwater events. A complete reevaluation of these systems is necessary to develop alternatives that would include system repairs, improvements, redesign, and potentially, complete system rebuilds. The Town also should consider evaluating funding sources to help offset costs incurred by these projects.

Flooding in the Town also places a large number of water and wastewater facilities at risk. These systems undergo water inundation during flood events because they are proximate to floodways and to the Chenango River.

Such systems have critical functionality needs, as they provide fresh water and manage wastewater for the Town and its neighboring communities, i.e., the Town of Dickinson and SUNY Broome College.

Failure of water and wastewater systems could hamper or prevent delivery of potable water to residents. The Committee considers securing these assets from damage or system failure during flood events a priority.

The Town also has several regional and local transportation routes, including Interstate 81, Route 11, Route 12, and Route 12A. These roadways cross several of the creeks located in the Town and provide access to vital facilities, jobs, and residences in the Community.

The bridges located along these routes also risk damage or wash out when flood events occur. Such an instance could result in the isolation of portions of Town, preventing residents from accessing necessary goods and services. In addition, damage or washouts to these bridges could prevent first responders and emergency vehicles from accessing people in need of assistance, particularly members of vulnerable populations.

Securing and ensuring the protection of infrastructure assets is paramount in promoting the safety and welfare of the Community.

The Community should explore options from site protection to facility relocation in order to protect and ensure the continuation of critical services and adequate community interconnectivity.

RECOVERY SUPPORT FUNCTION: Infrastructure

Floodwaters from the Chenango River and heavy sheet flow from surrounding hills, which also inundated existing SWMSs, severely impacted infrastructure in the Town. The impacts resulted in several system failures that in turn allowed significant residential flooding.

These events highlight the need for investment in this area. Rebuilding infrastructure with increased resilience, relocating assets, providing system redundancy, and designing protection measures to reduce or prevent flood impacts are all critical measures for improving the Town's capacity to respond to future disasters.

INFRASTRUCTURE NEEDS AND OPPORTUNITIES

Need: Reduce flood risk along Front Street to the greatest extent possible.

Need: Reduce risk and protect water/sewer pump stations and treatment facilities from flood hazards.

Need: Ensure water/sewer pump stations and treatment facilities have access to emergency back-up power.

Need: Address undersized and improperly designed SWMSs in locations throughout the Community to allow them to adequately handle rain, flow velocities, and/or debris deposition.

Need: Address failing SWMS in Wallace Road/ Morningside Drive neighborhood, which results in significant residential flooding.



INFRASTRUCTURE NEEDS AND OPPORTUNITIES (CONT'D)

Opportunity: Evaluate infrastructure design, layout, and construction to ensure it manages stormwater and flooding as efficiently as possible.

Opportunity: Inventory water/sewer facilities to identify flood impact reduction/elimination needs, including determining protective measures to reduce/eliminate flood impacts.

Opportunity: Provide/supply necessary back-up power alternatives to water/sewer systems.

Opportunity: Consider identifying a site and developing a new municipal well away from flood-prone areas to promote system security and redundancy.

Opportunity: Analyze existing SWMSs and develop comprehensive improvement plans or strategies for each facility as needed.

Opportunity: Provide comprehensive improvements to SWMSs, including green infrastructure and BMPs, to allow them to properly handle storm flows and reduce risk of system back-up or failure.

RECOVERY SUPPORT FUNCTION: Natural and Cultural Resources

Natural infrastructure has become increasingly recognized and promoted among hazard and climate planners as a low-impact and sustainable means to mitigate losses from natural hazards.

In the Town of Chenango, the Chenango River and its tributaries are both one of the Town's greatest assets and one of its greatest threats. While looking to protect the Town's assets, the Committee identified needs and opportunities to restore and expand the Town's natural flood management systems to best withstand inundation from future storms.

Natural and Cultural Resources

Heavy stream flows, massive debris deposition, and erosion all pose significant threats to natural and cultural assets in the Town of Chenango. Most of the Community's natural and cultural resource assets include waterways, wetlands, and parks.

Local stormwater develops a high velocity as it drains from surrounding hills and continues into local creeks. This high velocity causes severe erosion and allows stormwater to carry large amounts of debris into natural systems. Massive amounts of stone and gravel clog these systems, become deposited along creek beds, and remain behind in local parks, rendering play areas and ball fields unusable until debris removal is conducted.

The Committee identified the need to increase natural flood control measures such as wetlands and "green" retention basins to limit these impacts and manage some of the flow capacity, velocity, and debris issues.

NATURAL AND CULTURAL RESOURCES NEEDS AND OPPORTUNITIES

Need: Prevent erosion and protect embankments along key segments of local creeks and the Chenango River to protect property and community assets.

Need: Address flood risks and associated damages at parks throughout the Community.

Opportunity: Identify areas where creek embankment stabilization or creek bed depth can be addressed.

Opportunity: Identify parks at greatest risk from flood impact, and consider alternatives to address issues.

Opportunity: Consider converting portions of parks to floodwater retention areas, such as wetlands, and identify other areas not prone to flooding that can be re-designated as parks to replace any converted park areas.

Opportunity: Introduce wetlands and "natural" stormwater/flood management systems along creeks and the Chenango River, where possible.



Photo of Wendy's restaurant, Hess Station, and other stores down Front Street in Chenango. Photo is courtesy of Eric Thayer.



Section 3

Reconstruction and Resiliency Strategies



Photo is courtesy of Eric Thayer.

Section 3: Reconstruction and Resiliency Strategies

The Town of Chenango NY Rising Community Reconstruction (NYRCR) Planning Committee's (Committee) next step was to identify strategies to promote reconstruction and resiliency.

Reconstruction and resiliency strategies reflect community values, issues, needs, and opportunities, and are the foundation for identified projects and implementation strategies detailed further in Section 4 of this Town of Chenango NYRCR Plan.

Broad strategies were developed to enable the flexibility needed to address issues and adapt to changes and unforeseen influences throughout the planning and project identification process. The Committee reviewed and revised the strategies over several weeks based on information gathered from emergency responder stakeholders and input gleaned from Public Engagement Events. The Committee decided to promote the most immediate needs to yield the greatest benefit.

This section contains tables that identify prospective projects by strategy and describes their scope, estimated cost, and status as a proposed or featured project, or as an additional resiliency recommendation.

Proposed Projects – Projects proposed for funding through an NYRCR Planning Area's allotment of CDBG-DR funding.

Featured Projects – 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 NYRCR Program.

Additional Resiliency Recommendations – Projects and actions that the Planning Committee would like to highlight and that are not categorized as Proposed Projects or Featured Projects.

Strategy 1 Improve stormwater management facilities to better handle significant storm events, increase capacity and effectiveness, and help prevent or reduce risk and damage to persons and property.

The Town of Chenango (Town) suffers from a variety of stormwater management issues, including systems that are in substandard condition, are poorly designed, and do not provide adequate capacity to handle significant storm events. Failure of these systems during Tropical Storm Lee resulted in millions of dollars in public and private damages and property loss. The public consistently voiced the need to address deficiencies in local stormwater management systems during Public Engagement Events held throughout the planning process.

Strategy 1 specifically identifies the need to improve undersized and inadequately designed stormwater management systems. The charge is to:

- Address the failing stormwater management system in the Wallace Road/Morningside Heights neighborhood to reduce significant residential flooding;
- Mitigate or eliminate, where possible, flood risk to housing; and
- Ensure adequate access to schools, medical facilities, and other essential services after a flood event.



Projects associated with Strategy 1 were identified at locations throughout the Town. Stormwater management system improvements will benefit residents, businesses, the public and private sectors, the commercial corridor, residential neighborhoods, infrastructure, parks and public spaces. This improvement will also increase accessibility and circulation throughout the Town during storm events.

Table 3.1 lists the project ideas the Committee identified to accomplish Strategy 1.



Inadequate stormwater management systems in the Town of Chenango often result in significant residential flooding during major storm events, as it did shown here in the Morningside Heights neighborhood during Tropical Storm Lee. Photo is courtesy of the Town of Chenango.

TABLE 3.1 – STRATEGY 1

Strategy 1: Improve stormwater management facilities to better handle significant storm events, increase capacity and effectiveness, and help prevent or reduce risk and damage to persons and property.

Project Name	Short Project Description	Estimated Cost	Proposed or Featured Project	Regional Project (Y/N)
Smith Hill Creek (Wallace Road) Stormwater Management System	Replace sections of the drainage pipes under Northgate Plaza, and install a flap gate on the outlet end of each of the two pipes. Construct a retention wall between the Weis Grocery Store site and the Waste Water Treatment Plan.	\$1,200,748	Proposed	N
Northgate Plaza Flap Gate Installation	Replace sections of the drainage pipes under Northgate Plaza, and install a flap gate on the outlet end of each of the two pipes. Construct a retention wall between the Weis Grocery Store site and the Waste Water Treatment Plan.	\$355,000	Proposed	N
Fox Road Stormwater Improvements	Remove three existing culverts underneath Fox Road along Brooks Creek and replace with a bridge to allow for greater flow.	240,680	Proposed	N
Grant Road Stormwater Pipe Replacement	Remove approximately 200 linear feet of galvanized stormwater pipe (3' diameter) and replace pipe with 3' diameter piping with access for clean-out midway along the pipe.	\$75,200	Proposed	N
Nimmonsburg Neighborhood Stormwater Management System Master Plan	Conduct a comprehensive analysis of the Smith Hill Creek (Wallace Road) Stormwater Management System with recommendations for long-term solutions that permanently address flooding issues in the most efficient way.	\$300,000	Proposed	N

Strategy 2 Maintain and improve key infrastructure components and facilities to ensure the safe and efficient functions of the Community, especially during and after disaster events.

During Tropical Storm Lee, the Town of Chenango’s infrastructure was severely impacted by both riverine and flash flooding. Heavy sheet flow from surrounding hills and 9 to 11 inches of rain over a 36-hour period overwhelmed local streams and stormwater management systems. The inundation of key infrastructure assets throughout the Town resulted in damage to homes and businesses, limited road access, and increased risks to health and safety.

This strategy is focused on providing secure and reliable infrastructure within the Town of Chenango to ensure a safe and healthy environment for local residents, businesses, and visitors.

Flooding caused by Tropical Storm Lee also inundated other infrastructure assets across the Town of Chenango, such as sewer lift stations and water pump stations. These assets were inaccessible and at risk of failure and permanent damage, which threatened a suspension of water service and significant health risks if sewer lift stations failed.

- Considering the impacts of Tropical Storm Lee, the Committee focused on strategies to reduce flood risks and protect key infrastructure assets. Reduce risk and protect water and sewer pump stations, and treatment facilities from flood hazards; and
- Ensure water and sewer pump stations, as well as treatment facilities have access to emergency back-up power.

To ensure functionality and long-term resiliency of improvements, hydraulic modeling was used to ensure improvements could be performed at levels above flood elevations.

Strategy 2 projects strive to improve infrastructure assets that address health and safety needs, and build resiliency to housing, health and social services, natural and cultural assets, and economic vibrancy throughout the Town of Chenango.

Table 3.2 lists the preliminary project ideas defined by the Committee to accomplish Strategy 2.



Roads and bridges were washed out with raging waters by Tropical Storm Lee’s torrential rainfall. Photo is courtesy of the Town of Chenango.



TABLE 3.2 – STRATEGY 2

Strategy 2: Maintain and improve key infrastructure components and facilities to ensure the safe and efficient functions of the Community, especially during and after disaster events.

Project Name	Short Project Description	Estimated Cost	Proposed or Featured Project	Regional Project (Y/N)
Northgate Water Pump Station Upgrades	Raise electrical systems at Northgate Pump Station above flood levels.	\$29,750	Proposed	N
McGirk’s Sewer Lift Station Upgrades	Raise electrical systems above flood levels.	\$22,900	Proposed	N
Route 12A Water Pump Station Upgrades	Raise electrical systems above flood levels and install a back-up generator.	\$163,300	Proposed	N
New Well in the Northern Section of Town	Construct well, housing, and necessary piping.	\$1,750,000	Featured	N
Surveys, Site Analysis, and Testing for Well in the Northern Section of Town	Conduct studies and testing necessary for well siting and development.	\$254,900	Proposed	N
Route 12A Sewer Lift Station Improvements	Raise electrical systems and install a flood wall around the pump station to prevent inundation from adjacent low areas, and allow access to the pump station during floods. The electrical panel also should be relocated inside the flood wall to improve access to electrical controls during maintenance operations.	\$75,000	Proposed	N

Strategy 3

Ensure that adequate resources, services, and facilities are available to address emergency response and disaster recovery needs.

Strategy 3 was developed to address issues related to safety and emergency service needs during and after disaster events. Projects proposed under this strategy will enable key Town departments, first responders, and recovery personnel to more effectively and efficiently handle service needs during and after disasters.

During Tropical Storm Lee, the Chenango Fire Station became the center of local response and recovery efforts. The Committee, in coordination with Chenango elected officials and staff, expressed their desire to establish the Town Hall as Chenango’s emergency command and recovery center.

Additionally, the community identified sheltering issues in the Town. The Broome NY Rising Community Reconstruction Plan identified the need for a regional shelter to serve Broome County residents. This need echoes the Town’s need for adequate sheltering during and after disaster events.

Based on these needs, the Committee identified several key projects under Strategy 3. One project includes providing financial assistance to Broome County as part of the widely supported regional shelter development project.

Based on the Community’s need to establish a functional local disaster command and recovery center, the Committee identified a project that would secure a dedicated power source at the Town Hall. To meet this need, the Town is pursuing the installation of a permanent on-site generator with its own dedicated fuel source to allow the Town Hall municipal complex to fully function during a power outage.

Table 3.3 lists the project ideas that have been defined by the Committee to accomplish Strategy 3.



A centralized emergency command and recovery center is essential for efficient response and effective recovery efforts. Pictured here is the Chenango Town Hall, proposed as an emergency command and recovery center. Photo is courtesy of Eric Thayer.

TABLE 3.3 – STRATEGY 3

Strategy 3: Ensure that adequate resources, services, and facilities are available to address emergency response and disaster recovery needs.				
Project Name	Short Project Description	Estimated Cost	Proposed or Featured Project	Regional Project (Y/N)
Municipal Complex Back-up Generator	Install a back-up generator for municipal complex.	\$225,000	Proposed	N
Regional Shelter Funding	Provide funds for a regional shelter feasibility study in coordination with Broome County and six Broome NYRCR Communities.	\$100,000	Proposed	Y



Strategy 4 Preserve and protect the Town of Chenango’s natural, recreational, and cultural resources from manmade and natural threats and hazards.

In addition to weakening the Town of Chenango’s infrastructure, flooding from Tropical Storm Lee negatively impacted its natural and cultural assets. These assets help to define the Town’s character and contribute to its social fabric. Much of the flood damage caused by Tropical Storm Lee caused significant erosion and resulted in substantial debris deposition throughout the Town.

During the needs analysis, the Committee recognized that natural, cultural, and recreational resources should to be protected to prevent ongoing damage and the potential loss of these assets from major storm events. The Committee carefully reviewed the assets by their value and risk to flooding. Some assets, such as Broad Acres Park, are situated in areas with the greatest flood risk. It has long been known this is a flood-prone area and that substantial investment would be needed to protect Broad Acres Park.

Due to a variety of reasons, including limited public support, some projects that could potentially address assets in flood-prone areas were not pursued. This Town of Chenango NYRCR Plan does consider improvements to Castle Creek Park as an Additional Resiliency Project.

Strategy 4 addresses the following needs identified in Section 2 of this NYRCR Plan:

- Prevent erosion and maintain embankments along key segments of local creeks and the Chenango River to protect property and community assets; and
- Address flood risks and associated damages at parks throughout the Town.

Table 3.4 lists the project ideas defined by the Committee to accomplish Strategy 4.



Pictured here is damaged fencing, paving, and debris deposition left from Tropical Storm Lee at Castle Creek Park. Photo is courtesy of the Town of Chenango.

TABLE 3.4 – STRATEGY 4

Strategy 4: Preserve and protect the Town of Chenango’s natural, recreational, and cultural resources from manmade and natural threats and hazards.

Project Name	Short Project Description	Estimated Cost	Proposed or Featured Project	Regional Project (Y/N)
Bank Restoration and Erosion Prevention at Chenango Commons Golf Course	This project would restore an estimated 385 feet of stream bank to prevent further channel migration and to reduce sediment pollution in the Chenango River.	\$115,000	Proposed	N



Strategy 5

Protect and promote safe, quality housing for all residents in the Town.

Safe, sustainable housing must be provided to ensure the Town's long-term resiliency. Without adequate housing to support residents, the Town's character and appeal will be negatively impacted. The Committee acknowledged and public input reinforced the need to protect housing from floodwaters.

During Tropical Storm Lee, the Broad Acres neighborhood, along the Chenango River, was inundated with riverine flooding. Meanwhile, the Wallace Road neighborhood was under four feet of water, as local stormwater management systems failed and pushed stormwater into residential properties.

Costs associated with storm recovery can be more than many residents can bear if storm events occur frequently. If houses are at risk from flooding, residents may choose to abandon neighborhoods because of safety risks and the excessive cost of recovery.

Safe, quality housing is among the greatest assets a community can have. When home safety is threatened, a community may risk losing its residents and suffer declining property values. Ultimately, this can result in property abandonment, devaluation of neighborhoods, and long-term blight.

Strategy 5 was specifically developed to reduce or eliminate (to the greatest extent possible) flood risks to housing. Flood mitigation projects identified under other strategies often impact housing. Whether flood damage from Tropical Storm Lee was related to stormwater management systems, infrastructure, or natural and cultural resources, impacts to and failures of these assets increased threats or damage to housing. Therefore, while a specific project may directly reduce flood risk to an infrastructure component or a natural resource, such as a creek, the improvement may also reduce flood risks to nearby housing.

Many projects, including the Smith Hill Creek (Road) Stormwater Management System, can address flooding issues that impact housing. Therefore, there is no specific table of projects related exclusively to Strategy 5.

Strategy 6

Develop local zoning, codes, and programs, and provide legal and other professional assistance to help municipal staff ensure public safety, preserve property, and limit disaster impacts to the greatest extent possible, while securing long-term resiliency in the Town.

To ensure the long-term resiliency of specific areas and assets in the Town of Chenango, the Committee developed a strategy to evaluate shortfalls in existing zoning and codes, increase safety, and limit impacts from storm events. In addition, the strategy calls for technical assistance for services that may help to secure public safety, preserve property, and limit disaster impacts.

Strategy 6 was developed to specifically address enforcement and legal needs associated with permitting, land use issues, and zoning and ordinance conflicts, among other issues. The intent of this strategy is to support local authorities in resolving ongoing conflicts and legal issues that have hampered progress on several stormwater hazard and environmental issues.

This Town of Chenango NYRCR Plan has identified a variety of potential actions and projects that could address several issues that have contributed to damages or flood impacts from Tropical Storm Lee. Some actions and projects cannot move forward because legal matters must first be resolved.

Additional services that could be incorporated through Strategy 6 include providing staff to help fulfill participation requirements of the National Flood



Insurance Program (NFIP) Community Rating System (CRS). This could potentially help lower insurance rates in the community if NFIP requirements are met.

Projects under Strategy 6 will be critical to enable additional future recovery and resiliency projects to advance. Table 3.5 identifies the Committee’s project ideas to accomplish Strategy 6.

TABLE 3.5 – STRATEGY 6

Strategy 6: Develop local zoning, codes, and programs, and provide legal and other professional assistance to help municipal staff ensure public safety, preserve property, and limit disaster impacts to the greatest extent possible, while securing long-term resiliency in the Town.

Project Name	Short Project Description	Estimated Cost	Proposed or Featured Project	Regional Project (Y/N)
Community Rating System (CRS) Analysis	Identify opportunities and methods to achieve accomplishments in the NFIP’s six core flood loss reduction areas. Provide education services on CRS and assist residents with resiliency.	\$60,000	Proposed	N
Stormwater Enforcement and Legal Assistance	Provide assistance to the Town regarding ongoing enforcement issues, and assist with legal and other related services to address sites that contribute to stormwater issues.	\$150,000	Proposed	N

Strategy 7 Promote business development and improvements to necessary infrastructure to support commercial business expansion.

During the planning process, the Town of Chenango NYRCR Community repeatedly reinforced the need to promote business development and redevelopment in the commercial corridor. The focus is to improve the long-term economic viability of the Town by expanding its economic base.

A thriving local job market is critical to sustaining the overall quality of life in any community. In addition to providing work and income for residents, a strong commercial network contributes much-needed services to residents and other businesses. The presence of local businesses will help to promote a strong local economy in the Town of Chenango, and make it a more attractive place to live and work.

The core of the Town’s economic base is its commercial corridor. This corridor extends along Front Street, from the southern boundary of the Town, along the Chenango River, and continues east into the Chenango Bridge region of the Town. This corridor is the main transportation arterial through the Town and features a concentration of local businesses. This “downtown” area was heavily impacted by flooding during Tropical Storm Lee. Many vacant storefronts and empty land parcels remain. The corridor contains a variety of underutilized lots and lacks identity.

Strategy 7 was developed to promote business development opportunities and to support infrastructure improvements to foster economic expansion. Some of these opportunities include:

- Outreach to and/or training for local businesses to address disaster recovery and business continuity;
- Development of a downtown redevelopment plan;
- A review of local zoning and ordinances to ensure they conform to and promote economic development goals;
- Review options to extend commercial development in the northern portion of the Town of Chenango, along Front Street, to help promote economic development;
- Create business development and job growth incentives;
- Extend commercial development in the northern portion of the Town along Front Street to expand economic opportunities; and
- Redesign the layout of the commercial corridor to place buildings farther from the river and closer to Front Street, and place parking and open space closer to the river.

With such a wide range of potential opportunities along the corridor, the Committee felt it was advantageous to consider a comprehensive economic development study with a market analysis for the Front Street commercial corridor to provide guidance and direction.

Table 3.6 lists the project idea defined by the Committee to accomplish Strategy 7.

TABLE 3.6 – STRATEGY 7				
Strategy 7: Promote business development and improvements to necessary infrastructure to support commercial business expansion.				
Project Name	Short Project Description	Estimated Cost	Proposed or Featured Project	Regional Project (Y/N)
Front Street Commercial Corridor Economic Development Analysis	Conduct a comprehensive economic development study with a market analysis for the Front Street commercial corridor.	\$225,000	Proposed	N



Section 4

Proposed and Featured Project Profiles



Photo is courtesy of Eric Thayer.

Section 4: Proposed and Featured Project Profiles

After months of analysis, and public input, the Town of Chenango NY Rising Community Reconstruction (NYRCR) Planning Committee (Committee) finalized projects to advance resiliency efforts. The projects were classified into three categories: Proposed Projects, Featured Projects, and Additional Resiliency Recommendations. These categories are defined as follows:

- **Proposed Projects** – Projects are proposed for funding through a NYRCR Plan Area’s allotment of CDBG-DR funding.
- **Featured Projects** – 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 NYRCR Program.
- **Additional Resiliency Recommendations** – Projects and actions that the Planning Committee would like to highlight and that are not categorized as Proposed Projects or Featured Projects.

PROJECT ANALYSES

Several qualitative and quantitative analyses were used to help inform the Committee on details of potential project impacts in the Town of Chenango. A benefit-cost analysis was conducted to weigh the potential benefits and the identified costs associated with each project. A risk reduction analysis was completed to identify the ways in which flood reduction projects would effectively reduce flooding risks in the Town.

An economic analysis was conducted to identify reductions in financial risk and economic benefits that would be associated with the project. The estimated cost of the project was taken into consideration and weighed against potential cost savings that would result from mitigating storm impacts. This included costs

incurred by private entities (e.g., damages, property loss, or repairs), as well as the Town (e.g., clean-up, waste disposal, or infrastructure repairs).

The environmental benefits of the project were analyzed using available project data and assumptions, as well as associated hydrologic models, to assess potential impacts on the following:

- Type and quantity of environmental assets secured by the action;
- Type and quantity of clean-up accomplished by the action;
- Open space created by the action; and
- Importance of the action for high-priority habitats, threatened and endangered species, migration, or habitat connectivity.

The Community also took health and social benefits into consideration. This analysis is often more difficult to measure and can be much more qualitative in nature. It includes identifying and analyzing issues, such as:

- Safety;
- Quality of life;
- Security;
- Community appeal;
- Community functionality; and
- Equality.

The goal of this analysis is to estimate the risk reduction benefits of a project by identifying the amount of risk it reduces in the community relative to the initial level of risk quantified by the risk score through both the New York State Risk Assessment Tool and a Hydrologic Engineering Centers River Analysis System (HEC-RAS) model.



For projects without a HEC-RAS model, a qualitative assessment to estimate changes to exposure and vulnerability was conducted.

As part of the environmental analysis, a review of the project's location and impact extent was conducted. This analysis included the use of the following New York State Department of Environmental Conservation (NYS DEC) datasets:

- Rare Plants and Animals
- Significant Natural Communities
- Natural Communities Vicinity
- State Regulated Wetlands
- Classified Water Bodies
- Surface source intake zones
- Bird Conservation Areas
- Forest Matrix Blocks
- Forest Linkage Zones

Smith Hill Creek (Wallace Road) Stormwater Management System

PROJECT BACKGROUND

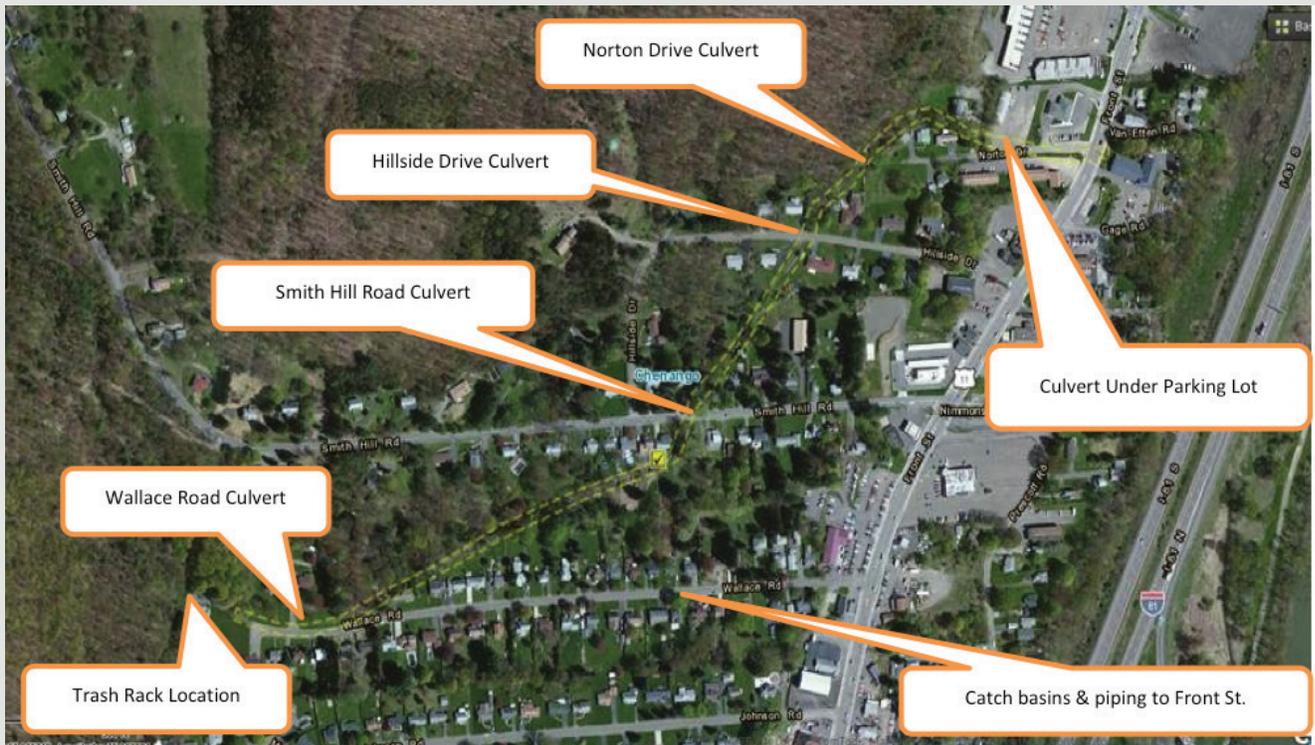
Smith Hill Creek is a manmade stream located in the Wallace Road neighborhood in the southern portion of Town of Chenango. Town staff, residents, and Committee Members indicated that the creek may have been a redesign or reroute of an existing stream at the time the residential neighborhood was developed. This stream carries stormwater, which drains off hills to the west of the neighborhood, northeasterly towards the Chenango River. The system acts as a stormwater management system, as the creek only obtains water from storm events. There are areas of the creek that contain standing water outside of storm events, but this is due to the poor drainage of the system. The creek and its associated stormwater management components consist of underground pipes of varying sizes and materials, as well as open swales and culverts that wind

through a residential neighborhood and eventually empty into a Broome County-managed stormwater system along Front Street.

CONNECTION TO THE DISASTER

The Smith Hill Creek stormwater management system completely failed during Tropical Storm Lee. The system was overwhelmed by sheet flow draining off of local hills, and the system became clogged with debris. This resulted in stormwater overflowing the system and flooding the Wallace Road neighborhood. Additionally, the portion of the Wallace Road neighborhood that stretches along Wallace Road is located in a bowl-like geographic feature with inadequate catch basins and drainage. This resulted in water getting trapped in this area and flooding approximately 50 homes, many with at least 4 feet of water. Personal property damages in this neighborhood alone exceeded \$1 million from Tropical Storm Lee. It should also be noted that the Wallace Road neighborhood has been continually plagued by failures of this system over the last decade. The Tropical Storm Lee event, however, had an

FIGURE 4.1 – SMITH HILL CREEK PROJECT OVERVIEW



Aerial photo Source :ESRI ARC-GIS, Produced by Tetra Tech, Inc.



unprecedented impact on the neighborhood, costing residences millions in damages and recovery costs.

SOLUTION

The Town has been aware of the issues regarding this system but has not had the resources needed to properly address the issue. Several engineers visited the site, and previous applications for funding assistance prepared by Town staff were reviewed. It was concluded that the entire system needed to be improved and that drainage improvement must be made along Wallace Road to address flooding related to the topographic depression. The project would include, but not be limited to, the following:

- Up-sizing the culverts along Wallace Road to 54-inch pipes on Smith Hill Road, Hillside Drive, Norton Driveway, and under the parking lot to Route 11;
- Increasing the cross-sectional area of the channels to accommodate the flow from a 100-year storm event;
- Shortening the culvert along Wallace Road and/or replacing it with an open channel;
- Installing check dams along the channel on Wallace Road or upstream to retain bed load sediments, and raise the base level of the stream, thus minimizing upstream undercutting and erosion;
- Installing catch basins along Wallace Road;
- Installing stormwater drainage piping along Wallace Road to convey stormwater from catch basins to the stormwater management system along Front Street;
- Installing trash racks along upper portions of the Creek to help minimize debris deposition downstream; and
- Installing access roads/paths, as needed.

This project is a significant undertaking and is one of the more expensive projects identified by the Town. It has strong support from the Committee and the Town of Chenango.

COST ESTIMATE

The total project cost is estimated at \$1,200,748, which includes approximately \$900,374 for improvements to the Smith Hill Creek stormwater management system itself. It also includes an additional \$300,374 for stormwater improvements along Wallace Road to collect and transport stormwater to the Front Street stormwater management system. These costs do not include maintenance measures, which will be necessary to ensure the continued effectiveness of the stormwater management system.

PROJECT BENEFITS

This stormwater management system improvement will ideally provide significant benefits to residents and property located in the Wallace Road neighborhood.

PROJECT COST-BENEFIT ANALYSIS

Economic Benefits

Flooding resulting from Tropical Storm Lee caused more than \$1 million in damages to local residents in the Wallace Road neighborhood. This project would help to alleviate some of the stresses on the existing stormwater management system and would help to prevent future system failures and associated property loss.

Although the project has a large estimated cost of approximately \$1,200,748, it presents long-term financial savings. From the years 2006 to 2014, flooding along Wallace Road, a result of the failure of the Smith Hill Creek stormwater management system, has resulted in at least \$2 million in damages, according to information provided by local residents. With the increasing magnitude and frequency of significant storm events, and the fact that two massive storm events impacted this system over the course of five years, causing millions of dollars in damages, improvements could save residents several millions of dollars over the life of this system (i.e., 40 years).

Flooding from this system has also placed unplanned costs on the Town of Chenango. Debris clean-up along Wallace Road alone cost the Town more than

TABLE 4.1 – TYPE AND QUANTITY OF ENVIRONMENTAL BENEFITS AND IMPACTS

	Type	Quantity
Environmental Assets Secured	Potential improvements and upgrades to existing catch basins, culverts, and other water collection systems in the Town.	Approximately seven culverts and/or catch basins along Smith Hill Creek.
Clean Up Accomplished	Potential for debris removal in catch basins and culverts	TBD
Open Space Created	No additional open space created.	
Importance for Habitat	The development of a stormwater management plan has the potential to improve stormwater conditions that will likely help to improve water quality and create a more reliable flow source to support aquatic life.	

\$4,000 after Tropical Storm Lee. Debris cannot move through the existing system efficiently, meaning that it gets clogged and becomes deposited in the resulting flooded areas. This debris deposition includes the existing drywells, which lose capacity and require extensive cleaning after flood events.

Environmental Benefits

Table 4.1 outlines the type and quantity of the environmental benefits and impacts of the project. Although no environmental assets were identified as being completely secured, there are several environmental benefits associated with this project.

The results showed that the project is not near potential or historic resources. There were also no records or instances of the existence of any threatened or endangered species in the project area. The project is expected to improve conditions in and along Smith Hill Creek. Although no areas of wetlands were identified in the project impact area, the reduction in water surface elevation (WSE) during smaller interval storm events could lead to the revitalization of wetland areas that may exist in the affected area. The Smith Hill Creek is identified as a class “C” waterway, which indicates that its water supports fisheries and that it is suitable for non-contact activities. A preliminary review of the site indicated that no rare plants and rare animals are present.

Health and Social Benefits

Improvements to the existing stormwater management system will significantly contribute to a reduction in the level and frequency of flooding in the Wallace Road neighborhood, and they may actually resolve it almost completely. Flooding provides a variety of health and safety risks that may be averted through the completion of this project. Floodwaters rose as high as four feet along portions of Wallace Road, completely inundating basements and first floors of residences. This posed drowning risks, as well as electrocution and fire risks, since electrical systems became submerged during flooding. Flooding of that magnitude also put first responders at risk, when they rescued stranded people.

Additional risk exists because this flooding is in a residential neighborhood, and most people tend to secure themselves in their homes during such events. Since this flooding is more indicative of flash flooding, appropriate warnings cannot be given to evacuate people from the area. This exposes a large number of people to the hazards and threats posed by flooding in this neighborhood.

Health and safety risks can continue after the flood waters have subsided and after their initial impacts on local buildings and facilities. For instance, flooding could compromise the structural integrity of structures; and impacts from the flooding could cause systems or building components to fail,



endangering those utilizing the facility. Once buildings have suffered flooding, they are often prone to mildew and fungus, which pose health threats to individuals.

Additional Benefits

- **Land Use Benefits** – This project will have a positive impact on neighboring properties and uses by providing reduced flood risk and increased development capacity, which will help protect assets and potentially increase property values. In addition, this project supports investment in the Town’s downtown, where commercial growth is desirable.
- **Benefits Neighboring Communities** – This project will demonstrate the Town’s desire to aid its neighboring communities. In this case, the project will specifically benefit the Town of Dickinson, as well as State University of New York (SUNY) Broome College.
- **Supports NYRCR Plan Goals** – Completion of this project supports one of the Town’s strategies, specifically the desire to maintain and improve key infrastructure components and facilities to ensure

the safe and efficient functions of the community, especially during and after disaster events.

ANTICIPATED REDUCTION OF RISK ASSOCIATED WITH THE PROJECT

Figure 4.3 shows the Smith Hill Creek (Wallace Road) Stormwater management system’s location in the defined risk areas. While the project will not have any impact on the inundation extents or WSE during flooding events, it will serve to reduce the risk of the system.

The improvements will decrease the exposure by adding defensive flood protection measures. The project will help fortify the system against the flood hazards, and positively impact its functionality during flooding events.

IMPLEMENTATION TIME FRAME

General project implementation, including design, preparation of bid documents, review of responses, permitting, and construction is expected to occur over approximately a one year period.

FIGURE 4.2 – WALLACE ROAD SWMS EXISTING SECTION

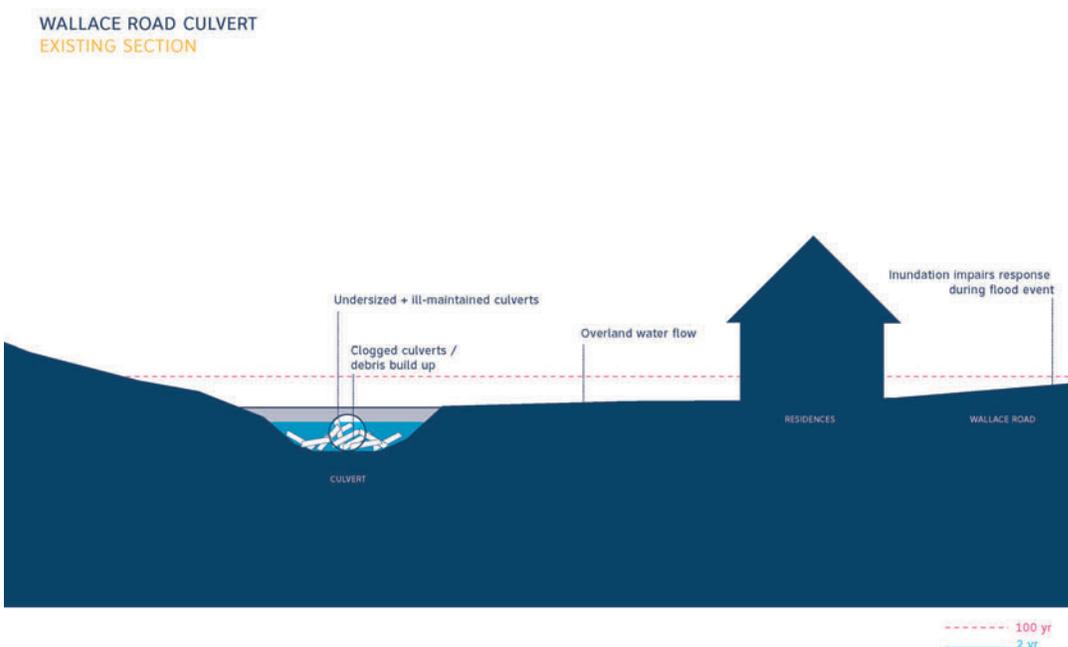


Figure 4.2 shows the existing culvert and debris deposition issues.

FIGURE 4.3 – WALLACE ROAD SWMS PROPOSED SECTION

WALLACE ROAD CULVERT
PROPOSED SECTION

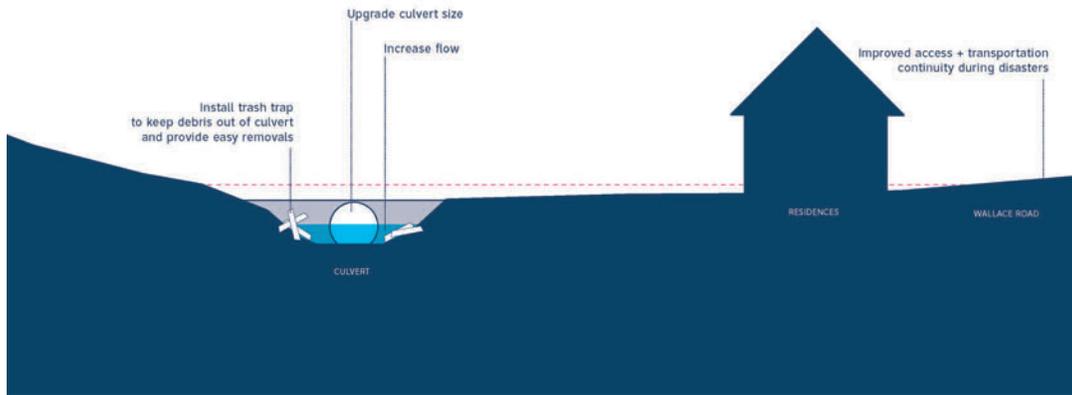
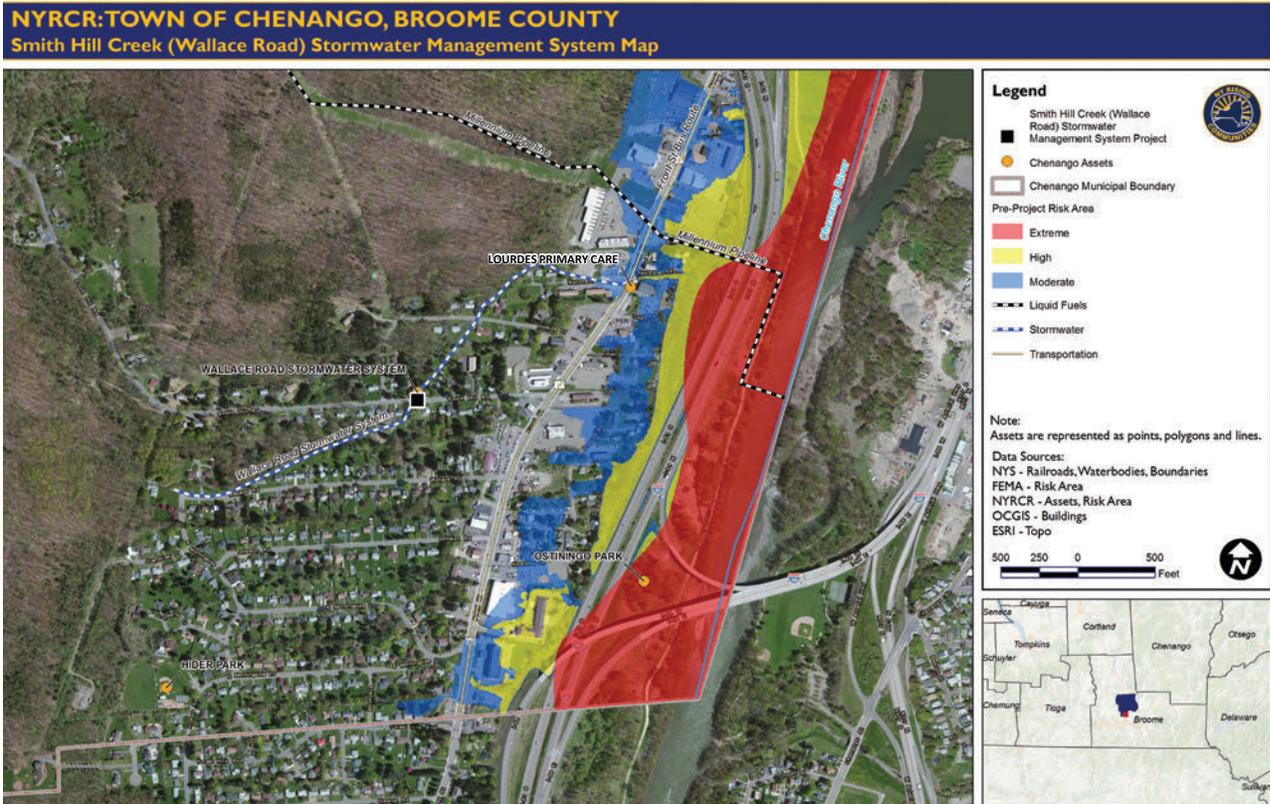


Figure 4.3 shows the culverts with increase diameters and items in place to control debris deposition.





REGULATORY REQUIREMENTS

The project will require construction permitting and the partial or possibly, full temporary closure of several roads. Since Smith Hill Road is a County road, construction of the culvert will have to be coordinated with Broome County and Highway Work Permitting may be required.

JURISDICTION

Jurisdiction for this proposed project rests in the Town of Chenango.

SUMMARY

Smith Hill Creek (Wallace Road) Stormwater Management System

- Investment: \$1,200,748
- Flood Level Reduction: The project is designed to limit, if not eliminate, flood risks posed by the failure of the Smith Hill Creek stormwater management system.
- Assets Protected: 1
- Repetitive Flood Properties Removed: N/A
- Potential Future Loss Prevented: Immediate: 0; long-term: \$1 million+
- Jobs Created: Approx. 15*

** The FTE construction jobs were estimated based on a methodology developed by the U.S. Department of Commerce Economics and Statistics Administration as presented in the September 2013 Economic Impact of Hurricane Sandy: Potential Economic Activity Lost and Gained in New Jersey and New York. This study estimated job creation from recovery spending on infrastructure projects in New York and reported 7.15 construction jobs and 8.4 total jobs per \$1,000,000 in construction spending.*



Northgate Plaza Flap Gate Installation

PROJECT BACKGROUND

The Town’s commercial corridor was significantly impacted by water backing up through the existing stormwater management system. This system captures rain water using catch basins along Front Street, which then runs through piping that extends beneath Northgate Plaza and empties into the Chenango River. This system manages stormwater along the length of the commercial corridor.

A significant contributor to this flooding issue is the absence of a flood gate to help prevent water from surging during flood events. Efficient and effective functionality of this corridor is critical, as it serves as a primary transportation arterial and contains the highest density of development, jobs, and services for the Town of Chenango.

CONNECTION TO THE DISASTER

Flooding from Tropical Storm Lee along the Chenango River caused the river to rise in flood height above the level of the drainage system, which serves the Front Street commercial corridor and empties into the River. This rise in river water levels caused water to push back up through the stormwater management system, resulting in flood waters emptying onto Front Street. This resulted in substantial flooding, property damage, and limited-access issues along Front Street.

SOLUTION

To address this issue, a duckbill flexible flap gate (Tideflex or similar) should be installed on the stormwater management system piping that runs beneath Northgate Plaza. This will assist in preventing stormwater from backing up through the system during future flood events. The project will also include the construction of a retention wall between the Weis Market building and the wastewater treatment plant.



Shown here flood waters along the Front Street corridor had a significant and devastating impact on the Town’s economy. Photo is courtesy of the Town of Chenango.



FIGURE 4.5 – AERIAL MAP OF NORTHGATE PLAZA FLAP GATE PROJECT



Aerial map of Northgate Plaza Source: ESRI ARC-GIS, Produced by Tetra Tech, Inc.

Since this area has the same altitude as Front Street, rising river water can make its way through this gap and continue to impact the plaza and Front Street.

COST ESTIMATE

The estimated total project cost is \$355,000.

PROJECT BENEFITS

This project will reduce or eliminate the flooding along Front Street caused by riverine flooding backing up through the existing stormwater management system.

PROJECT COST BENEFIT ANALYSIS

Economic Benefits

This project specifically addresses a key issue that impacts the Town’s most significant economic asset, its commercial corridor. By installing the flap gates, additional protection will be provided to the corridor, preventing floodwaters from pushing back through the system and flooding Front Street and Northgate Plaza. Flooding along the commercial corridor closed portions of Front Street for as much as three days during severe storm events. In the aftermath of Hurricane Irene and Tropical Storm Lee, businesses

TABLE 4.2 – TYPE AND QUANTITY OF ENVIRONMENTAL BENEFITS AND IMPACTS

	Type	Quantity
Environmental Assets Secured	Replace two outflow pipes and install new flood gates to prevent back flow from the Chenango River to the catch basins along Front Street.	Replace approximately 40 feet of piping in both the 24” and 42” outflow pipes.
Clean-up Accomplished	Potential for debris clean up along the outflow pipe locations.	TBD
Open Space Created	No additional open space created.	
Importance for Habitat	The replacement of pipes and installation of new flap gates will prevent backflow from the Chenango River into the catch basin system and stop flooding along Front Street. This will prevent aquatic life from entering the catch basin system and keep them in their natural habitat.	

lost tens of thousands of dollars in revenues, and employees could not reach or work at their place of employment. This resulted in lost wages and income tax revenues for the Town.

Even more substantial than the closing of Front Street was the time and costs incurred due to flood damage. Flooding along Front Street was as high as four feet in places, and caused significant damage to facilities, equipment, and supplies. In some cases, damage from the flooding caused businesses to be closed for long as six months, while repairs were made and recovery took place. The economic impacts are two-fold, since businesses not only incurred recovery and rebuilding costs, but also lost revenue during the time when they are closed.

The installation of the flap gate may also help prevent debris from washing back up into the system from the Chenango River. This debris can damage the piping and get clogged in the system. The damage and required cleaning that could result imposes additional costs on the Community. Therefore, the flap gate may help reduce maintenance costs on the system.

Environmental Benefits

Table 4.2 outlines the type and quantity of the environmental benefits and impacts of the project. Although no environmental assets were identified as being completely secured, several environmental benefits are associated with this project. The project will result in a reduction of the WSE levels.

The results showed that the project is not near potential or historic resources. There were also no records of instances of the existence of any threatened or endangered species in the project area. The Chenango River is identified as a class “C” waterway, which indicates that its water supports fisheries and that it is suitable for non-contact activities.

Health and Social Benefits

The purpose of installing the flap gate is to prevent water from pushing up through the stormwater management system and flooding Front Street. The resulting flooding provides a variety of health and safety risks, which may be averted through the completion of this project. With floodwaters as high as four feet in places along Front Street, there is substantial risk to individuals and motorists trying to access or travel through the area. Flooding poses drowning risks, as well as electrocution and fire risks when electrical systems become submerged during flooding. Flooding of that magnitude also puts first responders at risk, as they may need to address stranded individuals and fires.

Health and safety risks can continue after the floodwaters have subsided and made their impacts on local building and facilities. Flooding could compromise the structural integrity of structures. Impacts from the flooding could cause systems or building components to fail, endangering those utilizing the facility. Once buildings have suffered flooding, they can be prone to mildew and fungus, which pose health threats to individuals.



Due to Front Street serving as the Town’s primary road and containing a majority of the Town’s businesses and services, access along this road is critical. During Tropical Storm Lee, Front Street accessibility was severely limited; this prevented residents from being able to travel to local businesses and service providers. This hindered or prevented people from being able to purchase staples, such as food and medicine, and from accessing necessary service providers, such as healthcare facilities. Flooding also inhibited the movement of emergency vehicles, limiting the ability of first responders to address emergencies.

Public Support

The flooding along Front Street was identified by both the Committee and the public as one of the most significant issues resulting from Tropical Storm Lee. This support has been corroborated by those who attended Public Engagement Events.

Additional Benefits

- **Land Use Benefits** – This project has a positive impact on neighboring properties and uses by providing reduced flood risk and increased development capacity. This will help protect assets and potentially increase property values. In addition, this project supports investment in the Town’s downtown, where commercial growth is desirable.
- **Benefits Neighboring Communities** – This project will demonstrate the Town’s desire to aid neighboring communities. In this case, the project will specifically benefit the Town of Dickinson, as well as SUNY Broome College.
- **Supports Plan Goals** – Completion of this project supports one of the Town of Chenango NYRCR Plan strategies to maintain and improve key infrastructure components and facilities to ensure the safe and efficient functions of the community, especially during and after disaster events.

ANTICIPATED REDUCTION OF RISK ASSOCIATED WITH THE PROJECT

The reduction in risk was analyzed using the assumptions and factors described in the methodology above.

The improvements will decrease the exposure by adding defensive flood protection measures. The project will help fortify the system against the flood hazards and positively impact its functionality during flooding events.

IMPLEMENTATION TIME FRAME

General project implementation, including preparation of engineering design documents, submission to regulatory agencies for review and permit approval, preparation of bid documents and response reviews, and construction is expected to take place over an eight-week period.

REGULATORY REQUIREMENTS

Due to the proximity of the project to the Chenango River, the project may trigger consultation with NYS DEC.

JURISDICTION

Jurisdiction for this proposed project rests in the Town of Chenango.



SUMMARY

Northgate Plaza Flap Gate Installation

- Investment: \$355,000
- Flood Level Reduction: Not applicable (N/A)
- Assets Protected: 1
- Repetitive Flood Properties Removed: 0
- Potential Future Loss Prevented: \$5,000+ municipal costs, \$50,000+ private costs
- Jobs created: Approx. 3*

** The FTE construction jobs were estimated based on a methodology developed by the U.S. Department of Commerce Economics and Statistics Administration as presented in the September 2013 Economic Impact of Hurricane Sandy: Potential Economic Activity Lost and Gained in New Jersey and New York. This study estimated job creation from recovery spending on infrastructure projects in New York and reported 7.15 construction jobs and 8.4 total jobs per \$1,000,000 in construction spending.*



Municipal Complex Back-Up Generator Installation

PROJECT BACKGROUND

The Town’s Municipal Complex is the primary local government facility housing the Town Hall, local government offices, community center, and highway garage. The facility is critical for the day-to-day functions of local government.

CONNECTION TO THE DISASTER

During Tropical Storm Lee, the municipal complex served as the local command center for response and recovery efforts. To more effectively function and respond to disasters, the Community has expressed a desire to improve the facility to support additional command center functionality during emergency events. This critical facility lacks a sufficient generator ready for immediate use to keep the Town offices functioning in an emergency. Town staff, first responders, and officials recognized that in order for the facility to provide all of the services needed to keep the facility running, secure, and providing necessary services during an emergency response, a dedicated on-site power source is needed for the facility. The generator would provide enough power to allow for safety systems, lighting, heating, air conditioning, communications, computers, and related devices to function and allow for uninterrupted government services during the disaster event. The current facility only has access to smaller portable generators and associated equipment, which do not have the capacity to meet the needs of the Community in regards to the functionality of the facility as a response and recovery command center.

SOLUTION

The proposed solution is to have a permanent, automatic, on-site generator with a dedicated on-site fuel source installed at the facility.



Pictured above is the Chenango Town Hall. Photo is courtesy of Eric Thayer.

Specific project work would include the installation of a back-up generator (400-kilowatt [kW], 480-volt service) for the municipal complex to ensure provision of services and provide support for all aspects of municipal functionality during a disaster. The generator is intended to also allow the facility to function as a command center during emergencies and disaster events. In order to ensure functionality of the generator during emergency events, a permanent on-site diesel fuel storage tank will be installed to provide a dedicated fuel source to the generator.

COST ESTIMATE

The estimated total project cost is \$225,000.

PROJECT BENEFITS

The installation of the generator will allow the municipal complex to function during disasters when publicly provided electricity is compromised. It will also allow the municipal complex to function as the emergency operations center during disaster events.

PROJECT COST-BENEFIT ANALYSIS

Economic Benefits

This project is based on the effort to strengthen and prioritize local emergency response and recovery capabilities, and aimed at building a more resilient Town in the face of future disasters. This type of investment creates greater confidence for private investors, as it illustrates a commitment to the future of the Town’s residents, local work force, and health and social well-being.

FIGURE 4.6 – AERIAL MAP OF MUNICIPAL COMPLEX GENERATOR



Aerial map of municipal complex source: ESRI ARC-GIS, Produced by Tetra Tech, Inc.

Additionally, by creating more reliable power resources to the Town’s central command center and center for emergency operations, this project ensures that the Town will become more resilient against future storms. The investment in critical emergency operations and infrastructure will reduce future losses to life and property.

Power interruptions to the Town Hall, particularly during critical incidents, such as a hurricane or winter storm, could lead to delayed disaster response and deployment of emergency medical personnel or first responders, including police, fire fighters, and technicians. This could lead to more severe damage than may have otherwise occurred.

Power interruptions could also force the relocation of key local government officials to an area that does have continuous operational power, resulting in increased staff time and potential site rental costs (for instance, if the Town government had to

relocate to a hotel or conference center). Thus, an indirect economic benefit to the installation of a backup generator at Town Hall is also reducing overall disaster response and recovery costs.

Environmental Benefits

The project will result in better environmental quality in the building due to health and safety improvements and any renovation associated with the installation of new back-up generator.

Health and Social Benefits

Installing a back-up power generator to the Town Hall ensures the provision of essential services during a severe weather event or disaster. Power outages can prevent the Town from operating normally. This makes Town officials and emergency personnel inaccessible to its residents. Having back-up generators will provide uninterrupted power to the Town’s critical facilities.



Additionally, by ensuring that emergency and medical personnel are able to respond promptly and consistently to the needs of residents during a flood or other disaster incident, the socially vulnerable populations in Chenango will also be much safer. Socially vulnerable residents most often include the unemployed, low-moderate income individuals, disabled, minorities and elderly, and they are typically more likely to experience medical concerns or have difficulty in leaving their homes (such as due to a lack of personal transportation) during an event requiring evacuation.

The Town of Chenango has several areas identified as having medium social vulnerability, particularly along the southern portion of the Town from Front Street to Route 12A. Installing a backup generator at the Town Hall will also increase the overall safety of these residents.

Additional Benefits

This project can positively impact the community by supporting multiple Town of Chenango NYRCR Plan goals, such as ensuring that adequate resources, services, and facilities are available to address emergency response and disaster recovery needs.

ANTICIPATED REDUCTION OF RISK ASSOCIATED WITH THE PROJECT

The improvements will decrease the vulnerability by adding the back-up generator. The project will help fortify the system against the flood hazards and positively impact it's functionality during flooding events.

IMPLEMENTATION TIME FRAME

General project implementation, including advertising and bidding, permit approval, procurement and installation is expected to take place over a nine-week period.

REGULATORY REQUIREMENTS

The project may require construction permits and special hazardous material permitting involving the diesel fuel storage tank.

JURISDICTION

Jurisdiction for this proposed project rests in the Town of Chenango.

SUMMARY

Municipal Complex Back-Up Generator

- Investment: \$225,000
- Flood Level Reduction: N/A
- Assets Protected: N/A
- Repetitive Flood Properties Removed: 0
- Potential Future Loss Prevented: N/A
- Jobs Created: TBD *

** The FTE construction jobs were estimated based on a methodology developed by the U.S. Department of Commerce Economics and Statistics Administration as presented in the September 2013 Economic Impact of Hurricane Sandy: Potential Economic Activity Lost and Gained in New Jersey and New York. This study estimated job creation from recovery spending on infrastructure projects in New York and reported 7.15 construction jobs and 8.4 total jobs per \$1,000,000 in construction spending.*

Northgate Water Pump Station Upgrades

PROJECT BACKGROUND

The Town of Chenango has water pump stations located throughout the Town that provide fresh water to the Community. One of the Town’s key pump stations is located in the Northgate Shopping Plaza. This well services all the homes and businesses along the Front Street corridor as well as part of the Town of Dickinson. The pump station also provides water service to Broome County’s correctional facility and Broome Community College, both located in the Town of Dickinson. This well pumps 500,000 to 800,000 gallons of water per day.

CONNECTION TO THE DISASTER

The Northgate water pump station is located in close proximity to the 100-year floodplain. The pump station lies in several hundred feet of the Chenango River and is in significant risk of flood inundation when the river

overtops its banks during flood events. This facility has suffered repeated flood inundation in the past and most recently was flooded with approximately three-to-four feet of water during Tropical Storm Lee.

Repetitive flooding, including flooding from Tropical Storm Lee, has jeopardized the functionality of the pump station. The facility is at risk of complete failure when inundated since the electrical system is not located adequately above flood inundation height. Even if the system does not fail due to the submersion of the electrical system during flood events, the ongoing maintenance has continued to cost the Community in labor and repairs to the system. Town staff must constantly monitor the system for risk of failure, which places them at risk while accessing and checking on the system.

Without intervention, the potential of damage to the facility places the Community (as well as the Town of Dickinson and several of its assets) at increased

FIGURE 4.7 – AERIAL MAP OF NORTHGATE WATER PUMP STATION



Aerial map of Northgate water pump station source: Tetra Tech, Inc.



risk during future storm events. This risk includes the reduction or loss of water service.

SOLUTION

The proposed project would raise the electrical systems for the pump station above projected flood levels to ensure functionality during flood events.

To identify an appropriate solution to this issue, hydrologic and hydraulic (H&H) modeling was used to determine the height the electrical system would have to be raised in order to protect the system. Using the results of the H&H model for the Chenango River, the base flood elevation at this location is 856.5 feet. Adding a 2-foot freeboard, the electrical systems should be raised to an elevation of 858.5 feet.

This will effectively raise the electrical system above flood height, protecting the system against flood water exposure during future storm events.

COST ESTIMATE

The estimated total project cost is \$29,750.

PROJECT BENEFITS

The project will increase facility resiliency and reduce the risk of electrical system flood inundation and potential system failure.

PROJECT COST-BENEFIT ANALYSIS

Economic Benefits

This project is based on the effort to strengthen and prioritize local utilities, and is aimed at building a more resilient Town in the face of future disasters. This type of investment in critical public utilities creates greater confidence for private investors, as it illustrates a commitment to the future of the Town's residents, local workforce, and health and social well-being, and a reasonable anticipation of impending population growth and new development.

Additionally, by decreasing the potential for part of the Town's water system to be inoperable during or immediately following flood events, and by making the system more resistant to future storm damage,

this project ensures that the Town will become more resilient against future storms, and prepared to serve an increasing population as the Town flourishes in years to come.

This project will also lower associated maintenance costs after disaster events because it will eliminate the need for electrical equipment to be replaced after 100-year flood events, allowing public funding to be directed towards other projects with aging infrastructure or utilities components.

Environmental Benefits

Table 4.3 outlines the type and quantity of the environmental benefits and impacts of the project. Although no environmental assets were identified as being completely secured, there are several environmental benefits associated with this project. The project will result in a continued supply of fresh water to the Town during flood events.

An analysis of the project location showed that the project is not near a potential or historic record of the existence of any threatened or endangered species in the project area.

Health and Social Service Benefits

Upgrading the Northgate Water Pump Station through elevation of the electrical components will allow it to be more flood-proof and resilient to storm events. The project will not only increase its resiliency to weather events and reduce flood damage costs, it also decreases the likelihood of secondary hazards, including electrical fires and service interruptions. Thus, this project will have an indirect benefit of increasing public safety for the maintenance staff and municipal employees who inspect the station during and after disaster events for damage and structural integrity.

During flooding events, residents may be impacted by the loss of water service. Those residents who are considered socially vulnerable to such events would be greatly impacted. By addressing this issue and demonstrating that the community cares about the needs of residents outside of the Town itself, the

TABLE 4.3 – TYPE AND QUANTITY OF ENVIRONMENTAL BENEFITS AND IMPACTS

	Type	Quantity
Environmental Assets Secured	Raise the electrical system for the pump station above projected flood levels using existing easements and right-of-ways to minimize any potential environmental impacts.	One back-up generator
Clean Up Accomplished	Potential for clean up during improvements.	TBD
Open Space Created	No additional open space created.	
Importance for Habitat	None	

Town of Chenango will also enhance its reputation among the region.

Public Support Benefits

This project received public support to merit its advancement.

Additional Benefits

- **Land Use Benefits** – This project has a positive impact on neighboring properties and uses by providing reduced flood risk and increased development capacity, which will help protect assets and potentially increases property values. In addition, this project continues to support investment in the Town’s downtown, where commercial growth is desirable.
- **Benefits Neighboring Communities** – This project will demonstrate the Town’s desire to also aid their neighboring communities. In this case, the project will specifically benefit the Town of Dickinson, as well as SUNY Broome College.
- **Supports NYRCR Plan Goals** – Completion of this project supports the Town of Chenango’s NYRCR Plan goal of maintaining and improving key infrastructure components and facilities to ensure the safe and efficient functions of the community, especially during and after disaster events.

ANTICIPATED REDUCTION OF RISK ASSOCIATED WITH THE PROJECT

While the project will not have any impact on the inundation extents or WSEs during flooding events, it

will serve to reduce the risk of the Northgate Plaza businesses.

The reduction in risk was analyzed using the assumptions and factors described in the methodology above.

The reductions in risk are specific to this asset. The improvements will decrease the exposure by moving the electrical systems above the base flood elevation. The project will help fortify the system against the flood hazards and positively impact it’s functionality during flooding events.

IMPLEMENTATION TIME FRAME

General project implementation, including preparation of engineering design documents, submission to regulatory agencies for review and permit approval, preparation of bid documents and response reviews, and construction is expected to take place over a ten week period.

REGULATORY REQUIREMENTS

There are no regulatory requirements anticipated for this project.

JURISDICTION

Jurisdiction for this proposed project rests in the Town of Chenango.



SUMMARY

Northgate Water Pump Station Upgrades

- Investment: \$29,750
- Flood Level Reduction: N/A
- Assets Protected: 1
- Repetitive Flood Properties Removed: 0
- Potential Future Loss Prevented: long term – \$1,000+ in electrical repairs
- Jobs created: NONE *

** The FTE construction jobs were estimated based on a methodology developed by the U.S. Department of Commerce Economics and Statistics Administration as presented in the September 2013 Economic Impact of Hurricane Sandy: Potential Economic Activity Lost and Gained in New Jersey and New York. This study estimated job creation from recovery spending on infrastructure projects in New York and reported 7.15 construction jobs and 8.4 total jobs per \$1,000,000 in construction spending.*

McGirk’s Sewer Lift Station Upgrades

PROJECT BACKGROUND

The Town of Chenango maintains a variety of sewer lift stations throughout the Community. These systems help remove waste water through the sanitary sewer system, which is then transferred to the Town’s sanitary sewer treatment facility adjacent to the Northgate Plaza along the Chenango River. The Town’s sewer lift stations help ensure the health and safety of the Community by effectively managing the Town’s waste water.

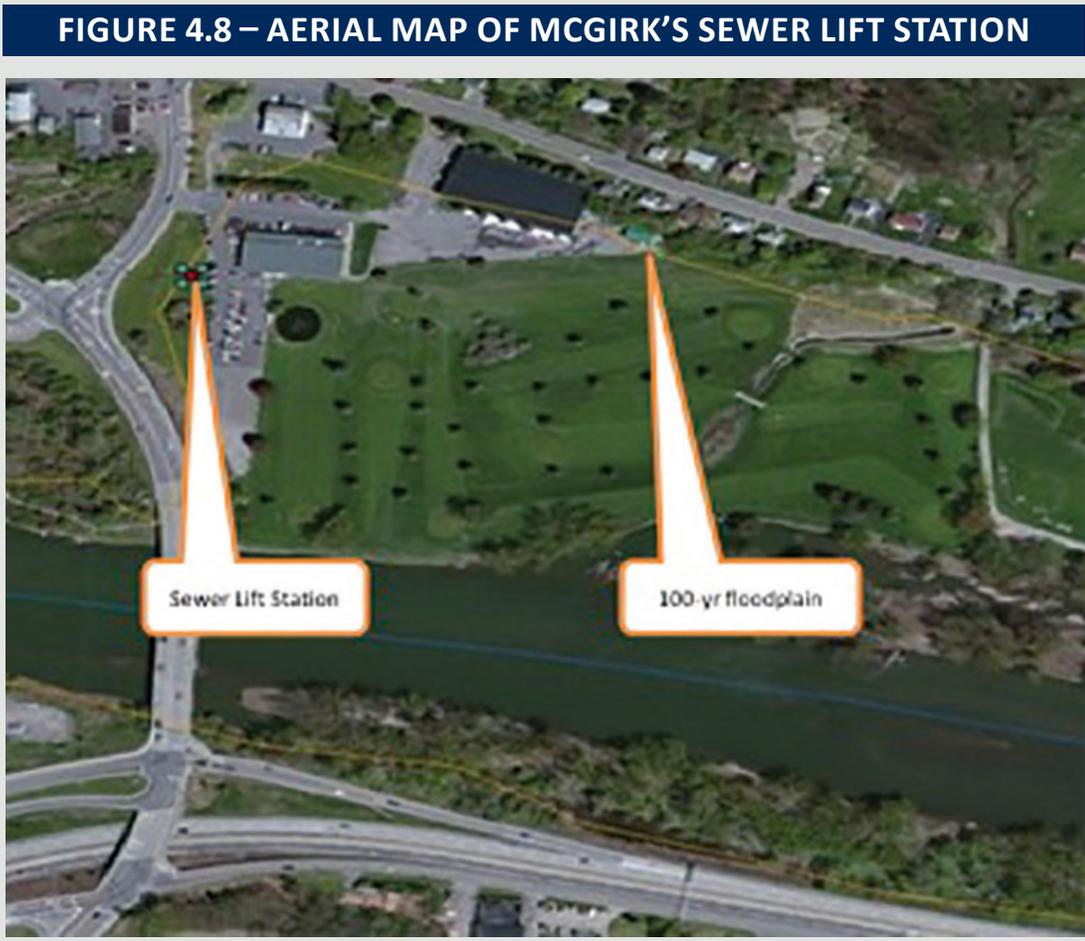
The McGirk’s station is located just north of the Chenango Bridge at the site of the Chenango Commons Golf Course. The facility is located in the 100-year floodplain. The McGirk’s sewer lift station in particular

receives all of the flow from the hamlet of Chenango Bridge and pumps it to the Route 12A pump station.

CONNECTION TO THE DISASTER

The location of the facility in the 100-year floodplain poses extreme risk to the lift station. This facility has suffered flood inundation in the past and most recently was flooded with approximately 4 feet of water during Tropical Storm Lee.

Repetitive flooding, including flooding from Tropical Storm Lee, has jeopardized the functionality of the lift station. The facility is at risk of complete failure when inundated because the electrical system is not located adequately above flood inundation height. Even if the system does not fail due to the submersion of the electrical system during flood events, the ongoing maintenance has continued to cost the Community in



Aerial map of McGirk’s sewer lift station source: ESRI ARC-GIS, Produced by Tetra Tech, Inc.



labor and material. Town staff must constantly monitor the system for risk of failure, which places them at risk during storm events.

SOLUTION

To address flood risk, the proposed project would raise the facility’s electrical systems above flood levels.

H&H modeling was used to identify adequate heights for the electrical system to be raised to protect it from flood exposure. The lift station is in the Chenango River floodplain at an elevation of 859.6 feet. Using the results of the H&H model for the Chenango River, the base flood elevation at this location is 861 feet. Adding a 2-foot freeboard, the electrical systems should be raised to a minimum elevation of 863 feet.

This will effectively raise the electrical system above flood height protecting the system against flood water exposure during future storm events.

COST ESTIMATE

The estimated total project cost is \$22,900.

PROJECT BENEFITS

The project will increase facility resiliency and reduce the risk of electrical system flood inundation and potential system failure.

PROJECT COST-BENEFIT ANALYSIS

Economic Benefits

This project is based on the effort to strengthen and prioritize local utilities, and is aimed at building a more resilient Town in the face of future disasters. Investment in critical public utilities creates greater confidence for private investors, as it illustrates a commitment to the future of the Town’s residents, local workforce, and health and social well-being, and a reasonable anticipation of impending population growth and new development. In

addition, the upgrades will require local service providers to perform the work and conduct routine inspections. This will result in the service providers’ increased revenue being translated to increased wages paid out to local employees for the period of the project. The money from these wages will be spent on other local goods and services, potentially creating additional jobs, increasing expendable income, and increasing taxes.

Major utility failures have an economic impact including the loss of work hours and the use of overtime for emergency personnel and utility response teams. Protective measures to prevent such utility interruptions will save the Town many of these secondary costs.

Additionally, by creating more reliable power resources, by decreasing the potential for part of the Town’s sewage system to be inoperable during or immediately following flood events, and by making the system more resistant to future storm damage, this project ensures that the Town will become more resilient against future storms and is prepared to serve an increasing population as the Town flourishes in years to come.

Environmental Benefits

Table 4.4 outlines the type and quantity of the environmental benefits and impacts of the project. Although no environmental assets were identified as being completely secured, there are several environmental benefits associated with this project. The project will benefit the environment by providing continual removal of waste water through the sanitary sewer system during flood events.

The results showed that the project is near a potential or historic record of an instance of the existence of the Bald Eagle, Brook Floater, Henslow’s Sparrow, Northern Harrier, Peregrine Falcon, Pied-billed Grebe, Timber Rattlesnake, Upland Sandpiper, Blunt-lobe Grape Fern, Corn Elm, Downy Wood-mint,

TABLE 4.4 – TYPE AND QUANTITY OF ENVIRONMENTAL BENEFITS AND IMPACTS

	Type	Quantity
Environmental Assets Secured	Raise the electrical system for the lift station above projected flood levels using existing easements and right-of-ways to minimize any potential environmental impacts.	One lift station
Clean-Up Accomplished	TBD	TBD
Open Space Created	No additional open space is created.	
Importance for Habitat	The lift station upgrades will continue to manage waste water and remove the risk of exposure to hazardous waste materials entering the ecosystem. This will continue to support aquatic life and water quality in the Chenango River.	

Fairy Wand, Golden Club, Hooker’s Orchid, Michaux’s Blue-eye-grass, Porter’s Reedgrass, Puttyroot, Rough Hedge-nettle, Wild Hydrangea, Wild Sweet-William and Yellow Wild Flax, which are threatened or endangered species. The project is not likely to affect the identified endangered species; however, during the construction of the improvements; consideration for the existence of these species will be made. The Unnamed Creek is identified as a class “B” waterway which indicates that its water supports fisheries and is suitable for non-contact activities. The Chenango River is identified as a class “C” waterway, which indicates that its water supports fisheries and is suitable for non-contact activities.

Health and Social Benefits

Upgrading the McGirk’s Sewer Lift Station through elevation of the electrical components will allow it to be more flood-proof and resilient to storm events. The project will not only increase its resiliency to weather events and reduce flood damage costs, it also decreases the likelihood of secondary hazards, including electrical fires and service interruptions. Thus, this project will have an indirect benefit of increasing public safety for the maintenance staff and municipal employees who inspect the station during and after disaster events for damage and structural integrity.

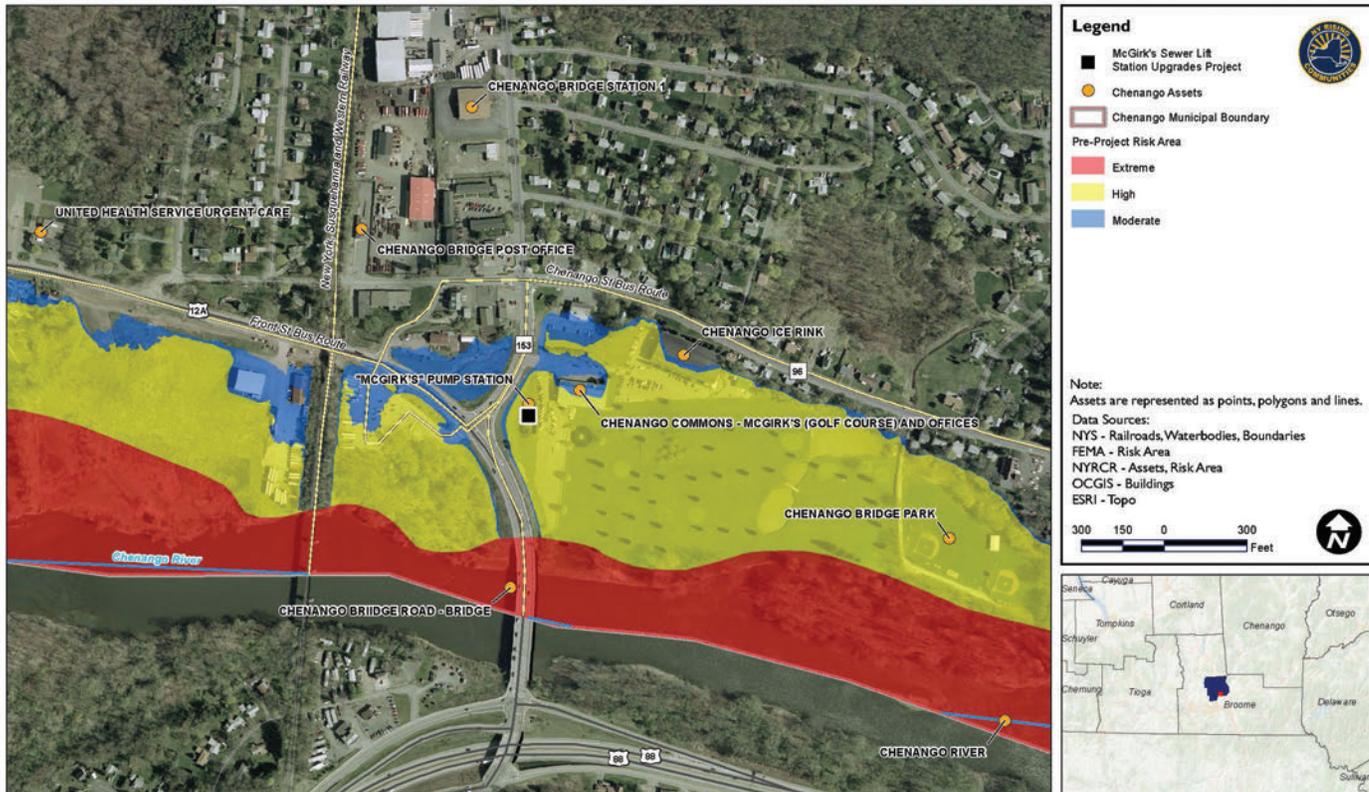
These station improvements will also strengthen the overall health of the community. If flood waters were to significantly damage the sewer lift station, it could

result in sewage overflows and backflows, creating a very toxic environment where the sewage release would happen. Residents would potentially have an inflow of human feces, sanitary napkins, toilet paper, and other undesirable/hazardous materials entering near their houses, putting themselves, children, and pets at risk. Contaminated water contains bacteria and viruses, pesticides, residuals from pharmaceutical drugs, and fungus, all of which lead to potential short-term, long-term, or fatal health problems.

During flooding events, residents may also be impacted by the loss of public utility services, even if backflows and overflows do not occur. Those residents who are considered socially vulnerable to such events would be greatly impacted because they are less likely to have access to transportation, alternate living locations, or economic resources to help with disaster recovery. The sewer lift station services part of the community which has been identified as having the highest concentration of socially vulnerable residents. Elevating electrical components to prevent sewage service interruptions will significantly aid these residents.



FIGURE 4.9 – AERIAL MAP OF MCGIRK’S SEWER LIFT STATION RISK AREA



Aerial map of McGirk's sewer lift station risk area source: Tetra Tech, Inc., HEC-RAS, 2014

NYRCR Plan strategies, including maintaining and improving key infrastructure components and facilities to ensure the safe and efficient functions of the community, especially during and after disaster events.

Additional Benefits

- **Land Use Benefits** – This project has a positive impact on neighboring properties and uses by providing reduced flood risk and increased development capacity, which will help protect assets and potentially increases property values. In particular, this project will help the nearby golf course, a previously identified strategic recreational asset to the Town. In addition, this project continues to support investment in high density neighborhoods and identified areas for future commercial and residential growth.
- **Supports NYRCR Plan Goals** – Completion of this project supports one of the Town of Chenango's

ANTICIPATED REDUCTION OF RISK ASSOCIATED WITH THE PROJECT

Figure 4.9 shows the Northgate Water Pump Station Upgrade's location in the defined Risk Areas. While the project will not have any impact on the inundation extents or WSEs during flooding events, it will reduce the risk of the lift station.

The improvements will decrease the exposure by adding defensive flood protection measures. The project will help fortify the system against the flood hazards and positively impact it's functionality during flooding events.

IMPLEMENTATION TIME FRAME

General project implementation, including preparation of engineering design documents, submission to regulatory agencies for review and permit approval, preparation of bid documents and response reviews, and construction is expected to take place over a ten week-week period.

REGULATORY REQUIREMENTS

There are no regulatory requirements anticipated for this project.

JURISDICTION

Jurisdiction for this proposed project rests in the Town of Chenango.

SUMMARY

McGirk's Sewer Lift Station Upgrades

- Investment: \$22,900
- Flood Level Reduction: N/A
- Assets protected: 1
- Repetitive Flood Properties Removed: 0
- Potential Future Loss Prevented: long term – \$1,000+ in electrical repairs.
- Jobs created: TBD *

** The FTE construction jobs were estimated based on a methodology developed by the U.S. Department of Commerce Economics and Statistics Administration as presented in the September 2013 Economic Impact of Hurricane Sandy: Potential Economic Activity Lost and Gained in New Jersey and New York. This study estimated job creation from recovery spending on infrastructure projects in New York and reported 7.15 construction jobs and 8.4 total jobs per \$1,000,000 in construction spending.*



Route 12A Water Pump Station Upgrades

PROJECT BACKGROUND

Another identified key Community asset and infrastructure component is the water pump station located on the south side of Route 12A adjacent to Thomas Creek. This station, like many other fresh water pump stations in the Town, provides a critical service in the delivery of fresh water to the Community. This pump station services the entire Chenango Bridge area, and pumps 300,000 to 500,000 gallons of water per day. Clean, reliable water is vital to the proper function and health of a community.

CONNECTION TO THE DISASTER

The Route 12A water pump station is located in the 100-year floodplain. It is located about 800 feet from the Chenango River and approximately 40 feet from Thomas Creek. The location of the pump station places it at extreme risk of flood inundation, not only from the Chenango River but also from Thomas Creek. The pump station has suffered flooding in the past and was flooded with approximately 3 to 4 feet of water during Tropical Storm Lee.

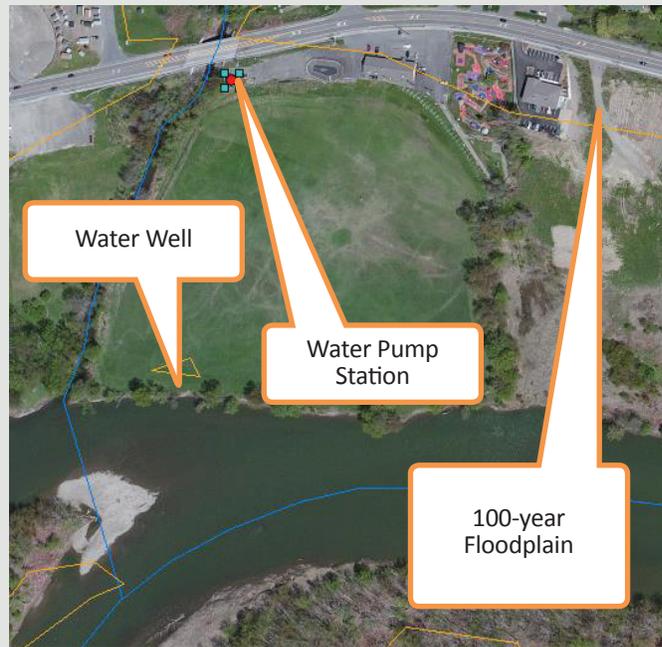
The ongoing maintenance, due to damages from flooding, continues to cost the Community in labor and materials to repair the system. In addition, maintenance and monitoring of the facility during flood events places municipal staff at risk as access to the site can be compromised and electrical systems may pose hazards in flood waters. Without intervention, the potential of damage to the facility places the Community at increased risk during future storm events. This risk includes the reduction or loss of water service.

SOLUTION

The proposed project would raise the electrical systems for the pump station above projected flood levels to ensure functionality during flood events.

To identify an appropriate solution to this issue, H&H modeling was used to determine the height the

FIGURE 4.10 – AERIAL MAP OF ROUTE 12A PUMP STATION SITE



Aerial map of Route 12A pump station site source: ESRI ARC-GIS, produced by Tetra Tech, Inc.

electrical system would have to be raised in order to protect the system. Using the results of the H&H model for the Chenango River, the base flood elevation at this location is 858.4 feet. Adding a 2-foot freeboard, the electrical system should be raised to an elevation of 860.4 feet. In addition to raising the electrical system above flood levels, the pump station needs a dedicated power source to ensure that the facility can continue to function if power is compromised during a storm event.

This will effectively raise the electrical system above flood height, protecting the system against flood water exposure during future storm events.

COST ESTIMATE

The estimated total project cost is \$167,300.

PROJECT BENEFITS

The project will increase facility resiliency and reduce the risk of electrical system flood inundation and potential system failure.

PROJECT COST-BENEFIT ANALYSIS

Economic Driver

This project is based on the effort to strengthen and prioritize local utilities, and is aimed at building a more resilient Town in the face of future disasters. This type of investment in critical public utilities creates greater confidence for private investors, as it illustrates a commitment to the future of the Town’s residents, local workforce, and health and social well-being, and a reasonable anticipation of impending population growth and new development. In addition, the physical installation of permanent generators at a critical facility, like the Route 12A Water Pump Station, will require local service providers to perform the work. The service providers’ increased revenue will result in increased wages being paid to local employees. The money from these wages will be spent on other local goods and services, potentially creating additional jobs, increasing expendable income, and increasing taxes.

Major utility failures have an economic impact in lost work hours, overtime of emergency personnel and utility response teams, and more. A backup power system to prevent such utility interruptions will save the Town many of these secondary costs.

Additionally, by creating more reliable power resources, by decreasing the potential for part of the Town’s water system to be inoperable during or immediately following flood events, and by making the system more resistant to future storm damage, this project ensures that the Town will become more resilient against future storms and is prepared to serve an increasing population as the Town flourishes in years to come.

Environmental Benefits

Table 4.5 outlines the type and quantity of the environmental benefits and impacts of the project. Although no environmental assets were identified as being completely secured, there are several environmental benefits associated with this project. The project offers an environmental benefit by continuing to provide a supply of fresh water to the Town during flood events.

The results showed that the project is near a potential or historic record of an instance of the existence of the Bald Eagle, Brook Floater, Henslow’s Sparrow, Northern Harrier, Peregrine Falcon, Pied-billed Grebe, Timber Rattlesnake, Upland Sandpiper, Blunt-lobe Grape Fern, Corn Elm, Downy Wood-mint, Fairy Wand, Golden Club, Hooker’s Orchid, Michaux’s Blue-eye-grass,

TABLE 4.5 – TYPE AND QUANTITY OF ENVIRONMENTAL BENEFITS AND IMPACTS

	Type	Quantity
Environmental Assets Secured	Raise the electrical system for the pump station above projected flood levels using existing easements and right-of-ways to minimize any potential environmental impacts.	One water pump station
Clean Up Accomplished	Potential for clean up during improvements.	TBD
Open Space Created	No additional open space is created.	
Importance for Habitat	None	



Porter’s Reedgrass, Puttyroot, Rough Hedge-nettle, Wild Hydrangea, Wild Sweet-William and Yellow Wild Flax, which are threatened or endangered species. The project is not likely to affect the identified endangered species; however, during the construction of the improvements; consideration for the existence of these species will be made. Although no areas of wetlands were identified in the project impact area, it is in a wetland “check zone” were actual wetlands may occur. Considerations during improvement for the existence of a wetland area will be made. Thomas Creek and the Chenango River are identified as a class “C” waterway which indicates that its water supports fisheries and is suitable for non-contact activities.

Health and Social Benefits

Upgrading the Route 12A Water Pump Station through elevation of the electrical components and by installing a backup generator will allow it to be more flood-proof and resilient to storm events. The project will not only increase its resiliency to weather events and reduce flood damage costs, it also decreases the likelihood of secondary hazards, including electrical fires and service interruptions. Thus, this project will have an indirect benefit of increasing public safety for the maintenance staff and municipal employees who inspect the station during and after disaster events for damage and structural integrity. It also ensures basic hygiene can continue for residents, promoting overall public health for the Town.

During flooding events, residents may be impacted by the loss of water service. Those residents who are considered socially vulnerable to such events would be greatly impacted because they are less likely to have access to transportation, alternate living locations, or economic resources to help with disaster recovery.

The water pump station services part of the community which has been identified as having the highest concentration of socially vulnerable residents, such as those who are unemployed, low-moderate

income, disabled, minorities, or elderly. Elevating electrical components and installing a backup power generator to prevent water service interruptions will significantly aid these residents.

Public Support Benefits

This project received public support at Public Engagement Events to justify advancement.

Additional Benefits

- **Land Use Benefits** – This project has a positive impact on neighboring properties and uses by providing reduced flood risk and increased development capacity, which will help protect assets and potentially increases property values. In addition, this project continues to support investment in high density neighborhoods and identified areas for future commercial and residential growth.
- **Supports NYRCR Plan Goals** – Completion of this project supports Town’s NYRCR strategy to maintain and improve key infrastructure components and facilities to ensure the safe and efficient functions of the community, especially during and after disaster events.

ANTICIPATED REDUCTION OF RISK ASSOCIATED WITH THE PROJECT

Figure 4.11 shows the Route 12A Water Pump Station Upgrade’s location in the defined risk areas. While the project will not have any impact on the inundation extents or WSEs during flooding events, it will serve to reduce the risk of the pump station.

The reduction in risk was analyzed using the assumptions and factors described in the previous methodology. The reductions in risk are specific to this asset.

The improvements will decrease the vulnerability by adding a back-up generator. The project will help fortify the system against the flood hazards and positively impact it’s functionality during flooding events.

IMPLEMENTATION TIME FRAME

The reductions in risk are specific to this asset. The improvements will decrease the vulnerability by adding a back-up generator. The project will help fortify the system against the flood hazards and positively impact its functionality during flooding events.

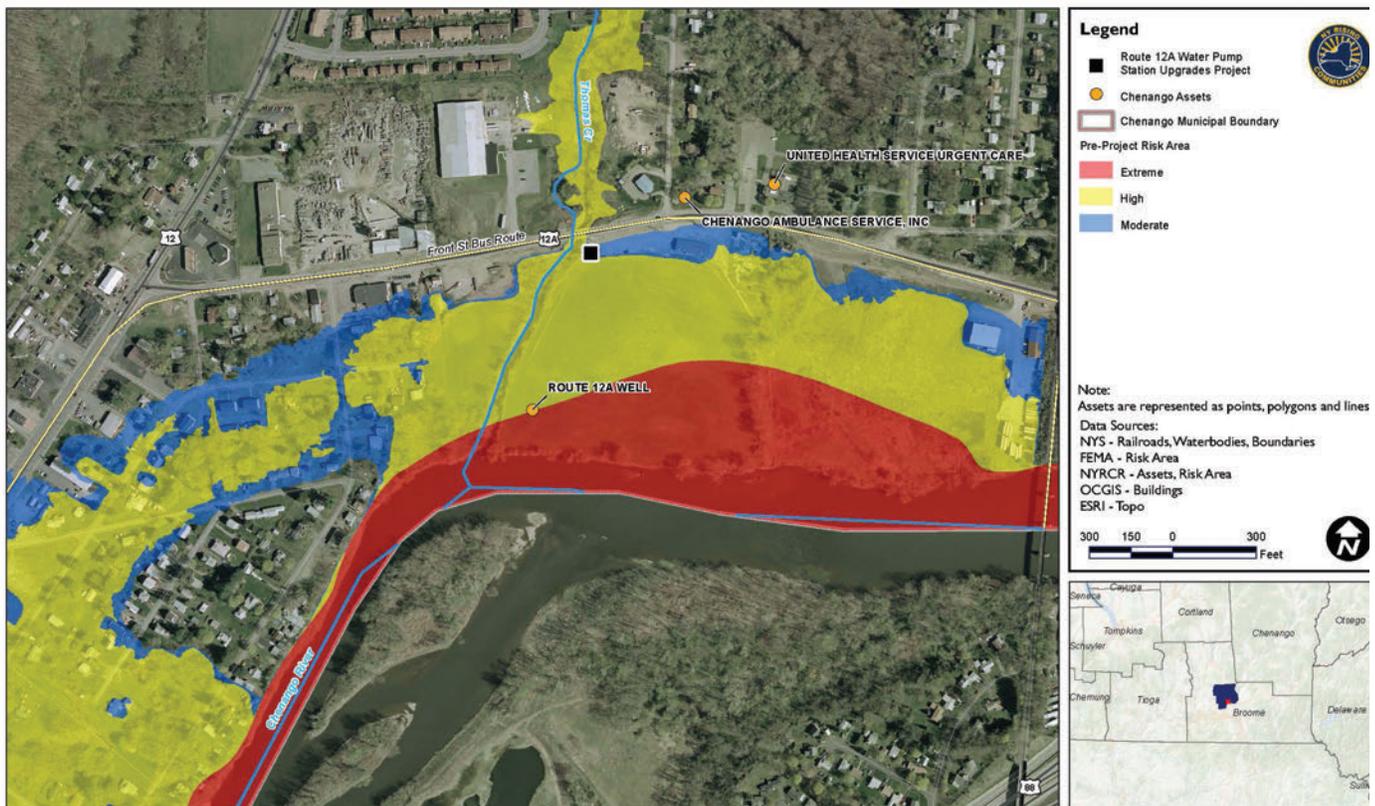
REGULATORY REQUIREMENTS

There are no regulatory requirements anticipated for this project.

JURISDICTION

Jurisdiction for this proposed project rests in the Town of Chenango.

FIGURE 4.11 – AERIAL MAP OF ROUTE 12A PUMP STATION LOCATION IN RISK AREA



Aerial map of Route 12A pump station location in risk area source: ESR ARC-GIS, produced by Tetra Tech, Inc.



SUMMARY

Route 12A Water Pump Station Upgrades

- Investment: \$167,300
- Flood Level Reduction: N/A
- Assets Protected: 1
- Repetitive Flood Properties Removed: 0
- Potential Future Loss Prevented: Long term – \$1,000+ in electrical repairs.
- Jobs Created: TBD *

** The FTE construction jobs were estimated based on a methodology developed by the U.S. Department of Commerce Economics and Statistics Administration as presented in the September 2013 Economic Impact of Hurricane Sandy: Potential Economic Activity Lost and Gained in New Jersey and New York. This study estimated job creation from recovery spending on infrastructure projects in New York and reported 7.15 construction jobs and 8.4 total jobs per \$1,000,000 in construction spending.*



Route 12A Sewer Lift Station Improvements

PROJECT BACKGROUND

Another critical Community asset is the Route 12A sewer lift station adjacent to Thomas Creek. This facility receives all the pumped sewage flow from the Chenango Bridge area and all the gravity flow from Highland and Woodland Roads. The station is a critical part of the Town's sanitary sewer system and is used to transfer waste to the Town's sewer treatment facility.

The project site consists of both the currently active and previously utilized lift stations, with electrical systems mounted on a nearby pole containing local power lines. The site is in proximity to the 100-year floodplain and lies very close to Thomas Creek.

CONNECTION TO THE DISASTER

The lift station site has suffered impacts from flooding on several occasions including complete inundation during Tropical Storm Lee due to its close proximity to the 100-year floodplain and Thomas Creek. This flooding has compromised the integrity of the electrical system at the site. Additionally, the site is at risk of impacts from debris being carried by flood waters and general debris depositions during flood events. While the facility continued to function during Tropical Storm Lee, flood inundation at the level experienced during the storm risked damaging and shutting down the facility.

SOLUTION

To effectively address risks to the site, it is recommended that the electrical systems be consolidated and raised above flood height. A flood wall will be installed around the facility to prevent inundation from adjacent low areas and allow access to the pump station during floods. The electrical panel should also be relocated inside the flood wall to improve access to electrical controls during maintenance operations. Using the results of the H&H model for the Chenango River, the base flood elevation at this location is 858.5 feet. Adding a 2-foot freeboard, the electrical systems should be raised to an elevation of 860.5 feet. Natural/green screening will be installed to enhance the

aesthetic quality of the project site.

These measures will protect the site from future flood inundation and exposure of the electrical system to flood waters while still permitting access to the facility.



Shown above, Route 12A Sewer Lift Station. Photo courtesy of Tetra Tech, Inc.

COST ESTIMATE

The estimated total project cost is \$76,650.

PROJECT BENEFITS

The project will increase facility resiliency and reduce the risk of electrical system flood inundation and potential system failure.

PROJECT COST-BENEFIT ANALYSIS

Economic Benefits

This project is based on the effort to strengthen and prioritize local utilities, and is aimed at building a resilient Town in the face of future disasters. Erecting a floodwall is less expensive than relocating the sewer lift station or elevating it to be out of the floodplain. Floodwalls can also be erected and protect a building from inundation without requiring other significant structural and design changes to the sewer station (besides relocating electrical components to be inside the floodwall).



Investment in critical public utilities creates greater confidence for private investors, as it illustrates a commitment to the future of the Town’s residents, local workforce, and health and social well-being, and a reasonable anticipation of impending population growth and new development. In addition, the physical installation of floodwall at a critical facility, like the Route 12A Sewer Lift Station, will require local service providers to perform the work and conduct routine inspections.

If all the suggested structural and utility upgrades from the NYRCR project are implemented, the service providers’ increased revenue will increase local employment wages. These wages will be spent on other local goods and services, potentially creating additional jobs, increasing expendable income, and increasing taxes.

Major utility failures have an economic impact in lost work hours, overtime of emergency personnel and utility response teams, and more. Protective measures to prevent such utility interruptions will save the Town many of these secondary costs.

Additionally, by creating more reliable power resources, by decreasing the potential for part of the Town’s sewage system to be inoperable during or immediately following flood events, and by making the system more resistant to future storm damage, this project ensures that the Town will become more resilient against future storms and is prepared to serve an increasing population as the Town flourishes in years to come.

Environmental Benefits

Table 4.6 outlines the type and quantity of the environmental benefits and impacts of the project. Although no environmental assets were identified

FIGURE 4.12 – AERIAL MAP OF ROUTE 12A SEWER LIFT STATION



Aerial map of Route 12A sewer lift station. Source: ESRI ARC-GIS, Produced by Tetra Tech, Inc.

TABLE 4.6 – TYPE AND QUANTITY OF ENVIRONMENTAL BENEFITS AND IMPACTS

	Type	Quantity
Environmental Assets Secured	Raise the electrical system for the lift station above projected flood levels using existing easements and right-of-ways to minimize any potential environmental impacts.	One lift station
Clean-up Accomplished	TBD	TBD
Open Space Created	No additional open space was created.	
Importance for Habitat	The lift station upgrades will continue to manage waste water and remove the risk of exposure to hazardous waste materials entering the ecosystem. This will support aquatic life in local waterways.	

Source: NYS DEC, 2014

as being completely secured, there are several environmental benefits associated with this project. The project provides environmental benefits by removing waste water through the sanitary sewer system during flood events. The results showed that the project is near a potential or historic record of an instance of the existence of the Bald Eagle, Brook Floater, Henslow’s Sparrow, Northern Harrier, Peregrine Falcon, Pied-billed Grebe, Timber Rattlesnake, Upland Sandpiper, Blunt-lobe Grape Fern, Corn Elm, Downy Wood-mint, Fairy Wand, Golden Club, Hooker’s Orchid, Michaux’s Blue-eye-grass, Porter’s Reedgrass, Puttyroot, Rough Hedge-nettle, Wild Hydrangea, Wild Sweet-William and Yellow Wild Flax, which are threatened or endangered species. The project is not likely to affect the identified endangered species During the construction of the improvements, however, consideration for the existence of these species will be made. Although no areas of wetlands were identified in the project impact area, it is in a wetland “check zone” were actual wetland may occur. Considerations during improvement for the existence of a wetland area will be made. Thomas Creek and the Chenango River are identified as a class “C” waterway which indicates that its water supports fisheries and is suitable for non-contact activities.

Health and Social Benefits

Upgrading the Route 12A Sewer Lift Station through elevation of the electrical components and construction of a floodwall will allow it to be more

flood-proof and resilient to storm events. The project will not only increase its resiliency to weather events and reduce flood damage costs, it also decreases the likelihood of secondary hazards, including electrical fires and service interruptions. Thus, this project will have an indirect benefit of increasing public safety for the maintenance staff and municipal employees who inspect the station during and after disaster events for damage and structural integrity.

These station improvements will also strengthen the overall health of the community. If flood waters were to significantly damage the sewer lift station, it could result in sewage overflows and backflows, creating a very toxic environment where the sewage release would happen. An overflow and backflow of the system could put residents at risk. Contaminated water contains bacteria and viruses, pesticides, residuals from pharmaceutical drugs, and fungus, all of which lead to potential short-term, long-term, or fatal health problems.

During flooding events, residents may also be impacted by the loss of public utility services, even if backflows and overflows do not occur. Those residents who are considered socially vulnerable to such events would be greatly impacted because they are less likely to have access to transportation, alternate living locations, or economic resources to help with disaster recovery.



The sewer lift station services part of the community which has been identified as having the highest concentration of socially vulnerable residents, such as those who are unemployed, low-moderate income, disabled, minorities, or elderly. Elevating electrical components and installing a floodwall to prevent sewage service interruptions will significantly aid these residents.

Additional Benefits

- **Land Use Benefits** – This project has a positive impact on neighboring properties and uses by providing reduced flood risk and increased development capacity, which will help protect assets and potentially increases property values. In addition, this project continues to support investment in high density neighborhoods and identified areas for future commercial and residential growth.
- **Supports NYRCR Plan Goals** – Completion of this project supports one of the Town’s NYRCR strategies of maintaining and improving key infrastructure components and facilities to ensure the safe and efficient functions of the community, especially during and after disaster events.

ANTICIPATED REDUCTION OF RISK ASSOCIATED WITH THE PROJECT

The reduction in risk was analyzed using the assumptions and factors described in the methodology above.

Figure 4.13 shows the Northgate Water Pump Station Upgrade’s location in the defined Risk Areas. While the project will not have any impact on the inundation extents or WSEs during flooding events, it will serve to reduce the risk of the lift station. The reductions in risk are specific to this asset. The improvements will decrease the exposure by adding defensive flood protection measures. The project will help fortify the system against the flood hazards and positively impact functionality during flooding.

IMPLEMENTATION TIME FRAME

General project implementation, including preparation of engineering design documents, submission to regulatory agencies for review and permit approval, preparation of bid documents and response reviews, and construction is expected to take place over a fourteen week period.

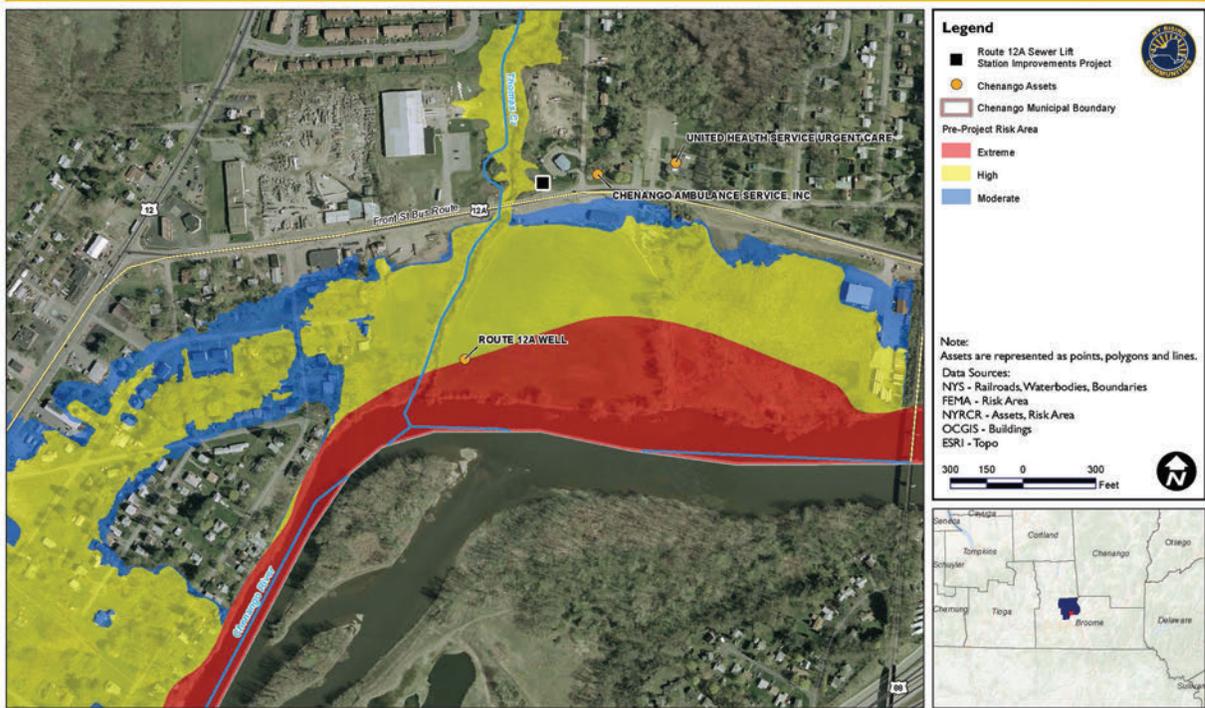
REGULATORY REQUIREMENTS

There are no regulatory requirements anticipated for this project.

JURISDICTION

Jurisdiction for this proposed project rests in the Town of Chenango.

FIGURE 4.13 – ROUTE 12A SEWER LIFT STATION RISK AREA



Aerial map of Route 12A sewer lift station risk area source: ESRI ARC-GIS, Produced by Tetra Tech, Inc.

FIGURE 4.14 – CONCEPT DRAWING OF ROUTE 12A SEWER LIFT STATION SCREENING



Concept rendering of Route 12A source: Tetra Tech, Inc., 2014



SUMMARY

Route 12A Sewer Lift Station Improvements

- Investment: \$76,650
- Flood level reduction: N/A
- Assets protected: 1
- Repetitive flood properties removed: 0
- Potential future loss prevented: Long term – \$1,000+ in electrical repairs
- Jobs created: TBD*

** The FTE construction jobs were estimated based on a methodology developed by the U.S. Department of Commerce Economics and Statistics Administration as presented in the September 2013 Economic Impact of Hurricane Sandy: Potential Economic Activity Lost and Gained in New Jersey and New York. This study estimated job creation from recovery spending on infrastructure projects in New York and reported 7.15 construction jobs and 8.4 total jobs per \$1,000,000 in construction spending.*

Regional Shelter Funding

PROJECT BACKGROUND

The Town of Chenango currently lacks any formal sheltering facility beyond space at local fire department buildings. These facilities generally lack capacity and resources to function effectively as a shelter. The Town has considered possibly using the highway maintenance garage and the high school as potential shelter locations. Due to the need for these facilities to continue to function for their original purpose, they do not permit effective utilization of these sites as shelters.

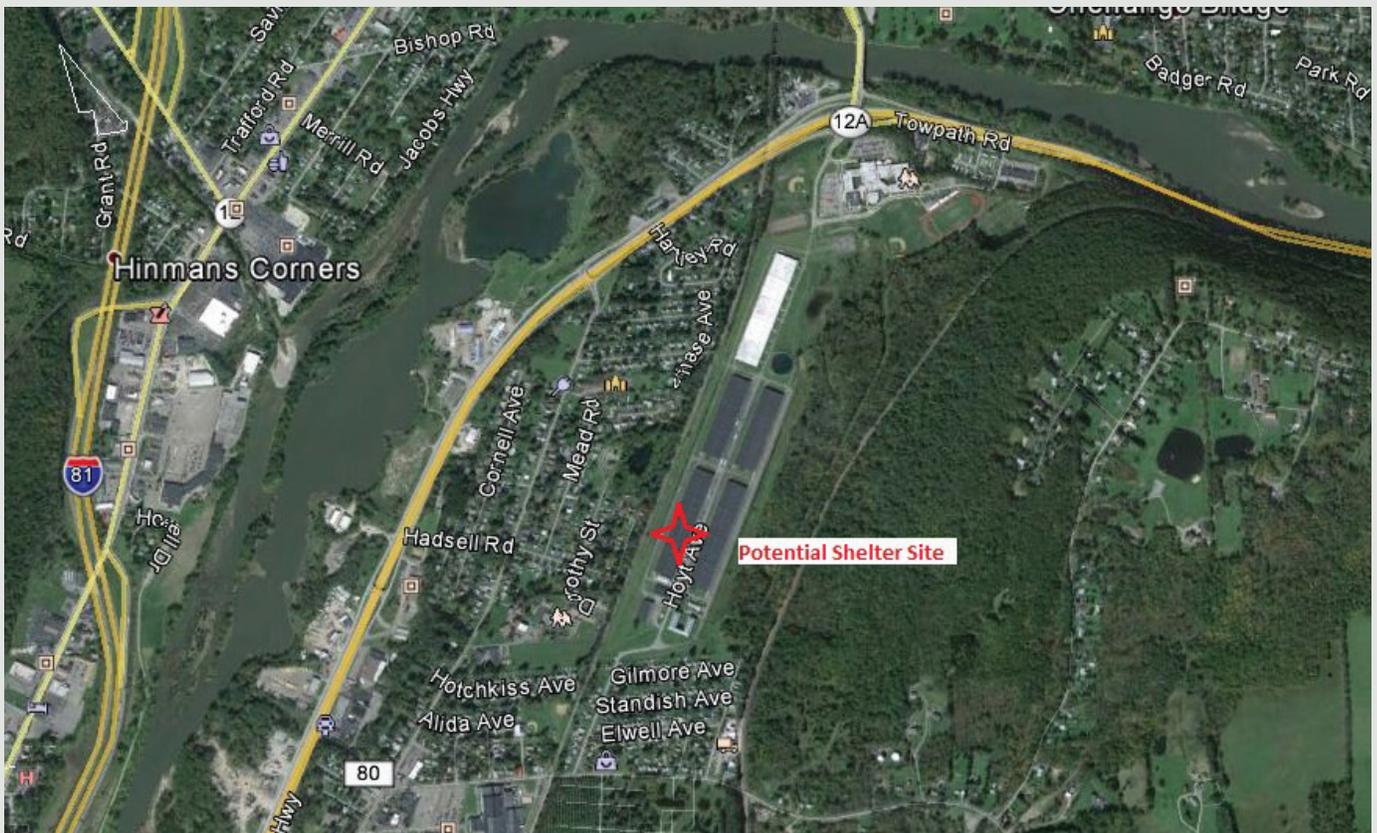
The Broome County Hazard Mitigation Plan and the Broome NY Rising Recovery Plan (prepared by six Round 1 NYRCR communities) identified the need for a regional emergency shelter facility. This shelter would provide service to residents of Broome County impacted by disaster events.

CONNECTION TO THE DISASTER

After being impacted by Tropical Storm Lee, it became apparent that the Town of Chenango lacked adequate sheltering facilities. While the Town has access to some smaller short-term facilities such as local fire stations, churches, and schools, many of these facilities need to function and provide service for their original intent and purpose. In addition, facilities such as schools place a variety of people in extremely stressed circumstances in proximity to children attending school. This could result in potential conflicts and risks that the Community hopes to avoid.

Due to the flooding and evacuations caused by Tropical Storm Lee, several hundred residents needed short-term sheltering services until their properties became accessible and they could return to their homes. The complexity of providing adequate shelter that could also provide American Red Cross recovery services made it

FIGURE 4.15 – AERIAL MAP OF POTENTIAL SHELTER SITE



Aerial map of potential shelter site. Source: Google Earth



clear that a more functional shelter option needed to be considered.

SOLUTION

The Broome NYRCR Plan included a project to develop a regional shelter at a former military depot in Fenton, which could house several thousand individuals. The Town of Chenango, in coordination with several other communities and Broome County, will jointly provide funds to develop a feasibility study for a regional emergency shelter.

The provision of the shelter will provide residents of the Town of Chenango with an emergency shelter location in relatively close proximity to their homes.

COST ESTIMATE

The total cost to undertake a feasibility study, identify compatible uses, and develop cost estimates for the regional shelter is approximately \$500,000. The estimated project cost (Chenango’s portion) is \$100,000.

PROJECT BENEFITS

The project will help identify a potential regional shelter site that would serve the residents of Chenango.

PROJECT COST-BENEFIT ANALYSIS

Economic Benefits

A report entitled, “The Economic Impact of Shelter Assistance in Post-Disaster Settings,” and prepared by CHF International under a grant from US Agency for International Development (USAID), explores and enumerates the other economic benefits provided by disaster shelters.

The most noteworthy economic benefits are listed immediately below:

- Pre-disaster economic benefits
- Shelter construction costs (or if already built, any construction costs to bring the shelter into compliancy measures)

- Increased economic activity stimulated by demand for materials used in construction or to prepare necessary supplies (toiletries, dried food, etc.) in advance.
- Post-disaster economic benefits
 - The use of shelter as a rent-saving mechanism
 - Increased productivity of workers
 - The development of home-based enterprise activities (HBE)

The majority of pre-disaster economic benefits are likely to be Town/region-wide, while the majority of post-disaster economic benefits are likely to be at an individual, resident basis. When a disaster incident reaches a complexity and severity requiring shelter activation, many residents are likely to experience some form of economic hardship (whether immediate or long-term) due to the costs of repairs to their homes/businesses and/or the potential loss of income from a destroyed vehicle, business closed because of the storm, or time needed to be spent on household repairs. While the Broome County shelter would not likely result in a long-term usage (thus activating the rent-saving mechanism economic benefit), it can still promote increased productivity of workers and HBE development as many residents will seek to return home and become economically stable as soon as possible.

The study conducted by CHF and USAID also found the following relevant economic findings:

- Families provided with shelter post-disaster typically attain a significantly higher increase in income than those families who are not provided with shelter.
- Investments in emergency shelter provision provide significant returns, generating a payback conservatively valued at three to eight times the value of the initial investment.
- Even for the programs serving the poorest and most vulnerable, and given only a short time for benefits to emerge, shelter provision appears to return considerably more than the initial investment.



- The benefits of shelter last beyond the emergency assistance period. These include positive effects on increased income and family health.
- The benefits from shelter provision appear to be larger after a period of a year or two has passed to enable forward linkages in the economy (e.g., the use of shelter as a platform for business, investments as a consequence of rent-saving, or inducements for a range of trades serving the investments in the home).
- The role of shelter as capital is particularly important in accelerating development and increasing incomes, but is typically unappreciated, particularly among post-disaster program planners.
- Beyond capital, but linked to it, the role of shelter as an overall platform for increasing incomes—with links to key ingredients for income improvement such as credit, training, agricultural support, small business development—is underappreciated, as well.

While these findings are specifically directed towards developing countries or areas with populations at a low to moderate income and would require further analysis for a population at a more median-income level, they provide a strong foundation to justify the economic benefits of a regional shelter in Broome County, NY, as well.

Environmental Benefits

No environmental assets were identified as being completely secured, however, there are several environmental benefits associated with this project. The project may result in the following environmental benefits:

- Creation of pedestrian friendly green space, sidewalks, and landscaping around the facility.
- Better environmental quality in the building due to health and safety improvements and any renovation associated with the project.

Additional Benefits

- **Benefits Neighboring Communities** – This project will demonstrate the Town’s desire to also aid their neighboring communities. In this case, the project will specifically benefit all of Broome County, including the other 26 jurisdictions in the County besides the Town of Chenango.
- **Strengthens Relationships with Local/Regional Organizations** – Because shelter development and implementation is heavily reliant upon volunteer support, this project has the potential to strengthen Town and County relationships with local/regional organizations, including volunteer organizations such as the American Red Cross. The American Red Cross will provide site visits to assess shelter capability and needs and will often organize shelter staffing and maintenance during a disaster event.
- **Supports NYRCR Plan Goals** – Completion of this project supports one of the Town’s NYRCR strategies to maintain and improve key infrastructure components and facilities to ensure the safe and efficient functions of the community, especially during and after disaster events.

ANTICIPATED REDUCTION OF RISK ASSOCIATED WITH THE PROJECT

The provision of the shelter will provide residents of the Town of Chenango with an emergency shelter location in relatively close proximity to their homes.

IMPLEMENTATION TIME FRAME

The study will take place over the course of 24 months.

REGULATORY REQUIREMENTS

The project may need to be coordinated with the NYS Department of Environmental Conservation (DEC) and NYS DOH as the proposed site was a former Department of Defense hazardous waste clean-up site.

JURISDICTION

Jurisdiction for this proposed project rests in Broome County.



SUMMARY

Regional Shelter Funding

- Investment: \$100,000
- Flood level reduction: N/A
- Assets protected: N/A
- Repetitive flood properties removed: 0
- Potential future loss prevented: NA
- Jobs created: TBD *

** The FTE construction jobs were estimated based on a methodology developed by the U.S. Department of Commerce Economics and Statistics Administration as presented in the September 2013 Economic Impact of Hurricane Sandy: Potential Economic Activity Lost and Gained in New Jersey and New York. This study estimated job creation from recovery spending on infrastructure projects in New York and reported 7.15 construction jobs and 8.4 total jobs per \$1,000,000 in construction spending.*



Fox Road Stormwater Improvements

PROJECT BACKGROUND

Fox Road winds through the hills in the northern section of the Town of Chenango, running west from Route 11. It is a small, two-lane road primarily lined with residences and some farms. Heading west along Fox Road from Route 11, the road crosses over Brooks Creek and then intersects with Brooks Road and Houdlum Hill Road. This intersection is located approximately 300 feet from Brooks Creek and contains a cluster of residences located around the intersection.

Currently, as Fox Road passes over Brooks Creek, it traverses three large culverts adjacent to one another. Brooks Creek suffers from flooding and an extreme amount of debris deposition during heavy storm events.

CONNECTION TO THE DISASTER

During Tropical Storm Lee, the culverts beneath Fox Road along Brooks Creek became jammed with debris. This caused water to back up along the creek and overtop its banks, which resulted in flooding of nearby residential properties. The site has suffered from this same issue in the past, which has resulted in damages to property, closed road ways, and costs incurred by the Town for clean-up and repair. In addition to property damages from flooding, the culverts and roadway also suffer damages as water floods the road, eroding portions of the banks and areas around the culverts, and debris impacts all of these components.

SOLUTION

To address the water management capacity issues, the project will involve the following:

- Removing the three existing culverts underneath Fox Road along Brooks Creek;
- Replacing culverts on Fox Road with a bridge spanning Brooks Creek that would have a 55-foot span and 8-foot rise; and

- If possible, widening the existing creek's cross-sectional area or providing additional detention storage along the creek between Perry Road and Fox Road.

This will increase the span and clearance for Brooks Creek allowing water and debris to more easily pass beneath Fox Road with reduced risk of jam and impacts from debris.

COST ESTIMATE

The estimated total project cost is \$240,680.

PROJECT BENEFITS

The project will address the cause of repeated flooding due to the existing stormwater management system. This will help address flooding impacts to homes as well as address the flooding which ends up isolating many of the homes once the culverts and channel are overburdened.

PROJECT COST-BENEFIT ANALYSIS

Economic Benefits

This project may create some temporary construction jobs to complete the project and may support local businesses who could supply materials and equipment. This injected funding into the regional construction supply line encourages economic growth through additional induced spending. Induced spending occurs as employees and businesses benefiting from the construction work in turn spend money on other goods and services. The potential induced benefit includes additional permanent jobs, increased taxes, and increased expendable income that may be spent on local goods and services.

In addition to this economic growth, improvements building a more resilient Town and roadways will create greater confidence for private investors in the Town of Chenango. As the Town prioritizes and implements infrastructure and transportation



TABLE 4.7 – TYPE AND QUANTITY OF ENVIRONMENTAL BENEFITS AND IMPACTS

	Type	Quantity
Environmental Assets Secured	Remove undersized culverts along Fox Road and Brooks Creek and replace with a bridge to expand capacity and reduce flood impacts.	Replace three culverts with a 55-foot span bridge with an 8-foot rise.
Clean Up Accomplished	Clean up accumulated debris along the existing culverts to improve stream functioning in Brooks Creek.	TBD
Open Space Created	No additional open space created.	
Importance for Habitat	The removal of the culvert and widening of the creek’s cross section will provide additional storage along Brooks Creek and lessen sedimentation along the channel. This will create a more reliable flow source to support aquatic life and water quality in the Brooks Creek.	

Source: NYS DEC, 2014

projects addressing flood safety and accessibility issues, these investments will encourage individuals and private businesses to continue to invest in Chenango, stimulating commercial and industrial business growth.

Finally, replacing the Fox Road culverts with a bridge will have a positive economic effect on future recovery and repair spending. As a result of this project, the local roadway will become more resilient against future storms. The project will reduce inundation for surrounding properties and transportation infrastructure which will help to reduce the significant future maintenance or repair costs associated with flood damage. While this project will certainly create economic opportunity, there are, however, limited direct economic benefits anticipated (permanent jobs, direct additional spending, and direct additional taxes).

Environmental Benefits

Table 4.7 outlines the type and quantity of the environmental benefits and impacts of the project. Although no environmental assets were identified as being completely secured, there are several environmental benefits associated with this project. The project will result in the following environmental benefits:

- Increase in conveyance capacity and reduction of upstream WSEs.

- Widen existing creek’s cross section to increase detention storage.

The results showed that the project is not near a potential or historic record of an instance of the existence of any threatened or endangered species. As indicated above the expected result of the project will improve conditions in and along the Brooks Creek. The project is not likely to affect the identified endangered species, however during the construction of the improvements; consideration for the existence of these species will be made. Although no areas of wetlands were identified in the project impact area, the reduction in WSE during smaller interval storm events could lead to the revitalization of wetland areas that may exist in the affected area. The Brooks Creek is identified as a class “C” waterway, which indicates that its water supports fisheries and is suitable for contact activities.

Health and Social Benefits

Implementing flood control measures to mitigate future flood damage on Fox Road will have significant social benefits. In particular, Fox Road serves as a main route or final destination for about a dozen residences in the Town of Chenango. By decreasing future flood damage and overtopping on this road, the Town will simultaneously increase residents’ confidence in being able to consistently access local routes and will facilitate increased travel on local roads. Also, farmers in this area have unique

FIGURE 4.16 – SECTION SAMPLE OF EXISTING CULVERT

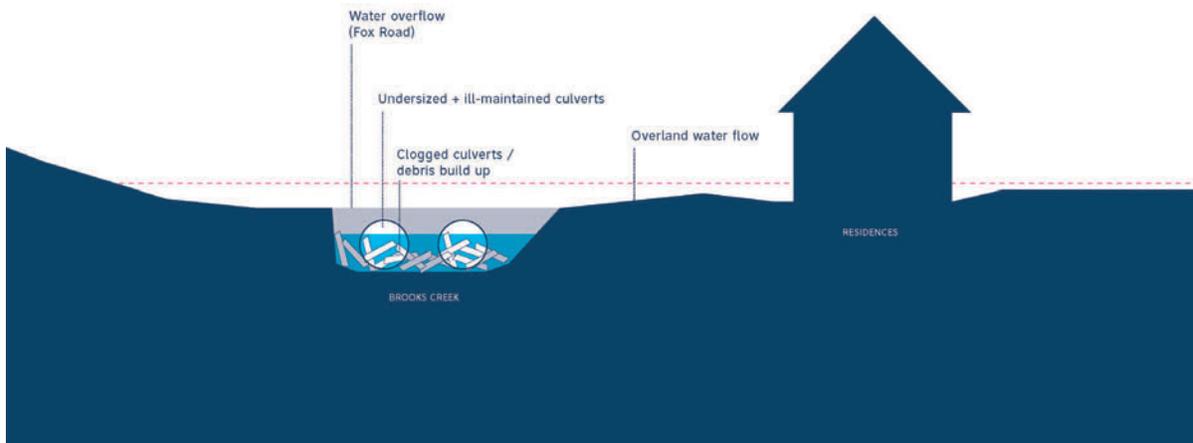


Diagram of clogged culvert source: Tetra Tech, Inc., 2014

FIGURE 4.17 – FOX ROAD CONCEPT FOR BRIDGE DEVELOPMENT



Photo rendering of Fox Road concept for bridge development source: Tetra Tech, Inc., 2014



roadway needs including the movement of livestock or produce. This project will contribute to economic stability for the Community.

Additionally, implementing flood control measures on this roadway segment will also decrease the risk of damage to personal vehicles, thereby increasing overall residential safety and preventing potential economic hardship. Health and safety personnel will be able to more adequately complete their jobs during and immediately after storm events, due both to less people needing assistance and to the ability to more easily access people who are in need (rather than needing to search for alternative, less-frequented routes that are not flooded).

Health and safety personnel’s ability to traverse Fox Road with ease is particularly important, since the majority of structures in the area are residential, and there could be elderly residents, persons with access and functional needs, or other socially vulnerable populations in greater need of assistance nearby.

By repairing roads now, it is less likely that the Town’s roads will suffer further damage in future storms (or that they will suffer less significant damage), thus ultimately keeping costs lower for the Town and decreasing future road closures. Decreased road closures will have secondary benefits for increasing the efficiency of Town staff, DPW personnel and police’s time, decreasing the potential for utility interruptions, and increasing residential confidence in the Town’s ability to respond to flood events.

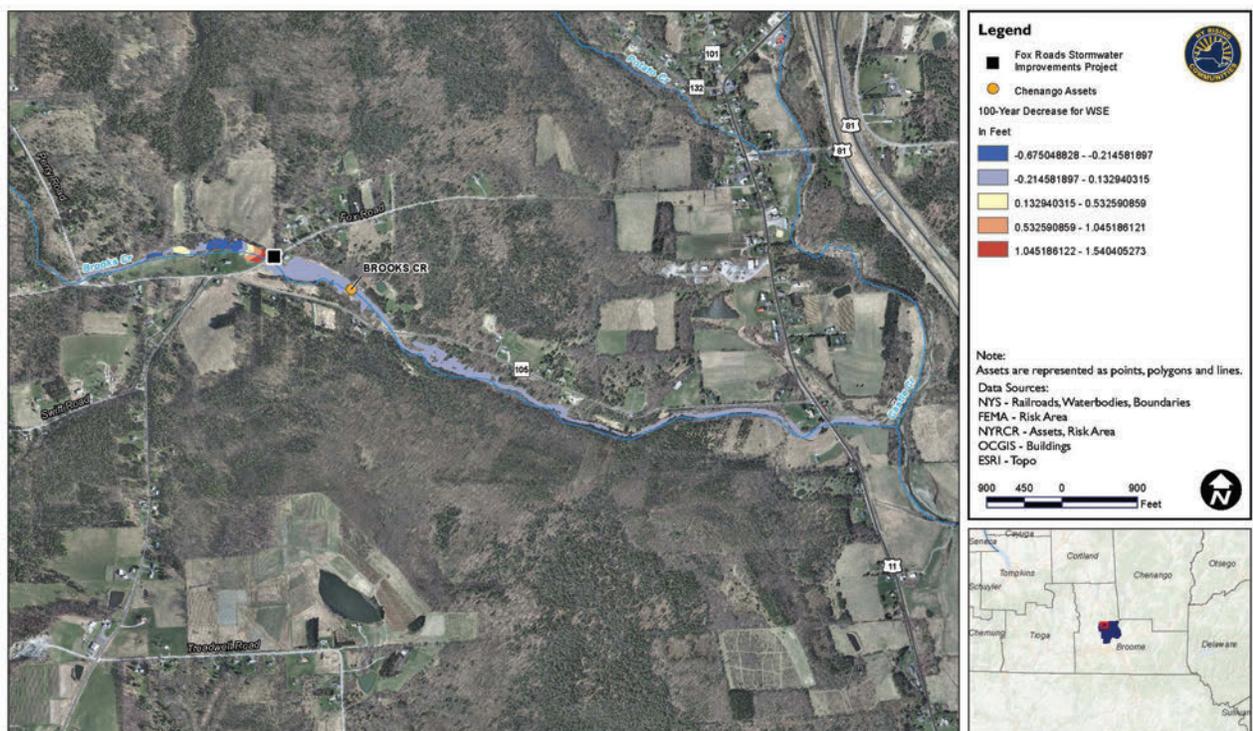
Public Support

Public feedback at Public Engagement Events was positive toward this project.

Additional Benefits

- **Provide Framework for Future Flood Control Resiliency Measures on Local Roads** – Although only one roadway segment was selected for this project’s focus, many other Town roadway segments are also highly vulnerable to the effects

FIGURE 4.18 – FOX ROAD PROJECT SITE AERIAL



Aerial map of Fox Road project site. Source: Tetra Tech, Inc., HEC-RAS, 2014

of flooding and have experienced repetitive damage. Upon successful completion of the Fox Road’s bridge, the Town could begin planning future transportation resiliency actions and demonstrate the success of Fox Road for flood control to secure funding for these new projects.

- **Strengthen Relationships with Nearby Communities** – Although Fox Road does not border other communities, residents of other communities routinely use Chenango transportation corridors to reach jobs, complete their shopping, and conduct other daily business. This project provides an opportunity for the Town to strengthen existing relationships with nearby communities by showing a regional benefit.
- **Supports NYRCR Plan Goals** – Completion of this project supports the Town’s NYRCR strategy to maintain and improve key infrastructure components and facilities to ensure the safe and efficient functions of the community, especially during and after disaster events.

ANTICIPATED REDUCTION OF RISK ASSOCIATED WITH THE PROJECT

The reduction in risk was analyzed using the available HEC-RAS derived dataset and using the assumptions and factors described in the methodology. The maps below visually display the potential effects of the Fox Road Stormwater Improvements project. Figure 4.18 shows the location of the project site in relation to flood hazards.

The project has the potential to eliminate the risks associated with flooding to the Brooks Creek. The project does not reduce the risk area or WSE for any assets; however, it does have the potential to alleviate flooding to upstream and downstream assets. The original inundation extents are based on FEMA DFIRM data.

IMPLEMENTATION TIME FRAME

General project implementation, including preparation of engineering design documents, submission to regulatory agencies for review and permit approval, preparation of bid documents and response reviews, and construction is expected to take place over a 14 week period.

REGULATORY REQUIREMENTS

The project will require necessary construction permits and must meet all local regulations regarding road construction requirements.

JURISDICTION

Jurisdiction for this proposed project rests in the Town of Chenango.



SUMMARY

Fox Road Stormwater Improvement

- Investment: \$240,680
- Flood level reduction: N/A
- Assets protected: Approx. 12 residences, as well as infrastructure (i.e., transportation) assets
- Repetitive flood properties removed: 0
- Potential future loss prevented: TBD
- Jobs created: Approx. 4*

** The FTE construction jobs were estimated based on a methodology developed by the U.S. Department of Commerce Economics and Statistics Administration as presented in the September 2013 Economic Impact of Hurricane Sandy: Potential Economic Activity Lost and Gained in New Jersey and New York. This study estimated job creation from recovery spending on infrastructure projects in New York and reported 7.15 construction jobs and 8.4 total jobs per \$1,000,000 in construction spending.*

Grant Road Stormwater Pipe Replacement

PROJECT BACKGROUND

Grant Road is a residential road that lies to the west of Interstate 81, and is located just southwest of where Castle Creek intersects the interstate. Grant Road runs parallel to Interstate 81 in a small residential neighborhood consisting of several single-family homes and a small junkyard.

One of the key features of Grant Road is that it intersects Fuller Road, which goes underneath Interstate 81 and connects with Front Street. This is an important feature because Dorman Road, which extends west from the Grant Road neighborhood, is the primary roadway for people living along this road and in the southwestern portion of the Town to access downtown Chenango. If something inhibits traffic flow along this corridor, it can effectively isolate hundreds of families from downtown Chenango.

FIGURE 4.19 – GRANT ROAD PIPE REPLACEMENT AERIAL



Aerial photo of Grant Road pipe replacement. Source: ESRI ARC-GID, Produced by Tetra Tech, Inc.

The Fuller Road and Grant Road intersection is significant because directly north of the intersection is a 36-inch stormwater drainage pipe. This pipe is part of a system that carries stormwater draining off hills to the west to a State stormwater management system near Interstate 81.

CONNECTION TO THE DISASTER

During significant storm events, runoff from local hills flows through swales in the Grant Road neighborhood where it then funnels into a pipe beneath the ground for approximately 200 feet before emptying into a detention area. The stormwater coming off of these hills often moves very swiftly and contains a substantial amount of debris. This debris has caused much of the pipe to become clogged and portions of



it have begun to rust away. During Tropical Storm Lee, the pipe clogged and caused water to back-up and overflow the existing swales. This caused flooding in the neighborhood and threatened the functionality of the intersection. Standing water at the site made the intersection extremely dangerous to pass through, which prevented access to downtown Chenango for all of those traveling along the length of Dorman Road and residing in the Grant Road neighborhood. In addition, the residents of eight homes on Grant Road north of the intersection were isolated and unable to utilize this road.

SOLUTION

The project would consist of removing approximately 200 feet of stormwater pipe (3-foot diameter) and replacing it with a new 3-foot-diameter galvanized pipe. It would also include installing an access point for cleaning approximately midway along the pipe.

This project will allow stormwater to freely move through the pipe and provide an access point for cleaning to help prevent the accumulation of debris.

COST ESTIMATE

The estimated total project cost is \$75,200.

PROJECT BENEFITS

The project will address consistent flooding issues along Grant Road due to the substandard condition of the existing stormwater management system. This will help reduce or eliminate flooding to local residences and ensure that Grant Road can remain functional during heavy rains.

PROJECT COST-BENEFIT ANALYSIS

Economic Benefit

This project would create limited construction jobs in the short term, potentially creating work for local and regional contractors in addition to materials and equipment sales for local and regional suppliers. This injected funding into the regional construction supply line encourages economic growth through additional induced spending, which occurs as employees and businesses participating in the construction work in

turn spend money on other local goods and services. The potential induced benefit includes short term increase in value added tax revenues.

Additionally, outside of hazard and flood incidents, this project will reduce ongoing maintenance costs. Currently, the Town needs to consider redirecting necessary and limited manpower towards debris removal and more intensive maintenance and repair costs (or lacking sufficient manpower, the issue that future flood damage will continue to grow more severe). By replacing the necessary pipe with newer material, this will lower the time and amount of effort needed to ensure proper maintenance.

During and immediately after flood events, this project will also help reduce the cost of flood damage repairs to local roadways that are currently flooded due to the substandard condition of the current pipe. During Tropical Storm Lee, the Town of Chenango had to repair 100' of a damaged 42" pipe, road surface, rip rap wall, and road shoulder near 145 Dorman Road, which is located relatively close to Grant Road and the proposed project site. The damage costs for Dorman Road totaled \$20,362, which was slightly more than the damage costs for the entire town-wide road/culvert debris removal. Those damage costs totaled \$19,798.

One last and more indirect economic benefit to this project is that it will help ensure that Dorman Road remains open during and immediately following flood disaster events by eliminating flooding at the intersection of Dorman and Grant Roads. By maintaining this access, residents will not have to worry about any loss of income from not being able to get to their jobs and local businesses in downtown Chenango will not receive a decrease in daily shopping amounts.

Environmental

Although no environmental assets were identified as being completely secured, there are several environmental benefits associated with this project.



The project will result in the following environmental benefits:

- Removal of debris from system resulting in increased conveyance capacity.
- Reduction of upstream ponding and flooding.
- Restoration of water flow in the stream to its natural state.

Health and Social Benefits

The Grant Road Stormwater Improvements project will benefit the overall health for residents in the Town of Chenango in several significant ways. Most importantly, this project will prevent residents, specifically hundreds of families in neighborhoods near Grant Road, Fuller Road, and Dorman Road, from becoming as easily isolated during flood events. Approximately eight homes along Grant Road were completely isolated during Tropical Storm because the only way out from their homes was through the proposed project site. If residents are not prepared for this potential isolation, they can be lacking necessary food and toiletries, as well as medicines.

This is of particular concern for any vulnerable populations in the region, such as the elderly or those with functional and access needs, because they typically need a higher level of medical care. This project will help ensure that (1) residents with special needs are able to obtain necessary medications and health supplies and (2) emergency medical personnel can reach residents in the event of a health emergency.

Additionally, this project will help reduce both short-term and chronic stress and anxiety for residents who live near the intersection. People who are aware of the frequency of flooding and potential for isolation will have increased worry during a flood event or immediately before a flood event. By ensuring the road is less floodprone, the nearby residents will be able to direct their energy towards obtaining necessary supplies and preparing for the flood, not stressing over whether they will be trapped.

This project will also increase motorist safety.

The CDC reports that over half of all flood-related deaths occur when a car or motor vehicle is driven into flooded areas. Because the proposed project location is both a prime transit area and the only means of access for some residents into and out of their neighborhood, there is an increased likelihood that motorists may become stranded while trying to traverse this area when flooded. By reducing the frequency of the road flooding, the Town will also significantly decrease the potential loss of life or rate of motor vehicle accidents during flood events in this intersection.

Additional Benefits

- **Supports NYRCR Plan Goals** – Completion of this project supports the Town's NYRCR strategy of improving stormwater management facilities to better handle significant storm events, increase capacity and effectiveness, and help prevent or reduce risk and damage to persons and property.

ANTICIPATED REDUCTION OF RISK ASSOCIATED WITH THE PROJECT

This project will allow stormwater to freely move through the piping and provide an access point to clean out the pipe to help prevent similar situations from happening in the future. Thus, it would potentially lower the flood exposure to Grant Road and nearby residences.

IMPLEMENTATION TIME FRAME

General project implementation, including preparation of engineering design documents, submission to regulatory agencies for review and permit approval, preparation of bid documents and response reviews, and construction is expected to take place over a 13 week period.

REGULATORY REQUIREMENTS

The project will require necessary construction permits.

JURISDICTION

Jurisdiction for this proposed project rests in the Town of Chenango.



SUMMARY

Grant Road Stormwater Pipe Replacement

- Investment: \$75,200
- Flood level reduction: N/A
- Assets protected: 0
- Repetitive flood properties removed: 0
- Potential future loss prevented: TBD
- Jobs created: TBD*

** The FTE construction jobs were estimated based on a methodology developed by the U.S. Department of Commerce Economics and Statistics Administration as presented in the September 2013 Economic Impact of Hurricane Sandy: Potential Economic Activity Lost and Gained in New Jersey and New York. This study estimated job creation from recovery spending on infrastructure projects in New York and reported 7.15 construction jobs and 8.4 total jobs per \$1,000,000 in construction spending.*

Nimmonsburg Neighborhood (Wallace Road) Stormwater Management System Master Plan

PROJECT BACKGROUND

The Nimmonsburg neighborhood is located in the southern portion of the Town of Chenango. It lies west of Front Street along the municipal boundary with the Town of Dickinson. The houses are detached, single-family homes that line a series of streets spanning the neighborhood. The streets include North and South Morningside Drive, Johnson Road, Wallace Road, Smith Hill Road, Hillside Drive, and Norton Drive. Residences are located on parcels of about 0.25 to 0.50 acre in size, typically containing a single-story structure. The neighborhood is nestled between rolling hills on the west and Front Street on the east. The neighborhood is made up of well-maintained properties, but lacks some infrastructure amenities such as sidewalk, curbs/gutters, and an effective stormwater management system.

The neighborhood is prone to flooding for a variety of reasons, including stormwater runoff from hills to the west, ineffective stormwater management systems along Smith Hill Creek and in the neighborhood, and the nature of topography in the area which consists of depressions.

CONNECTION TO THE DISASTER

During Tropical Storm Lee, the Smith Hill Creek stormwater management system completely failed due to debris deposition, undersized components, and poor drainage design. In addition, the eastern end of Wallace Road is located in a geographic depression with only small stand-alone catch basins to collect any water. These became quickly inundated and clogged with debris as water poured off of nearby hills and overtopped the stormwater management system. This led to extensive flooding throughout the neighborhood with over \$1 million in personal property loss, damages, and repairs.

Part of the issue plaguing this neighborhood is

addressed in the previously described Smith Hill Creek Stormwater management system proposed project. However, that project is focused on addressing the urgent need to improve the stormwater management system, which has consistently failed and caused severe flooding. In order to fully address the flood risks to this neighborhood, a comprehensive study and stormwater management plan must be developed.

SOLUTION

The comprehensive study and stormwater management plan project would include a comprehensive study of the Smith Hill Creek stormwater management system, the creek's watershed, analysis of existing stormwater management system in the neighborhood, and topography and drainage in the target area.

The comprehensive analysis and resulting stormwater management plan for the neighborhood would help the Community to identify additional long-term goals and projects for the neighborhood to more efficiently and effectively manage stormwater and protect residents and their property.

COST ESTIMATE

The estimated total project cost is \$300,000.

PROJECT BENEFITS

The project will provide a comprehensive stormwater management analysis in order to effectively address flooding issues in the Nimmonsburg neighborhood. This will help the community identify the necessary steps needed to provide long term solutions to address flooding and increase resiliency within the neighborhood.

PROJECT COST-BENEFIT ANALYSIS

Economic Benefits

The actual analysis and development of the stormwater management plan will not have a direct economic impact. The results of the study and associated plan could result in projects that could address several factors that cause or contribute to



TABLE 4.8 – TYPE AND QUANTITY OF THE ENVIRONMENTAL BENEFITS AND IMPACTS

	Type	Quantity
Environmental Assets Secured	Potential improvements and upgrades to existing catch basins, culverts, and other water collection systems in the Town.	Approximately seven culverts and/or catch basins along Smith Hill Creek.
Clean Up Accomplished	Potential for debris removal in catch basins and culverts.	TBD
Importance for Habitat	The development of a stormwater management plan has the potential to improve stormwater conditions that will likely help to improve water quality and create a more reliable flow source to support aquatic life.	

flooding in the neighborhood. This could potentially save millions of dollars for local residents who have continually incurred costs due to losses and damages associated with flooding in the neighborhood.

Environmental Benefits

Although no environmental assets were identified as being completely secured, there are several environmental benefits associated with this project. The project will result in the following environmental benefits:

- Conduct a thorough study of the watershed and develop a master stormwater management plan to mitigate future stormwater impacts.

An analysis of the project location showed that the project is not near a potential or historic record of an instance of the existence of any threatened or endangered species. As indicated previously, the expected result of the project will improve conditions in and along Smith Hill Creek. The project is not likely to affect the identified endangered species; however during the construction of the improvements, consideration for the existence of these species will be made. Although no areas of wetlands were identified in the project impact area, the reduction in WSE during smaller interval storm events could lead to the revitalization of wetland areas that may exist in the affected area. The Smith Hill Creek is identified as a class “C” waterway, which indicates that its water supports fisheries and is suitable for non-contact activities.

Public Support Benefits

The Town has received ongoing public support throughout the planning process to address the flooding issues in the Nimmonsburg Neighborhood, which includes Smith Hill Creek and Wallace Road.

Additional Benefits

By conducting the study and having it on file, the Town would have a plan to specifically cite that could address flood issues in the target area. This will assist in securing potential future funding as the issues will be recognized in a formal planning document with qualitative (and quantitative?) evidence.

ANTICIPATED REDUCTION OF RISK ASSOCIATED WITH THE PROJECT

This project has the potential to reduce vulnerability and exposure to Chenango’s assets by identifying type and location for additional stormwater management projects. Assets closer to the Smith Hill Creek Stormwater management system have the highest potential for the reduction in risk.

IMPLEMENTATION TIME FRAME

This plan will take approximately six months to complete.

REGULATORY REQUIREMENTS

The development of the plan does not involve any regulatory requirements.

JURISDICTION

Jurisdiction for this proposed project rests in the Town of Chenango.



SUMMARY

Nimmonsburg Neighborhood (Wallace Road) Stormwater Management System Master Plan

- Investment: \$300,000
- Flood level reduction: N/A
- Assets protected: 1
- Repetitive flood properties removed: 0
- Potential future loss prevented: The plan itself will not result in the prevention of future loss.
- Jobs created:)*

** The FTE construction jobs were estimated based on a methodology developed by the U.S. Department of Commerce Economics and Statistics Administration as presented in the September 2013 Economic Impact of Hurricane Sandy: Potential Economic Activity Lost and Gained in New Jersey and New York. This study estimated job creation from recovery spending on infrastructure projects in New York and reported 7.15 construction jobs and 8.4 total jobs per \$1,000,000 in construction spending.*



Surveys, Site Analysis, and Testing for New Well in Northern Section of Town

PROJECT BACKGROUND

The Town of Chenango’s primary business district is located in the most flood-prone portion of the Town. This area houses a significant portion of the Town’s business and infrastructure, including several water pump stations, roads, sewer lift stations, major employers, and more. In addition, some of the Town’s infrastructure, such as the Northgate water pump station, provides service to adjacent communities. The exposure of these systems to flood poses a significant risk of system failure. To avoid this situation, the Town is considering developing a new well further north away from the flood-prone areas along the Chenango River. This will increase local capacity to support future development as well as provide redundancy and resiliency to the system.

The Town is also currently updating its Comprehensive Plan. A significant portion of this plan addresses commercial development in the Community. Commercial development is currently limited by the accessibility and availability of public water for commercial businesses.

With these two factors in mind, the Town has been considering the option of constructing a new fresh water well in the northern section of Town, away from the flood-prone areas along the Chenango River. The development of this well will address the following issues:

- Need for redundancy in the existing water system in case portions of the system in the flood-prone areas fail;
- Increased capacity to allow for and promote economic development within the Community and outside the floodplain; and
- Need to secure water sources outside of flood-prone areas to ensure the safety of the system.

CONNECTION TO THE DISASTER

Historic flood events in Chenango have placed the Town’s water pump stations at great risk. These facilities were flooded with as much as four feet of water from Tropical Storm Lee. Fresh, potable water is one of the most significant health and safety provisions in a community and is absolutely necessary for the day-to-day function of the Town, its residents, and businesses.

SOLUTION

The project consists of the development of a new well in the northern section of Town to allow for increased system capacity, redundancy, and resiliency.

Specific project work includes:

- Conducting studies to identify best site location for well; and
- Performing water testing.

The development of this well will help protect the Town from complete system failure if one or several pump stations located in the floodplain become damaged or otherwise cease to function.

COST ESTIMATE

The estimated total project cost is \$254,900.

PROJECT BENEFITS

The studies and analysis are necessary components to properly cite the well and verify that an adequate quantity of safe drinking water is accessible via the well. Once this is verified, construction on the well can take place. The well development project will increase the Town’s fresh water capacity, which will support future development in the Town. It will also provide redundancy and resiliency to the system to ensure that fresh water continues to be provided to the community if any of the wells located in flood hazard zones are damaged and/or out of commission.

PROJECT COST-BENEFIT ANALYSIS

Economic Benefits

The economic benefits from this project could be substantial since the provision of public water further

TABLE 4.9 – TYPE AND QUANTITY OF ENVIRONMENTAL BENEFITS AND IMPACTS

	Type	Quantity
Environmental Assets Secured	Develop a new well and construct a pump station to increase water system capacity and resiliency to prevent complete system failure during flood events.	One new well and pump station
Clean Up Accomplished	TBD	TBD
Open Space Created	No additional open space created.	
Importance for Habitat	None	

north along Route 12 would allow for increased commercial development both along that corridor and outside the floodplain. Currently, economic development is limited, because water must be provided by private, on-site wells. Commercial development, especially development of any significant magnitude, requires a dedicated, reliable source of water.

This project could allow for extensive commercial development along the Route 12 corridor, as well as potentially providing new jobs and increasing the tax base for the Town. Commercial development along the Route 12 corridor could provide the Town with thousands of additional dollars in taxes every month, depending on the level of development. With proper guidance by the Town, development along this corridor could focus on drawing higher paying commercial business to the area rather than additional retail, which is already concentrated in the Town’s commercial corridor.

The well would also provide secondary benefits by supplying the existing system with redundancy and safety. The new well would provide the necessary water if one of the existing flood-prone wells failed or had to be shut off for safety reasons. The new well would ensure that local residents and business would continue to have water, especially if the system were interlinked with the existing public water system.

Environmental Benefits

Although no environmental assets were identified as being completely secured, several environmental

benefits are associated with this project. The project will provide an environmental benefit by developing a new well and pump station in the northern section of Town to provide continued clean water during flood events.

Health and Social Benefits

The purpose of the studies and analysis is to make sure that the potential new well would have adequate capacity and would provide quality water for the community. This will help verify that clean safe drinking water is available to the Town and thereby provide substantial health benefits to the community in regards to the well development project.

The provision of these studies and tests will ensure that a well can be constructed, again aiding in an increased capacity and redundancy in the existing water system. By providing redundancy to the Town’s water system, the new well will ensure the safe and efficient distribution of water to residents and businesses on a continual basis, no matter what outside factors may occur. The efficient provision of clean, safe water is critical for any community.

Additional Benefits

- **Increased Service Capacity** – The addition of a new well in the Town will not only add redundancy and increase health and safety but will also allow for additional water service capacity as well. This will aid development and redevelopment opportunities in the Community.



- **Supports Goals of the Town Comprehensive Plan** – The project supports the Town’s desire to increase water service to accommodate future growth.
- **Supports NYRCR Plan Strategies** – Completion of this project supports the Town’s NYRCR strategy to maintain and improve key infrastructure components and facilities to ensure the safe and efficient functions of the Community, especially during and after disaster events.

ANTICIPATED REDUCTION OF RISK ASSOCIATED WITH THE PROJECT

Conducting studies and surveys to locate the well site is necessary to develop a well in the northern section of Town. The provision of this well will help protect the Town from complete system failure if one or several

pump stations located in the floodplain become damaged and/or cease to function.

IMPLEMENTATION TIME FRAME

General project implementation, including submission to regulatory agencies for review and permit approval, preparation of bid documents and response reviews, and surveys and analysis is expected to take place over a four-month period.

REGULATORY REQUIREMENTS

Permitting may be required to verify that there are no environmental or health issues related to the citing and development of the well.

JURISDICTION

Jurisdiction for this proposed project rests in the Town of Chenango.

SUMMARY

Surveys, Site Analysis, and Testing For New Well in Northern Section of Town

- Investment: \$254,900
- Flood level reduction: N/A
- Assets protected: 0
- Repetitive flood properties removed: 0
- Potential future loss prevented: N/A
- Jobs created: Construction: N/A*

** The FTE construction jobs were estimated based on a methodology developed by the U.S. Department of Commerce Economics and Statistics Administration as presented in the September 2013 Economic Impact of Hurricane Sandy: Potential Economic Activity Lost and Gained in New Jersey and New York. This study estimated job creation from recovery spending on infrastructure projects in New York and reported 7.15 construction jobs and 8.4 total jobs per \$1,000,000 in construction spending.*

Stormwater Enforcement and Legal Assistance

PROJECT BACKGROUND

Over the last several years, the Town of Chenango has encountered several obstacles regarding redevelopment, code enforcement, and other related issues in the Community. These issues have varied from land-use violations to environmental and permitting issues. During the course of this planning process, several innovative and significant projects were considered; however, due to ongoing legal and enforcement issues, the projects have no real way to come to fruition in the near future. This is not only costing the Community thousands of dollars in legal fees and staff time but is also preventing improvements and redevelopment from occurring in the Community.

CONNECTION TO THE DISASTER

Some of the enforcement and legal processes could directly address flood hazards in the Community. There were several issues with specific properties that, due to potential violations, may have contributed to increased flood impacts. It has been difficult to have these items addressed directly due to legal and other enforcement issues.

SOLUTION

This project will help address some of the Town's legal and enforcement issues through funding assistance. Funds will be used to coordinate with State and local agencies regarding sites throughout the Community that may contribute to flooding issues. In addition, funds will be used for legal and other professional services to address such sites. Legal services would include fees and staff time to address land use, permitting, and code and ordinance issues.

This project will help remove some of the obstacles currently inhibiting development and redevelopment, as well as those preventing the Town from making progress on potential threats to the Community.

COST ESTIMATE

The estimated total project cost is \$150,000.

PROJECT BENEFITS

This project will significantly help the Town address a variety of legal, enforcement, and other issues which currently hinder progress on more substantial flood-related issues.

PROJECT COST-BENEFIT ANALYSIS

Economic Benefits

The most immediate economic benefit of this project is the relief that the funds will provide to the Town regarding addressing ongoing enforcement and legal issues. These issues have consistently plagued the Community for over a decade. Enforcement and legal issues cost tens of thousands of dollars to the Community each year. They also drain funds and resources that could be used to directly address other issues. This includes addressing and improving stormwater and flooding issues in the Community.

In a broader sense, this project is critical in addressing stormwater issues at key sites throughout the Community. By providing the funding needed to appropriately deal with the legal and enforcement matters that have stalled progress on potential projects, they can now allow projects to move forward. This will result in flood threats finally being attended to as contributing sites and factors can now have definable projects developed and implemented in a timely manner.

These projects will reduce or eliminate flood risks in the Community, which could prevent property damage and financial loss due to these flood events. The economic impacts would benefit residents, businesses, service providers, and the Town directly, as costs from flood impacts and recovery are minimized or eliminated.

Health and Social Benefits

By removing legal roadblocks and assisting in enforcement issues, projects which involve the very health and safety issues posed by these flood hazards could be addressed.

This project would open the door to effectively and permanently address risks posed to the community.



It would allow and support agency coordination, site access, land use conformity, application of the appropriate fees and fines, and other actions necessary to promote the health and safety of the Town while ensuring laws and regulations are being properly enforced.

Additional Benefits

- **Support Legal and Enforcement Consistency** – Promote legal, code, zoning and enforcement policy through the Town.
- **Supports NYRCR Plan Goals** – Completion of this project supports the NYRCR strategy of developing local zoning and codes that help secure public safety, preserve property, and limit disaster impacts to the greatest extent possible while securing long term resiliency in the community.

and those obstacles preventing the Town from making progress on potential threats to the Community. This project has the potential to reduce the flood exposure of Chenango assets by identifying and eliminating sites throughout the Community that contribute to flooding.

IMPLEMENTATION TIME FRAME

The project should take approximately 24 months to complete.

REGULATORY REQUIREMENTS

No regulatory requirements exist for use of funds for the listed services.

JURISDICTION

Jurisdiction for this proposed project rests in the Town of Chenango.

ANTICIPATED REDUCTION OF RISK ASSOCIATED WITH THE PROJECT

This project would help remove some of the obstacles currently inhibiting development and redevelopment

SUMMARY

Stormwater Enforcement and Legal Assistance

- Investment: \$150,000
- Flood level reduction: N/A
- Assets protected: 1
- Repetitive flood properties removed: 0
- Potential future loss prevented: NA
- Jobs created: No jobs are anticipated to be created.

Front Street Commercial Corridor Economic Development Analysis

PROJECT BACKGROUND

The Town of Chenango’s primary commercial corridor extends along Front Street (Route 11/12) from the Town’s southern boundary north until it turns east along Chenango Bridge Road (Route 12A). This corridor has developed as an automobile-oriented commercial area with strip malls, “big box” businesses, fast-food restaurants, and a variety of other primarily retail establishments.

The Town, through its recent update to its Comprehensive Plan, intends to provide zoning and ordinance changes to revitalize and improve this area. Currently, areas such as Northgate Plaza sit half full with tenants while other lots lie underutilized. The Town’s commercial corridor is its strongest, most significant asset, yet it suffers from a variety of issues that prevent it from fully contributing to the Community in its most efficient and effective manner.

CONNECTION TO THE DISASTER

The Town’s commercial corridor extends along the Chenango River with much of it being located in the 100-year floodplain. During Tropical Storm Lee, floodwaters inundated much of this area, resulting in property damage, business closures, closure of Front Street, loss of wages and revenue, and lack of services. Much of this may have been averted if there were different design standards, codes, and ordinances that addressed the threat of flooding to these facilities.

SOLUTION

This project consists of an economic development analysis along the corridor that will take into consideration all aspects of design, development, redevelopment, and marketing.

The analysis would include the following activities:

- Conduct a comprehensive economic development study with a market analysis along the Front Street commercial corridor;
- Evaluate infrastructure and traffic flow along the corridor, and make recommendations to address any identified issues;
- Identify the area’s character, and brand the corridor to promote the type of development the market can support while meeting the capacity, scale, service, and aesthetics the Town desires;
- Identify opportunities to incorporate and promote green infrastructure and smart growth techniques;
- Offer alternative design and layout standards for the corridor that would make it more visually appealing while drawing businesses and shoppers to the area;
- Examine other commercial opportunities beyond retail, including office and mixed-use development; and
- Examine zoning, ordinance, and design alternatives to address flood threats.

This analysis will help provide guidance in developing a more robust commercial corridor that meets the needs and desires of the local Community while ensuring long-term resiliency against flood hazards.

COST ESTIMATE

The estimated total project cost is \$225,000.

PROJECT BENEFITS

The project would provide a comprehensive analysis of the Front Street commercial corridor. This will help identify those factors that may be inhibiting growth and development/redevelopment along the corridor. This analysis could provide a significant number of benefits to the Community including identifying methods to increase economic development, examine mixed use opportunities, provide new jobs, and improve the aesthetic quality of the corridor.



PROJECT COST-BENEFIT ANALYSIS

Economic Driver

While there are few anticipated direct economic benefits (e.g., permanent jobs secured or added; potential increase in economic activity) as a result of this proposed project, there is great potential for this project to catalyze substantial future economic return, particularly as the focus of the analysis is the commercial corridor of the Town. If the study results lead to future project implementation, numerous new jobs could be created and spending on local businesses would significantly increase.

Environmental Benefits

Although no environmental assets were identified as being completely secured, there are several environmental benefits associated with this project. The project will result in the following environmental benefits:

- Develop and promote green infrastructure design and smart growth techniques; and
- Increase access to natural resources.

Health and Social Benefits

Although this analysis will not likely result in any direct health and social benefits to the Community, it will create significant opportunities to add cultural value and to protect an important community economic driver. It will invigorate the unique culture of the Town by supporting the development of a unique branding and layout to increase the attractiveness and visual appeal of the corridor. In turn, as these projects are implemented and the corridor is enhanced, so too will local civic pride increase.

The study may also ultimately benefit vulnerable populations, particularly the elderly or those with access needs, who may have difficulty in traveling long distances. Revitalization of the Town's commercial corridor will support new businesses being brought in and the ease of access to new businesses, making it easier for more vulnerable

residents to achieve their daily needs and conduct their routine shopping.

The outcome of the transportation part of the study also has the opportunity to reduce flood risk and improve mobility and safety in the Town by increasing access to less flood-prone routes and improving the ability of safety personnel to access residents near or in the commercial district.

Additional Benefits

- **Land Use Benefits** – This project stands to positively impact land use in the Town. If the study identifies areas that can be used as passive open space, greenways, or storage retention near the Chenango River as part of creating a more visually appealing commercial corridor, overall flood risk will be decreased and property values could increase.
- **Compliance with the Town Hazard Mitigation Plan Jurisdictional Annex Recommendations**– This project complies with recommendations identified in the Town's Jurisdictional Annex from the Broome County Hazard Mitigation Plan (2013). Specific correlations include:
 - **Integration of Multiple Planning Mechanisms:** The local economic development group will utilize the identification of hazard areas when assisting new business in finding a location.
 - **Local and Regulatory Capability Needs:** The Town currently does not have an economic development plan.
 - Corresponds with areas of identified growth/development trends.
- **Springboard for Future Projects** – This study will provide the framework and identify any needs to successfully implement future construction and design projects to benefit the Community. It will allow the Town to conduct strategic economic development to ensure new buildings, transportation upgrades, and other infrastructure benefits are created with multiple purposes and in a logical manner.

- **Supports NYRCR Plan Goals** – Completion of this project supports the Town’s NYRCR strategy of promoting business development and improvements to necessary infrastructure to support commercial business expansion.

ANTICIPATED REDUCTION OF RISK ASSOCIATED WITH THE PROJECT

This project does not affect the inundation extent or WSE on Chenango assets; however, the infrastructure and traffic flow study could potentially reduce flooding risk. The project would accomplish this by identifying vulnerable infrastructure and critical traffic corridors, followed by the proposing of mitigation strategies to alleviate flooding damage.

IMPLEMENTATION TIME FRAME

This project would take approximately eight months to complete.

REGULATORY REQUIREMENTS

There are no regulatory requirements involved with this study.

JURISDICTION

Jurisdiction for this proposed project rests in the Town of Chenango.

SUMMARY

Front Street Commercial Corridor Economic Development Analysis

- Investment: \$225,000
- Flood level reduction: N/A
- Assets protected: Approximately 200 residences
- Repetitive flood properties removed: 0
- Potential future loss prevented: Long-term – \$1 million in personal property loss and flood damages
- Jobs created: N/A



Community Rating System (CRS) Management and Assistance

PROJECT BACKGROUND

The Town of Chenango recently submitted an application for consideration under the National Flood Insurance Program’s (NFIP) Community Rating System (CRS). This program consists of a scoring system that could allow the Town to be considered for reduced flood insurance rates.

CONNECTION TO THE DISASTER

Several sites in the Town of Chenango have been identified as repetitive loss properties. With an increasing number of flood events, the Town is looking to find ways to make flood insurance more affordable to residents and businesses. Many of these properties are not in identified flood zones and do not receive Federal subsidies while still paying high premiums.

SOLUTION

This project will fund program management and general assistance with the CRS Program. Specifically, funds will be used to identify opportunities and methods to achieve accomplishments in the NFIP six core flood loss reduction areas, allowing the Community to reduce flood insurance rates by earning a better class rating. Funds will also be used to educate elected officials, staff, and the public about the program. The program will also provide information and education to residents with resiliency-focused residential property improvements and provide information about funding resources.

To successfully complete this project, the Town may need to hire additional staff or a consulting firm, or the Town may choose to consider a regional approach to the project and work with Broome County. In addition to serving as the principal investigator in the CRS analysis, the staff member or consultant hired should ideally be involved in other local floodplain management and administration roles, such as the implementation of flood loss reduction activities. These activities

include the enforcement of flood damage prevention ordinances and update of the flood maps, policies, and plans for the Town.

COST ESTIMATE

The estimated total project cost is \$60,000.

PROJECT BENEFITS

The project would help the Town of Chenango possibly reduce flood insurance costs by earning a better class rating in the NFIP system.

PROJECT COST-BENEFIT ANALYSIS

Economic Driver

The CRS program gives communities multiple incentives to maintain and improve their flood mitigation activities over an indefinite period of time. The most visible benefit of participation in the CRS program is the discount in flood insurance payments that property owners receive. If the Town of Chenango achieves a Class 9 CRS rating, leading to a 5% reduction, the Town would then experience \$5,906.15 in savings for total annual premiums and \$41.59 in savings per individual premium, based on the number of premiums in the Town as of August 2014. If the Town achieves a Class 8 CRS rating, leading to a 10% reduction, the Town would experience \$11,812.30 in total annual premium savings and \$83.19 in savings per individual premium.

Although the Town of Chenango has a median income on par with the State of New York and \$10,000 greater than the County’s median income, 10% of the Town’s population is at or below the poverty line. The additional insurance payment savings will benefit the Community by reducing potential economic hardship, particularly for those at poverty level, and by allowing those residents with a comfortable income to engage in increased discretionary spending.

If the Town continues to participate in flood mitigation activities and increase its CRS class, it can receive a discount of up to 45%, although Class 1 communities are extremely rare. The table below

TABLE 4.10 – CRS CLASS DISCOUNTS

Rate/Class	Insurance Discount	Credits Required
1	45%	4,500+
2	40%	4,000-4,499
3	35%	3,500-3,999
4	30%	3,000-3,499
5	25%	2,500-2,999
6	20%	2,000-2,499
7	15%	1,500-1,999
8	10%	1,000-1,499
9	5%	500 – 999
10	0%	0 – 499

shows the breakdown of insurance discount to class rating for CRS-participating communities.

Because the CRS program encourages the use of flood mitigation, preparedness, and risk reduction activities to achieve credits, it ultimately decreases flood vulnerability and increases public safety by offering incentives for the Town to continue implementing new flood protection measures, highlighting the practices already in place, and thus reducing the impact of flood events when they actually occur. Since the NFIP’s inception, the Town of Chenango has had 107 claims for loss submitted, with total payments equaling \$ 2,288,226.60.

In 2011, 43 claims were submitted, which amounted to the largest number in a single year and made up 27.6 % of claims submitted through the Town’s history with the NFIP. Additionally, 42.3% of all claims submitted have occurred in the last 10 years, and 58.3% of all claims submitted have occurred in the last 15 years. Even considering the events of 2011 as an outlier event, flood claims have been much higher in recent years than during the first 20 years of the NFIP’s existence. The Town can use the CRS program as one method of preventing the number of claims and payments necessary from continuing to rise significantly.

While this financial benefit to residents is a very strong advantage of the CRS program, there are additional benefits of participation, including no fees associated with the CRS application.

According to FEMA, the only costs the community incurs are those needed to implement flood control activities to earn CRS credits (which then have secondary public safety benefits) and the staff time necessary for documentation of credits and for the certification process.

Environmental Benefits

By its nature, this project does not have environmental impacts or benefits.

Health and Social Benefits

In addition to the environmental, financial, and risk reduction benefits, participation in CRS provides a community with a variety of health and social benefits. The Town can use the CRS program as a nationally-recognized benchmark and tool for evaluation, offering a broader scope for determining mitigation activity success than its own more limited history of flood losses.

Because CRS activities are focused on flood protection and mitigation, they ultimately provide enhanced public safety, reduced damage to property and public infrastructure, and avoidance of economic disruption and loss. The determination to maintain CRS ratings and discounted insurance premiums can also help communities prepare for flood events during periods of time when there have not been many recent flood events and when public support for preparedness initiatives generally tends to be lower.

Additionally, each new activity that the Community engages in provides a public relations opportunity for the Town to highlight current initiatives. The Town can use these activities as a way to increase civic pride and public education about topics like flood risk, individual property owner vulnerability, or recommendation guides to residents on how to protect homes and businesses during floods.



One last minor, but still valuable, benefit of the CRS program is that it makes available technical assistance in designing and implementing some flood activities to community officials at no charge.

Additional Benefits

- **Supports Implementation of Other NYRCR Projects** – Because CRS credits are received through the implementation of flood control and mitigation activities, this program will provide additional incentive to the Town to implement other projects identified in the NYRCR report, as funding becomes available. These projects could include but are not limited to:
 - Smith Hill Creek (Wallace Road) Stormwater Management System
 - Northgate Plaza Flap Gate
 - Fox Road Stormwater Improvements
 - Grant Road Stormwater Pipe Replacement
- **Supports NYRCR Plan Goals** – Completion of this project supports the Town’s NYRCR strategy of developing local zoning and codes that help secure public safety, preserve property, and limit disaster impacts to the greatest extent possible while securing long term resiliency in the community.

- **Supports Town Mitigation Goals** – This project was identified as a high-priority mitigation initiative in the jurisdictional annex of the Broome County Hazard Mitigation Plan (2013).

ANTICIPATED REDUCTION OF RISK ASSOCIATED WITH THE PROJECT

This project has the potential to reduce vulnerability of assets in Chenango by more quickly identifying high risk assets and reducing flood insurance rates. Additionally, the project has the potential to lower exposure to neighborhood assets by assists with resiliency-focused property improvements.

IMPLEMENTATION TIME FRAME

Funding will be provided to extend through a two-year period.

REGULATORY REQUIREMENTS

No regulatory requirements are needed to provide CRS management and assistance.

JURISDICTION

Jurisdiction for this proposed project rests in the Town of Chenango.

SUMMARY

Community Rating System (CRS) Management and Assistance

- Investment: \$60,000
- Flood level reduction: N/A
- Assets protected: N/A
- Repetitive flood properties removed: 0
- Potential future loss prevented: N/A
- Jobs created: Possibly 1



Bank Restoration and Erosion Prevention at Chenango Commons Golf Course

PROJECT BACKGROUND

The Chenango Commons Golf Course is one of the recreational assets identified by the Town of Chenango Planning Committee and the public. It is a private nine-hole golf course located along the Chenango River. The golf course is in the downtown area of the Community and easily accessible by the public. The golf course provides outdoor recreation for residents and also contains several small businesses as part of the on-site facility.

A portion of the golf course contains a stormwater management system that handles the stormwater from the residential neighborhood located to the north of the site. The stormwater travels through swales and pipes under the golf course to eventually empty into the Chenango River. This system allows stormwater to drain from the Clarendon Drive neighborhood.

CONNECTION TO THE DISASTER

During Tropical Storm Lee, the entire golf course and the associated on-site structures, including several businesses, were inundated with at least four feet of flood water. This caused extensive damage to the facility and resulted in buildings being shut down for six months.

In addition, the area near the outlet pipe for the stormwater management system suffered severe bank erosion. The erosion was concentrated in the area where the outlet pipe feeds into the Chenango River. The bank was eroded back approximately 40 feet in this area, exposing several unused gas lines. The bank suffered erosion for several hundred feet, centered around the pipe outlet.

Ongoing erosion at this site could begin to impact the golf course and cause considerable damage to one of the Community's recreational assets if left unchecked.



Shown above is an outlet pipe and bank erosion at Chenango Commons. Photo is courtesy of Tetra Tech, Inc.

SOLUTION

This project will restore the bank and provide outlet protection. Specific project work includes:

- Stabilizing the bank, using a combination of toe-wood and engineered soil lifts to rebuild the profile;
- Re-establishing permanent native vegetation;
- Developing a new vegetation management plan for the golf course maintenance personnel to deter mowing and herbicide use in a re-established riparian buffer zone; and
- Providing outlet protection along the pipe outfall location at Chenango River.

This project would help prevent further deterioration of the golf course and would halt further damage to the stormwater management system emptying into the Chenango River.

COST ESTIMATE

The estimated total project cost is \$115,000.

PROJECT BENEFITS

The project will help prevent further site degradation at the Chenango Commons Golf Course.



PROJECT COST-BENEFIT ANALYSIS

Economic Benefits

This project would create limited construction jobs in the short term, potentially creating work for local and regional contractors, in addition to materials and equipment sales for local and regional suppliers. This injected funding into the regional construction supply line encourages economic growth through additional induced spending, which occurs as employees and businesses participating in the construction work in turn spend money on other local goods and services. The potential induced benefit includes short-term increase in value added tax revenues.

In addition to economic growth spurred by construction, improvements aimed at enhancing local recreational assets, like the golf course, will also create greater confidence for private investors in the Town of Chenango. This project will help demonstrate that the Town also cares about the quality and aesthetics of local businesses. Additionally, this project will promote the sustainable income of the local golf course.

In regards to flood mitigation and economic benefits, the project seeks to reduce stormwater management system drainage into the Chenango River by

encouraging proper drainage into other areas. Thus, this project would reduce future maintenance costs to keep the river clean and free of debris, and it would also reduce the cost of flood damage by slightly decreasing the amount of stormwater and riverine flooding in the Chenango River.

Environmental Benefits

Although no environmental assets were identified as being completely secured, there are several environmental benefits associated with this project. The project should result in an increase in conveyance capacity and reduction of upstream WSEs.

The results showed that the project is near a potential or historic record of an instance for multiple threatened or endangered species. Specifically, there is the possibility of the existence of the Bald Eagle, Brook Floater, Henslow’s Sparrow, Northern Harrier, Peregrine Falcon, Pied-billed Grebe, Timber Rattlesnake, Upland Sandpiper, Blunt-lobe Grape Fern, Corn Elm, Downy Wood-mint, Fairy Wand, Golden Club, Hooker’s Orchid, Michaux’s Blue-eye-grass, Porter’s Reedgrass, Puttyroot, Rough Hedge-nettle, Wild Hydrangea, Wild Sweet-William, and Yellow Wild Flax.

TABLE 4.11 – TYPE AND QUANTITY OF THE ENVIRONMENTAL BENEFITS AND IMPACTS

	Type	Quantity
Environmental Assets Secured	Bank restoration and erosion control along the pipe outfall to manage flow into the Chenango River.	Approximately 385 linear feet of bank restoration along the outlet pipe into Chenango River.
Clean Up Accomplished	Remove sediments and clean up accumulated debris along the along the pipe outlet area to prevent further erosion along the banks.	TBD
Open Space Created	No additional open space created.	
Importance for Habitat	The bank restoration and erosion control along the outfall to the Chenango River will improve flow conditions and prevent further sedimentation in the Chenango River. This will create a more reliable flow source to support aquatic life and water quality in the Chenango River. The re-establishment of native vegetation and provision of a vegetation management plan will help support and promote local wildlife and vegetation. This will strongly benefit environmental conditions.	

The project is not likely to affect the identified endangered species; however, during the construction of the improvements, consideration of these species will be made. The Unnamed Creek is identified as a class “B” waterway which indicates that its water supports fisheries and is suitable for non-contact activities. The Chenango River is identified as a class “C” waterway, which indicates that its water supports fisheries and is suitable for non-contact activities.

Health and Social Benefits

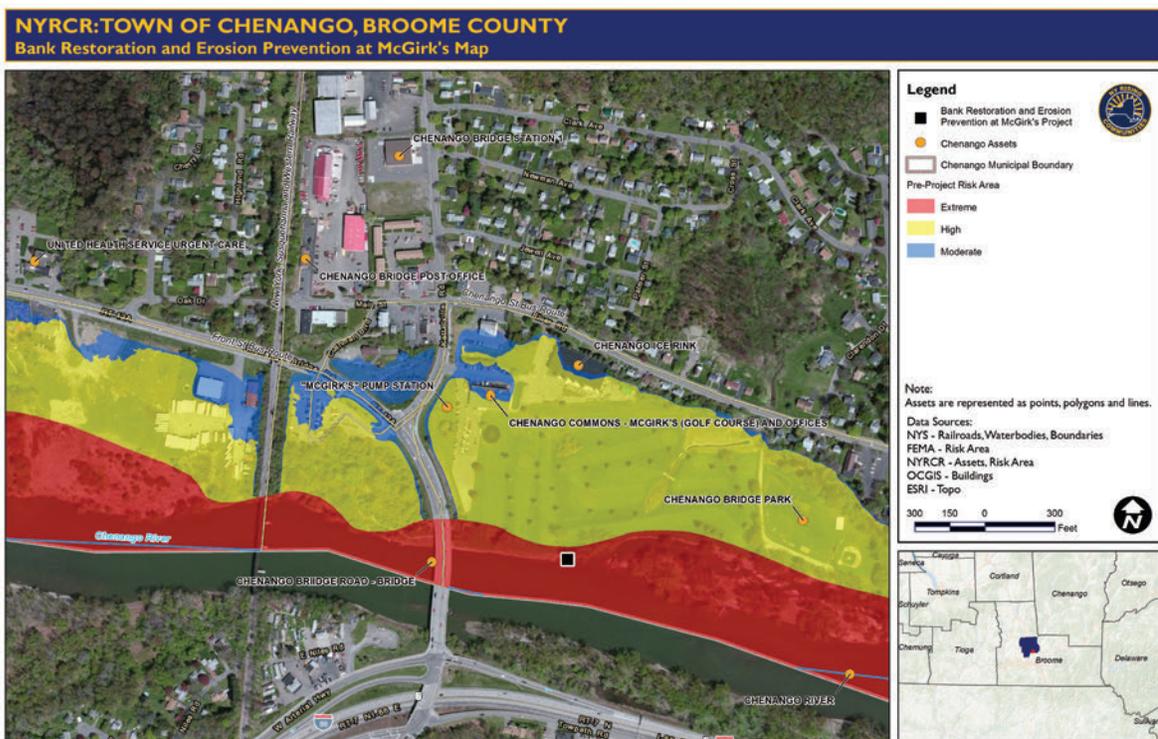
This project will have a distinct social benefit of increasing the aesthetics and overall attractiveness of the local golf course. This will increase local civic pride as residents will be able to demonstrate the concern the Town has towards promoting the quality and stability of local businesses and the Town’s visual appeal. Additionally, because the golf course has been identified by the Town as a key recreational asset, this will show a multi-pronged project approach that seeks to both

enhance local infrastructure and protect an important economic asset.

This project will also have several safety benefits. The bank restoration will help prevent unwary golfers or other visitors to the golf course from slipping or being caught in an unsafe location, with exposed pipeline.

More indirectly, the erosion prevention aspect of the project will help prevent increased deposits from being added to the river and will help decrease the amount of stormwater runoff into the Chenango River. This will ultimately and ideally reduce the actual damage caused by riverine flooding events both to property and to residents’ health.

FIGURE 4.20 – AERIAL OF MCGIRK’S BANK RESTORATION AND EROSION PREVENTION





Additional Benefits

- **Supports NYRCR Plan Goals** – Completion of this project would advance the Town’s NYRCR strategy of preserving and protecting the Towns natural, recreational, and cultural resources from manmade and natural threats and hazards.

ANTICIPATED REDUCTION OF RISK ASSOCIATED WITH THE PROJECT

Figure 4.16 shows the Bank Restoration and Erosion Prevention at the golf course in the defined Risk Areas. While the project would not have any impact on the inundation extents or WSEs during flooding events, it will serve to reduce the risk of the golf course.

The reduction in risk was analyzed using the assumptions and factors described in the methodology above. The reductions in risk are specific to this asset. The improvements will decrease the exposure by adding defensive flood protection measures. The project will help fortify the system against the flood hazards and positively impact its functionality during flooding events.

IMPLEMENTATION TIME FRAME

General project implementation, including preparation of engineering design documents, submission to regulatory agencies for review and permit approval, preparation of bid documents and response reviews, and construction is expected to take place over a 12-month period.

REGULATORY REQUIREMENTS

Coordination with NYS DEC may be required since the project is located in proximity to the Chenango River. Construction permitting will most likely be required.

JURISDICTION

Jurisdiction for this proposed project rests in the Town of Chenango.

SUMMARY

Bank Restoration and Erosion Prevention at Chenango Commons Golf Course

- Investment: \$115,000
- Flood level reduction: N/A
- Assets protected: One
- Repetitive flood properties removed: 0
- Potential future loss prevented: TBD
- Jobs created: Approx. 2*

** The FTE construction jobs were estimated based on a methodology developed by the U.S. Department of Commerce Economics and Statistics Administration as presented in the September 2013 Economic Impact of Hurricane Sandy: Potential Economic Activity Lost and Gained in New Jersey and New York. This study estimated job creation from recovery spending on infrastructure projects in New York and reported 7.15 construction jobs and 8.4 total jobs per \$1,000,000 in construction spending.*



New Well in Northern Section of Town

PROJECT BACKGROUND

The Town of Chenango's primary business district is located in the most flood-prone portion of the Town. This area houses a significant number of the Town's business and infrastructure assets, including several water pump stations, roads, sewer lift stations, major employers, and more. In addition, some of the Town's infrastructure, such as the Northgate water pump station, provides service to adjacent communities. The exposure of these systems to flood poses a significant risk of system failure. To avoid this situation, the Town is considering developing a new well further north, away from the flood-prone areas along the Chenango River. This will increase local capacity to support future development as well as provide redundancy and resiliency of the system.

The Town is also currently working on updating its Comprehensive Plan. A significant portion of this plan addresses commercial development in the Community. This is currently limited by the accessibility and availability of public water for commercial businesses.

With these two factors in mind, the Town has been considering the option of constructing a new fresh water well. The development of this well would address the following issues:

- Need for redundancy in the exiting water system in case portions of the system in the flood-prone areas fail;
- Increased capacity to allow and promote economic development in the Community and outside the floodplain; and
- Need to secure water sources outside of flood-prone areas to ensure the safety of the system.

CONNECTION TO THE DISASTER

Historic flood events in Chenango have placed the Town's water pump stations at great risk. These facilities were flooded with as much as four feet of water during Tropical Storm Lee. Fresh, potable water is one of

the most significant health and safety provisions in a community and is absolutely necessary for the day-to-day function of the Town, its residents, and businesses.

SOLUTION

The project consists of the development of a new well in the northern section of Town to allow for increased system capacity, redundancy, and resiliency.

Specific project work includes:

- Constructing the pump station and housing; and
- Installing a water line along Route 12 to hook the new well into the Town water system.

The development of this well will help protect the Town from complete system failure if one or several pump stations located in the floodplain become damaged and/or cease to function.

COST ESTIMATE

The estimated total project cost is \$1,750,000.

PROJECT BENEFITS

The project will increase the Town fresh water capacity, which in turn, will support future development in the Town. It will also provide redundancy and resiliency to the system to ensure that fresh water continues to be provided to the Community if any of the wells located in flood hazard zones are damaged and/or out of commission.

PROJECT COST-BENEFIT ANALYSIS

Economic Benefits

The potential economic benefits from this project could be substantial as the provision of public water further north along Route 12 would allow increased commercial development along that corridor. Currently economic development is limited since water must be provided by private, on-site wells. Commercial development, especially development of any significant magnitude, requires a dedicated, reliable source of water. This could allow for extensive commercial development along the Route



TABLE 4.12 -TYPE AND QUANTITY OF THE ENVIRONMENTAL BENEFITS AND IMPACTS

	Type	Quantity
Environmental Assets Secured	Develop a new well and construct a pump station to increase water system capacity and resiliency to prevent complete system failure during flood events.	One new well and pump station
Clean Up Accomplished	TBD	TBD
Open Space Created	No additional open space created.	
Importance for Habitat	None	

12 corridor, and it could provide new jobs and an increased tax base for the Town.

Commercial development along the Route 12 corridor could provide the Town with thousands of additional dollars in taxes every month depending on the level of commercial development. With proper guidance by the Town development along this corridor could focus more on drawing higher paying commercial business to that area rather than additional retail which is already concentrated in the Town’s commercial corridor.

The well would also provide secondary benefits by supplying the existing system with redundancy and safety. The new well would be able to provide the necessary water needed if one of the existing flood prone wells failed or had to be shut off for safety reasons. The new well would ensure that local residents and business would be able to continue to have water if the system is interlinked with the existing public water system.

Environmental Benefits

Although no environmental assets were identified as being completely secured, there are several environmental benefits associated with this project. The project will provide an environmental benefit by developing a new well and pump station in the northern section of Town to provide continued clean water during flood events.

Health and Social Benefits

Constructing a new well out of the flood prone region of the Town that is tied into the existing public water

system could increase the health and safety benefits in the community. By providing redundancy to the Town’s water system, the new well will ensure the safe and efficient distribution of water to residents and businesses during those times when wells or portions of the system may fail. The efficient provision of clean, safe water is critical for any community.

All aspects of the community rely on this resource and securing the provision of local water will help reassure residents that water will be available, even during flood events. This will be ensured by providing resiliency and redundancy to the existing public water system. This will also increase appeal for commercial businesses knowing that even during flood emergencies the Town’s water supply is designed with redundancy in place to ensure the necessary functions of businesses, services and residences.

Additional Benefits

- **Increased Service Capacity** – The addition of a new well in the Town will not only add redundancy and increase health and safety, through securing the provision of clean reliable water in the community, but will also allow for additional water service capacity as well. This will allow for additional development and redevelopment opportunities in the community.
- **Supports Goals of the Town Comprehensive Plan** – The project supports the Town’s desire to increase water service to accommodate future growth.

- **Supports NYRCR Plan Strategies** – Completion of this project supports the Town’s NYRCR strategy of maintain and improve key infrastructure components and facilities to ensure the safe and efficient functions of the Community, especially during and after disaster events.

ANTICIPATED REDUCTION OF RISK ASSOCIATED WITH THE PROJECT

The development of a well in the northern section of Town will help protect the Town from complete system failure if one or several pump stations located in the floodplain become damaged and/or cease to function.

IMPLEMENTATION TIME FRAME

General project implementation, including preparation of engineering design documents, submission to regulatory agencies for review and permit approval, preparation of bid documents and response reviews, and construction is expected to take place over a 8-month period.

REGULATORY REQUIREMENTS

Extensive permitting may be required regarding construction, as well as verifying that there are no environmental or health issues related to the citing and

development of the well. NY DOT may also have to be consulted with regarding the installation of piping along Route 12A.

JURISDICTION

Jurisdiction for this proposed project rests in the Town of Chenango.

SUMMARY

New Well in Northern Section of Town

- Investment: \$1,750,000
- Flood level reduction: N/A
- Assets protected: 0
- Repetitive flood properties removed: 0
- Potential future loss prevented: NA
- Jobs created: Construction – Approx. 14 jobs and another 16 in support jobs.*

** The FTE construction jobs were estimated based on a methodology developed by the U.S. Department of Commerce Economics and Statistics Administration as presented in the September 2013 Economic Impact of Hurricane Sandy: Potential Economic Activity Lost and Gained in New Jersey and New York. This study estimated job creation from recovery spending on infrastructure projects in New York and reported 7.15 construction jobs and 8.4 total jobs per \$1,000,000 in construction spending.*

Section 5 Additional Materials



Photo is courtesy of Eric Thayer.

Section 5: Additional Materials

Additional Resiliency Recommendations

Table 5.1 lists the additional resiliency recommendations for the town of Chenango NY rising community reconstruction (NYRCR) community (community). Additional resiliency recommendations are projects and actions the town of Chenango NYRCR planning committee (committee) highlighted but which are not categorized as either proposed projects or featured projects.

TABLE 5.1 – ADDITIONAL RESILIENCY RECOMMENDATIONS

Strategy	Project Name	Short Project Description	Estimated Cost	Regional Project (Y/N)
Improve stormwater management facilities to better handle significant storm events, increase capacity and effectiveness, and help prevent or reduce risk and damage to persons and property.	Clarendon Drive Stormwater Improvements	Open up storm sewer piping and convert to swales where possible; and evaluate system for additional drains as necessary.	\$42,600	N
Protect and promote safe, quality housing for all residents in the Town.	Residential Demolition Program	Develop a residential demolition program for properties impacted by Tropical Storm Lee. The program will provide funding assistance for demolishing and removing properties that are uninhabitable from this storm event. Eligible applicants must own the structure to be demolished, must have owned the property before the storm event, and used it as a functioning residence. The structure must also be a residence intended for occupancy.	\$300,000	N
Preserve and protect the Town of Chenango’s natural, recreational, and cultural resources from manmade and natural threats and hazards.	Castle Creek Park Improvements	Redesign/reorient park so that community assets are moved to higher ground to help reduce the chance of flood damage.	\$120,000	N



Master Table of Projects

The Town of Chenango NYRCR Planning Committee has undertaken an iterative and methodical process to arrive at the Proposed Projects, Featured Projects, and Additional Resiliency Recommendations presented in this plan. The three-part methodology was designed to identify and consider the full range of potential actions and outcomes through a variety of analytical and quantitative assessment combined with stakeholder outreach, public engagement, and Committee discussions. The project selection process consisted of the following three steps:

- **Initial project Identification:** The project evaluation process was initiated through a combination of existing plan review, preliminary stakeholder surveys, and Committee discussions, which collectively returned more than 50 possible projects and initiatives spanning the full breadth of Community needs and opportunities.
- **Preliminary Project Analysis:** Selecting projects from a large group of worthy potential projects required a series of increasingly detailed qualitative and quantitative analyses. The full list of identified projects was initially evaluated and refined by four primary criteria to create a manageable universe of feasible projects for further assessment. Project evaluation criteria included Categorization, Feasibility, Funding, and Alignment with Chenango NYRCR Plan Goals.
- **Detailed Analysis and Final Project Selection:** Final project selection and delineation into the three-tiered hierarchy of Proposed Projects, Featured Projects, and Additional Resiliency Recommendations occurred through a series of in-depth analyses applied to those projects identified during the previous phase of assessment. This process included detailed Cost-Benefit Analysis, Risk Reduction Analysis, and Hydraulic Modeling combined with ongoing public feedback and Committee discussions. Proposed Projects are projects identified for funding through a NYRCR Community's allotment of Community Development Block Grant Disaster Recovery (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 NYRCR Program. Additional Resiliency Recommendations are projects and actions that the Committee would like to highlight and that are not categorized as Proposed or Featured Projects.

Table 5.2 summarizes all Proposed Projects, Featured Projects, and Additional Resiliency Recommendations developed by the Community per NYRCR guidance. Projects in this table are not ranked or prioritized.

TABLE 5.2 – MASTER PROJECT TABLE

Strategy	Project Name	Short Project Description	Project Category	Estimated Cost	Regional Project (Y/N)
Improve stormwater management facilities to better handle significant storm events, increase capacity and effectiveness, and help prevent or reduce risk and damage to persons and property.	Smith Hill Creek (Wallace Road) Stormwater Management System	Make improvements to Smith Hill Creek Stormwater Management System with associated drainage improvements along Wallace Road.	Proposed	\$1,200,748	N
Improve stormwater management facilities to better handle significant storm events, increase capacity and effectiveness, and help prevent or reduce risk and damage to persons and property.	Northgate Plaza Flap Gate	Install flap gate(s) and replace pipes in the stormwater management system beneath Northgate Plaza. Construct retention wall between Weis Market site and Waste Water Treatment Plant.	Proposed	\$355,000	N
Ensure that adequate resources, services, and facilities are available to address emergency response and disaster recovery needs.	Town Hall Backup Generator	Install back-up generator with permanent fuel storage tank at the Town Hall to ensure provision of essential services and provide support for all aspects of municipal functionality during a disaster.	Proposed	\$225,000	N
Maintain and improve key infrastructure components and facilities to ensure the safe and efficient functions of the Community, especially during and after disaster events.	Northgate Water Pump Station Upgrades	Raise electrical systems at Northgate Pump Station above flood levels.	Proposed	\$29,750	N



TABLE 5.2 – MASTER PROJECT TABLE (CONT'D)

Strategy	Project Name	Short Project Description	Project Category	Estimated Cost	Regional Project (Y/N)
Maintain and improve key infrastructure components and facilities to ensure the safe and efficient functions of the Community, especially during and after disaster events.	McGirk's Sewer Lift Station Upgrades	Raise the electrical systems above flood levels.	Proposed	\$22,900	N
Maintain and improve key infrastructure components and facilities to ensure the safe and efficient functions of the Community, especially during and after disaster events.	Route 12A Water Pump Station Upgrades	Raise the electrical systems above flood levels and install a permanent back-up generator.	Proposed	\$167,300	N
Maintain and improve key infrastructure components and facilities to ensure the safe and efficient functions of the Community, especially during and after disaster events.	Route 12A Sewer Lift Station Improvements	Raise electrical systems two feet above base flood elevation and install a flood wall around the Route 12A Sewer Pump Station. Relocate the electrical panel inside the flood wall to improve access to electrical controls during maintenance operations.	Proposed	\$76,650	N
Ensure that adequate resources, services, and facilities are available to address emergency response and disaster recovery needs.	Regional Shelter Funding	Provide funds for regional shelter in coordination with Broome County	Proposed	\$100,000	Y

TABLE 5.2 – MASTER PROJECT TABLE (CONT'D)

Strategy	Project Name	Short Project Description	Project Category	Estimated Cost	Regional Project (Y/N)
Improve stormwater management facilities to better handle significant storm events, increase capacity and effectiveness, and help prevent or reduce risk and damage to persons and property.	Nimmonsburg Neighborhood Stormwater Management System Master Plan	Conduct a comprehensive analysis of the Smith Hill Creek (Wallace Road) Stormwater Management System with recommendations for long-term solutions that most effectively and efficiently address the flooding issues permanently.	Proposed	\$300,000	N
Improve stormwater management facilities to better handle significant storm events, increase capacity and effectiveness, and help prevent or reduce risk and damage to persons and property.	Fox Road Stormwater Improvements	This project involves: Removing three existing culverts underneath Fox Road along Brooks Creek and replacing with a bridge.	Proposed	\$240,680	N
Improve stormwater management facilities to better handle significant storm events, increase capacity and effectiveness, and help prevent or reduce risk and damage to persons and property.	Grant Road Stormwater Pipe Replacement	Remove approximately 200 linear feet of stormwater pipe (3-foot diameter) and replace with a new 3-foot pipe with access for cleaning approximately midway along the pipe.	Proposed	\$75,200	N



TABLE 5.2 – MASTER PROJECT TABLE (CONT'D)

Strategy	Project Name	Short Project Description	Project Category	Estimated Cost	Regional Project (Y/N)
Maintain and improve key infrastructure components and facilities to ensure the safe and efficient functions of the Community, especially during and after disaster events.	Surveys, Site Analysis and Testing for New Well in Northern Section of Town	The project involves surveying, site analysis, test drilling and water testing for the development of a new well.	Proposed	\$254,900	N
Maintain and improve key infrastructure components and facilities to ensure the safe and efficient functions of the Community, especially during and after disaster events.	New Well in Northern Section of Town	Develop a new well in the northern section of Town to allow for increased capacity and resiliency. The project consists of drilling and installation of well, construction of pump station, and housing and installation of water line along Route 12.	Featured	\$1,750,000	N
Develop local zoning, codes, programs and provide legal assistance to help secure public safety, preserve property, and limit disaster impacts to the greatest extent possible while securing long-term resiliency within the Community.	Stormwater Enforcement and Legal Assistance	Address enforcement and legal processes including coordination with State and local agencies to address sites that contribute to stormwater issues.	Proposed	\$150,000	N
Develop local zoning, codes, programs, and provide legal assistance to help secure public safety, preserve property, and limit disaster impacts to the greatest extent possible while securing long-term resiliency within the Community.	Community Rating System (CRS) Management and Assistance	Manage and administer the CRS program within the Town. Funds may be used to hire additional staff or a consulting firm.	Proposed	\$60,000	N

**TABLE 5.2 – MASTER PROJECT TABLE (CONT'D)**

Strategy	Project Name	Short Project Description	Project Category	Estimated Cost	Regional Project (Y/N)
Preserve and protect the Town's natural, recreational, and cultural resources from manmade and natural threats and hazards.	Bank Restoration and Erosion Prevention at Chenango Commons Golf Course	Restore and provide outlet protection at the Chenango Common Golf Course.	Proposed	\$115,000	N
Promote business development and improvements to necessary infrastructure to support commercial business expansion.	Front Street Commercial Corridor Economic Development Analysis	Conduct an economic development analysis along the Front Street commercial corridor that highlights aspects of design, development, redevelopment, and marketing.	Proposed	\$225,000	N
Maintain and improve key infrastructure components and facilities to ensure the safe and efficient functions of the Community, especially during and after disaster events.	New Well in Northern Section of Town	Develop a new well in the northern section of Town to allow for increased capacity and resiliency. The project consists of drilling and installation of well, construction of pump station, and housing and installation of water line along Route 12.	Featured	\$1,750,000	N
Improve stormwater management facilities to better handle significant storm events, increase capacity and effectiveness, and help prevent or reduce risk and damage to persons and property.	Clarendon Drive Stormwater Improvements	Open up storm sewer piping and convert to swales where possible; and evaluate system for additional drains as necessary.	Additional Resiliency	\$42,600	N
Protect and promote safe, quality housing for all residents in the Town.	Residential Demolition Program	Develop a residential demolition program for properties impacted by Tropical Storm Lee. The program will provide funding assistance for demolishing and removing properties that are uninhabitable from this storm event. Eligible applicants must own the structure to be demolished, must have owned the property before the storm event, and used it as a functioning residence. The structure must also be a residence intended for occupancy.	Additional Resiliency	\$300,000	N
Preserve and protect the Town of Chenango's natural, recreational, and cultural resources from manmade and natural threats and hazards.	Castle Creek Park Improvements	Redesign/reorient park so that community assets are moved to higher ground to help reduce the chance of flood damage.	Additional Resiliency	\$120,000	N



Collaborative Connections For Public Engagement

The people of the Town of Chenango understand first-hand what it means to collaborate to move their Community forward in the face of adversity. In the aftermath of Tropical Storm Lee, which struck Chenango with devastating impact, the Community has scores of examples of neighbors helping neighbors to clear downed trees and debris, and citizens offering weary first responders respite and refreshments during grueling work efforts.

This spirit of community collaboration and engagement played a direct role in public engagement and the development of the Town of Chenango NYRCR Plan and its community-driven resiliency initiatives. The communications strategy formed at the beginning of the NYRCR process targeted outreach to all segments of the Community, including residents, property owners, business owners, a variety of service providers, and the first responder community, to name a few.

The public engagement process and outreach and education campaigns used in Chenango included a multi-media approach that developed and delivered messages in ways and to locations where people regularly access information. From posters in locations where there is heavy foot and vehicular traffic, to e-mail blasts, social media, and website postings, a variety of means were used to inform the Community about the NYRCR Program, how they could be involved in the Town of Chenango NYRCR Plan, and how resiliency measures could benefit the place they call home.

INFORMATION GATHERING

The Committee solicited information and public opinions about Community needs and opportunities relative to storm recovery and building resiliency. This qualitative information was instrumental in the development of Proposed and Featured Projects, and Additional Resilience Recommendations, in light of existing and non-existing Community resources, critical assets, and essential redundancies.

REGULAR PLANNING COMMITTEE MEETINGS

Since NYRCR Program commencement in the Town of Chenango in June 2014, the Committee—composed of local residents, business people, and Community organizational stakeholders—met every other week to discuss issues, vet prospective projects, and advance the outreach process.

By design, each meeting included time for public comments in an open, respectful environment.



Regular Committee Meetings were open to the public and were forums for examining and discussing public opinion and scientific analysis. Photo of committee meeting is courtesy of Eric Thayer.

DOOR-TO-DOOR SURVEYS, FIRST RESPONDER STAKEHOLDER INTERVIEWS (AUGUST 2014)

Committee members conducted door-to-door surveys in the Nimmonsburg neighborhood, which experienced significant personal property loss following a major stormwater system failure in the wake of Tropical Storm Lee. The purpose of the survey was to gauge historical losses and impacts of storms that have caused damages to this particular area of Chenango.

Additionally, the Committee held a stakeholder meeting in August 2014 with the first responders to identify and address critical needs and challenges in providing services. This qualitative information factored into the Proposed and Featured Projects and Additional Resiliency Recommendations.

GETTING THE WORD OUT

Public outreach efforts incorporated the following variety of multi-media messages:

- Media alerts;
- Newspaper ads (print and online);
- Informational flyers and posters;
- Website notifications (including NYRCR Program and the Town);
- Personal social media; and
- Inserts accompanying utility bills, mailed directly to households.

Public Engagement Events

Four Community-wide Public Engagement Events were conducted between July 2014 and January 2015 to provide education about the NYRCR Program; obtain input from the Town's residents, property owners, and business owners; and review projects based on public input, intelligence gathering, and scientific analysis.

Public Engagement Event 1

The first Public Engagement Event introduced the purpose and intent of the NYRCR Program, as well as the geographic area and planning process. Attendees reviewed posters of the Town of Chenango NYRCR Vision Statement, Town of Chenango neighborhoods, and flood hazard areas (FHA) within the planning area. The major topic discussed during this first event was flood damage.

Public Engagement Event 2

The second Public Engagement Event introduced the Hydrologic Engineering Centers-River Analysis System

(HEC-RAS) to the community. This tool is used by the hydraulic modeling team to determine the impact projects will have on water levels once implemented. Section 2 of the NYRCR Plan was presented with the initial HEC-RAS results. This section combines the results of the Risk Assessment and the initial HEC-RAS results to identify the flood-prone areas in the Town of Chenango. Several public comments were received during this meeting and focused on drainage issues in Queens Estates, public outreach methodology, flooding at the aquifer at Bellaire Drive, frequently flooded properties near the Chenango River/ Broad Acres, the cost effectiveness of stream debris removal, and the filling of the floodplain.

Public Engagement Event 3

During Public Engagement Event 3 on November 12, 2014, Proposed and Featured Projects and Additional Resiliency Recommendations were shared with the attending public. At that time, the planning process that resulted in the identification and analytical vetting of these projects and measures was explained. All were corroborated by public input gathered through multiple means during the course of the 7-month process.

Public Engagement Event 4

The capstone of the second round of the NYRCR Program, Public Engagement Meeting 4, will be the forum where the final Town of Chenango NYRCR Plan was unveiled, replete with all the research, information and opinion-gathering results, and scientific and data analysis that was completed. Prospective projects will be identified for potential implementation and funding.



Risk Assessment Methodology

The following section outlines the initial risk assessment for assets within the Town of Chenango.

DATA SOURCES USED

New York State Department of State (NYS DOS) provided data from the following sources:

- Environmental Systems Research Institute (ESRI) (2010);
- Federal Communications Commission (2012);
- Federal Communications Commission;
- Insurance Services Office, Inc.;
- National Oceanic and Atmospheric Administration (NOAA);
- National Park Service (2011);
- National Pipeline Mapping System (2003);
- NYS Department of Environmental Conservation (NYS DEC) (2009);
- New York State (NYS) Department of Health;
- New York State Department of Transportation (NYS DOT);
- NYS Division of Homeland Security and Emergency Services;
- NYS Education Department (2000);
- NYS Office for People With Developmental Disabilities;
- NYS Office of General Services; and
- NYS Office of Mental Health.

Local data from Broome County included:

- Building data;
- Buy-out property information;
- Critical facilities;
- Damaged roadways;
- Depth grids;
- FHAs;
- Infrastructure;

- Land use;
- Natural resources;
- Parcels;
- Soils;
- Tax data; and
- Zoning.

COMMUNITY VALUE

The Committee worked with the Consultant Team to assign community value for the identified assets. Assigning community value allowed the Committee to get a geographic picture of where important community assets were located as well as allowing the Committee to weigh potential project impacts on the Town in an informed manner. It did not factor into the risk score of individual assets.

DESCRIPTION OF METHODOLOGY

The risk assessment for assets within the Town incorporated NYRCR baseline methodology, enhanced by specific assumptions at the request of the Committee. The baseline methodology included four major components of the analysis: Risk Area, Hazard Factor, Exposure Score, and Vulnerability Score.

Risk area classifications (Extreme, High, or Moderate) are determined by the asset’s location relative to mapped risk zones.

The hazard score of 3 was assigned for the hazard factor in the tool (100-year floodwater level occurring within a 100-year planning time frame).

The exposure score is determined by the sum of a base score (derived from the risk area in which the asset is located) plus 0.5 point for each of the six landscape feature conditions below, if present. A base score was assigned for exposure to each asset depending on highest-class risk area (Extreme = 2, High = 1, and Moderate = 0.5) in which a significant portion of the asset is located. The total exposure score was calculated for each asset by adding 0.5 point to the base score for each of the following conditions:

- **Defensive flood protection measures** – measures are absent, below base flood elevation (BFE), in poor condition, or lack maintenance commitment;
- **Elevation** – the asset site is below BFE;
- **Freeboard** – elevation of the habitable or occupied portion of the asset is less than 2 feet above BFE;
- **Point of Confluence** – asset is within an area subject to increased flood risk (based on Consultant Team’s judgment or Committee guidance) because of a confluence of merging streams;
- **Stormwater Discharge** – asset is within an area subject to increased flood risk (based on Consultant Team’s judgment or planning guidance) because of stormwater system discharge; and
- **Vegetated Stream Bank Buffers** – asset is within Floodway Fringe (Federal Emergency Management Agency [FEMA] definition).

VULNERABILITY SCORE

Table 5.3 outlines the methodology, which accounts for an asset with a known length of time of service disruption or complete loss of service.

The Town of Chenango worked toward developing a methodology for assessing risk, which considered the unique situation and individual dynamics of areas at risk. To assess true vulnerability, the Committee determined which asset locations required consideration and concluded that because asset-specific information on facility recovery times (after impact by a flooding event) was not available for all assets, standard assumptions based on similar facilities should be used.

The Committee worked together to develop a tiered-factor approach to assess risk, generating risk scores that accurately reflected vulnerabilities and overall risk within the Community.

The factor is adjusted based on similar facility types in a descending five-point scale that is reduced by one point determined by its risk area location. For example, as noted in the vulnerability section below, all buildings were assumed to be 5 and all garages and storage buildings were assumed to be 4. Assumptions were reviewed and approved by the Committee. When specific vulnerability information was available, the standard methodology was applied; however, if information was not available, the following assumptions were applied:

RISK AREA ASSUMPTIONS

Risk area and social vulnerability assumptions are listed below:

- Risk Areas:
 - Extreme risk areas: areas within the 100-year FHA that are within 1,000 feet of a Repetitive Loss Property.
 - High-risk areas: areas within the 100-year FHA.
 - Moderate-risk areas: areas within the 500-year FHA.
 - “Not Applicable (N/A)” risk areas: areas outside of an identified FHA (all assets not located in an Extreme, High, or Moderate Risk Area were identified as N/A, and do not produce a risk score. Assets in this category are given a risk score of “False” in the risk assessment tool).
- Socially Vulnerable Populations: Social Vulnerability Index (SOVI) measures the social vulnerability of populations to environmental hazards. Assets with a SOVI score of Medium or higher were identified as “Yes” in the risk tool.



TABLE 5.3 – VULNERABILITY BASED ON IMPACT ON SERVICE OR FUNCTION OF COMMUNITY ASSETS

Impact	Insignificant 1	Minor 2	Moderate 3	Significant 4	Major 5
A. Economic Assets	Limited interruption in service or short-term reduced service	Service loss for up to 1 week or longer-term reduced services	Service loss for more than 1 week up to 1 month or longer-term reduced service	Service loss for more than 1 month or permanent reduced capacity	Permanent loss of service of the economic asset
B. Health and Social Services Assets	Limited interruption in service or short-term reduced services; Services under more than usual stress but manageable	Service loss of up to 1 week or longer-term reduced services; Services under more than usual stress on several fronts	Service loss for more than 1 week up to 1 month or longer-term reduced service; Services under severe pressure	Service loss for more than 1 month or permanent reduced capacity	Permanent loss of service of any one of the essential services listed
C. Housing Assets	Limited inconvenience	Out of use for up to 1 week	Out of use for more than 1 week up to 1 month	Out of use for up to 6 months OR permanent loss of 15% or less of housing in a group asset	Out of use for more than 6 months OR permanent loss of more than 15% of the housing in a group asset
D. Infrastructure System Assets	Limited interruption in service or short-term reduced service	Service loss for up to 1 week or longer-term reduced services	Out of use for more than 1 week up to 1 month or longer-term reduced service	Service loss for more than 1 month or permanent reduced capacity	Permanent loss of service of any one of the facilities listed
E. Natural and Cultural Resources Assets	Limited interruption in service or short-term reduced service OR Limited loss of access, habitat, or use	Service loss for up to 1 week or longer term reduced services; Minimal natural habitat impacts, temporary loss of public access, temporary loss of open space/ tourism assets	Out of use for more than 1 week up to 1 month OR moderate impacts on natural habitats, sustained loss of public access, long-term loss of private open space	Service loss greater than 1 month OR permanently diminished capacity of natural resources; substantial damages of important natural habitat	Permanent loss of service of the cultural asset OR complete loss of important natural habitats
F. Assets Providing Services for Socially Vulnerable Populations	Limited service interruption	Service loss for up to 1 week	Out of use for more than 1 week up to 1 month	Permanent service interruption of more than 1 and less than 6 months	Service interruption of 6 or more months

ASSUMPTIONS FOR THE LANDSCAPE ATTRIBUTES AND VULNERABILITY

Assumptions for assessing landscape attributes are listed below:

Landscape attributes:

- Defensive Flood Protection Measures: all assets were assumed “Yes” if absent, below BFE, in poor condition, or lacking maintenance commitment.
- Elevation: all assets outside the Extreme, High, or Moderate risk area were assumed “No,” and all assets in the High and Moderate hazard zone were assumed “Yes” if the asset site is below BFE.
- Freeboard: all assets outside the Extreme, High, or Moderate risk area were assumed “No,” and all building, structure, and bridge assets in the Extreme, High, and Moderate risk areas were assumed “Yes” if elevation of the habitable or occupied portion of the asset is less than 2 feet above BFE.
- Point of Confluence (POC): all assets within 1,500 feet downstream of a major POC (this is a HMP dataset with all streams with 4,300 cubic feet per second [cfs] or more during a 100-year storm event) and within the Extreme, High, or Moderate risk areas are “Yes;” all others are “No.”
- Stormwater Discharge: all assets within 1,000 feet of a major culvert (Hazard Mitigation Plan [HMP] dataset) and within the Extreme, High, or Moderate risk areas are “Yes.”
- Vegetated Stream Buffers: all assets within the floodway are assumed “Yes;” all others “No.”

ASSETS IN “EXTREME” AND “HIGH” RISK AREAS VULNERABILITY:

- All buildings were assumed to be 5.
- All garages storage buildings were assumed to be 4.
- All transportation infrastructure and water treatment facilities were assumed to be 3.
- All wells and springs were assumed to be 2.
- All natural and cultural resources other than buildings were assumed to be 2.

- All natural resources were assumed to be 1.
- Assets in the “Moderate” Risk Area

VULNERABILITY:

- All buildings were assumed to be 4.
- All garages storage buildings were assumed to be 3.
- All transportation infrastructure and water treatment facilities were assumed to be 2.
- All wells and springs were assumed to be 1.
- All natural and cultural resources other than buildings were assumed to be 2.
- All natural resources were assumed to be 1.

LANDSCAPE ATTRIBUTES:

- Point of Confluence: “Yes” if the asset is subject to increased flooding due to an upstream point of confluence, and “No” if the asset is not affected. Comments justifying impact were provided where available.
- Stormwater Discharge: “Yes” if the asset is affected by stormwater discharge and “No” if the asset is not affected. Comments justifying impact were provided where available.

While the risk scores differ between the two events as a result of using different hazard scores, the basis for how assets are categorized into the severe, high, moderate, or residual risk levels is the same for the two events, as shown by the similarly colored regions in Figure 2.8. For example, a risk score of 60 in the 100-year event evaluation is shown as 80 in the 500-year event evaluation; however, both scores are classified as severe risk.

RISK REDUCTION ANALYSIS

A risk reduction analysis was completed for those Community Development Block Grant Disaster Recovery (CDBG-DR) Priority and Featured Projects that are intended to reduce the risk of flood damage to assets. This analysis was limited by the data and information available and the inundation and extents of the data. The analysis was based on the point location of an asset as identified by the City. The risk areas are based on the



available Digital Flood Insurance Rate Maps (DFIRMs); however, the HEC-RAS baseline inundation extents do not always align and therefore slight differences may be seen in the analysis.

This analysis identified the number of assets secured as a result of the impact of the CDBG-DR Priority and Featured Projects. Assets were considered secured if the project impacts result in an elimination of risk indicated by a risk score of 0. The term “secured” is only applicable to this analysis and may not necessarily represent a real-world elimination of flooding impacts.

The analysis was limited to the data available and all discussion regarding reduction in risk was meant to estimate projected impacts to the asset(s). The analysis may not reflect the project’s post-construction conditions or the resulting impacts of a measure once implemented.

DETAILS OF THE ANALYSIS

Risk Area: A change to this entry (by one category) was made if the HEC-RAS analysis estimates a change in inundation extent and the asset is no longer located in the floodplain.

Risk Area estimates are determined by landscape attributes and vulnerability, described below:

- **Point of Confluence:** A change to this attribute was made if there is a reduction in flow due to an upstream mitigation measure or the asset is moved from its original location further from the point of confluence.
 - **Stormwater Discharge:** A change to this attribute was made if the proposed project increases stormwater conveyance for those assets currently “Yes” and are within 1,000 feet downstream of a culvert/stormwater-specific project.
 - **Vegetated Streambank Buffer:** If the asset is no longer in the floodway, a change to this entry will be made.
 - **Vulnerability:** The methodology used to originally assess the Vulnerability score for the assets is included in Table 5.5 below. In accordance with this methodology, if the proposed project changes the Risk Area of an asset the vulnerability score was changed in accordance with the vulnerability methodology outlined above based on the new Risk Area. The risk score will also change if there is an improvement in the capacity of the asset to recover from an event as the vulnerability score was reduced by one category.
- **Landscape Attributes:** Changes to these entries will be made if the hydraulic analyses indicated an improvement to the following landscape attributes:
 - **Defensive flood protection measure:** A change to this attribute was made if defensive flood protection measures are proposed to the asset(s) or if the proposed measure provides improved flood defenses in the area.
 - **Elevation:** A change to this attribute was made if the HEC-RAS analysis indicates a reduction in water surface elevation on the assets site.
 - **Freeboard:** A change to this attribute was made for elevation projects where the measure increases freeboard to or above the standard.

TABLE 5.4 – RISK SCORE RANGES

100-YEAR EVENT	500-YEAR EVENT
Severe (Risk Score >53)	Severe (Risk Score >70)
<p>Risk scores in the “Severe” category occur only if one of the two factors, exposure or vulnerability, is rated 5, and the other is 4 or higher, which could indicate that the asset is in a dangerous situation. Both exposure and vulnerability should be reduced, if possible. Consider relocation a priority option for these assets.</p>	
High (Risk Score 24 – 53)	High (Risk Score 32 – 70)
<p>Risk scores in the “High” category are indicative of conditions that could lead to significant negative outcomes from a storm. Using the risk scoring system, a total of 24 (or 32 for the 500-year event) can be achieved only if the vulnerability is 4 and exposure is 2, or vice versa. A vulnerability of 4 indicates likely loss of service of an asset for an extended period of time. For many assets, this loss may be unacceptable. Actions should be taken to reduce vulnerability, such as elevating or flood-proofing the asset to help avoid a long-term loss of function. A score of 4 for exposure indicates most of the local landscape attributes that help reduce storm damages are absent. Actions to restore landscape attributes may be appropriate. All other risk scores higher than 24 (or 32 for the 500-year event) indicate either the exposure or the vulnerability (or both) are higher than the conditions discussed above, lending more weight to need to take actions that reduce risk. Relocation may be necessary in the future if other means of adaptation or management actions are not effective.</p>	
Moderate (Risk Score 6 – 23)	Moderate (Risk Score 8 – 31)
<p>Risk scores in the “Moderate” category pose moderate to serious consequences, but adaptation may be of lower priority based on one factor, exposure, or because vulnerability remains relatively low. Use a combination of measures to reduce exposure and vulnerability.</p>	
Residual (Risk Score <6)	Residual (Risk Score <8)
<p>Risk scores in the “Residual” category occur when both exposure and vulnerability are relatively low. This situation suggests floods would pose minor or infrequent consequences. However, a vulnerability score of 3 may not be acceptable for critical facilities or assets of high community value, because the community cannot afford to be without these services, even infrequently. Note that risk is never completely eliminated. Some residual risk still remains even after management measures have been implemented. It is recommended that the community monitors conditions and adapts as necessary.</p>	



TABLE 5.5 – RISK ASSESSMENT TOOL

Asset Information							Landscape Attributes							Risk Assessment				Table 5.5 – Risk Assessment Tool Optional: Risk Assessment (500-Year Event)			
Asset	Risk Area	Asset Class	Asset Sub-Category	Socially Vulnerable Populations	Critical Facility	Community Value	Defensive Flood Protection Measures	Elevation	Freeboard	Point Of Confluence	Stormwater Discharge	Vegetated Streambank Buffers	Landscape Attribute Score	Hazard Score	Exposure Score	Vulnerability Score	Risk Score	Hazard Score	Exposure Score	Vulnerability Score	Risk Score
New York, Susquehanna and Western Railway	Moderate	Infrastructure Systems	Transportation	No	No	High	Yes	No	No	No	No	No	0.5	3	1.00	2	6	4	1.00	2	8
New York, Susquehanna and Western Railway	N/A	Infrastructure Systems	Transportation	No	No	High	Yes	No	No	No	No	No	0.5	3	False	2	0	4	False	2	0
New York, Susquehanna and Western Railway	N/A	Infrastructure Systems	Transportation	No	No	High	Yes	No	No	No	No	No	0.5	3	False	2	0	4	False	2	0
Millennium Pipeline	N/A	Infrastructure Systems	Liquid Fuels	Yes	Yes, Fema	High	Yes	No	No	No	No	No	0.5	3	False	2	0	4	False	2	0
Town Of Chenango	N/A	Health and Social Services	Government and Administrative Services	Yes	Yes, Fema	High	Yes	No	No	No	No	No	0.5	3	False	3	0	4	False	3	0
Dimmock Hill	N/A	Infrastructure Systems	Water Supply	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	False	1	0	4	False	1	0
Castle Creek Post Office	N/A	Health and Social Services	Government And Administrative Services	No	No	High	Yes	Yes	No	No	No	No	1	3	False	3	0	4	False	3	0
Chenango Bridge Post Office	N/A	Health and Social Services	Government And Administrative Services	Yes	No	High	Yes	No	No	No	No	No	0.5	3	False	3	0	4	False	3	0
Chenango Ambulance Service, Inc.	N/A	Health and Social Services	Emergency Operations/Response	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	False	3	0	4	False	3	0
Northgate Wwtp	Extreme	Infrastructure Systems	Wastewater	Yes	No	High	Yes	Yes	Yes	Yes	No	Yes	2.5	3	4.50	5	68	4	4.50	5	90
Chenango Bridge Station 1	N/A	Health and Social Services	Emergency Operations/Response	Yes	Yes, Fema	High	Yes	No	No	No	No	No	0.5	3	False	3	0	4	False	3	0
Chenango Bridge Station 2	N/A	Health and Social Services	Emergency Operations/Response	No	Yes, Fema	High	Yes	No	No	No	No	No	0.5	3	False	3	0	4	False	3	0
Chenango Fire #2	N/A	Health and Social Services	Emergency Operations/Response	No	Yes, Fema	High	Yes	No	No	No	No	No	0.5	3	False	3	0	4	False	3	0
Chenango Station 1	N/A	Health and Social Services	Emergency Operations/Response	Yes	Yes, Fema	High	Yes	No	No	No	No	No	0.5	3	False	3	0	4	False	3	0
Tower	N/A	Infrastructure Systems	Telecommunications	Yes	No, Locally Significant	Low	Yes	No	No	No	No	No	0.5	3	False	3	0	4	False	3	0
John R. Harshaw Primary School	N/A	Health and Social Services	Schools	No	Yes, Fema	High	Yes	No	No	No	No	No	0.5	3	False	3	0	4	False	3	0



TABLE 5.5 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.5 – Risk Assessment Tool Optional: Risk Assessment (500-Year Event)			
Asset	Risk Area	Asset Class	Asset Sub-Category	Socially Vulnerable Populations	Critical Facility	Community Value	Defensive Flood Protection Measures	Elevation	Freeboard	Point Of Confluence	Stormwater Discharge	Vegetated Streambank Buffers	Landscape Attribute Score	Hazard Score	Exposure Score	Vulnerability Score	Risk Score	Hazard Score	Exposure Score	Vulnerability Score	Risk Score
Chenango Forks High School	N/A	Health and Social Services	Schools	No	Yes, Fema	High	Yes	No	No	No	No	No	0.5	3	False	3	0	4	False	3	0
Chenango Forks Middle School	N/A	Health and Social Services	Schools	No	Yes, Fema	High	Yes	No	No	No	No	No	0.5	3	False	3	0	4	False	3	0
Chenango Bridge Elementary School	N/A	Health and Social Services	Schools	No	Yes, Fema	High	Yes	No	No	No	No	No	0.5	3	False	3	0	4	False	3	0
Central Baptist Christian Academy	N/A	Health and Social Services	Schools	Yes	Yes, Fema	High	Yes	Yes	No	No	No	No	1	3	False	3	0	4	False	3	0
Chenango Bridge Methodist Church	N/A	Natural and Cultural Resources	Cultural or Religious Establishments	No	Yes, Fema	High	Yes	Yes	No	No	No	No	1	3	False	3	0	4	False	3	0
Chenango Bridge Elementary School	N/A	Health and Social Services	Schools	No	Yes, Fema	High	Yes	No	No	No	No	No	0.5	3	False	3	0	4	False	3	0
Chenango Forks High School	N/A	Health and Social Services	Schools	No	Yes, Fema	High	Yes	No	No	No	No	No	0.5	3	False	3	0	4	False	3	0
Chenango Forks Middle School	N/A	Health and Social Services	Schools	No	Yes, Fema	High	Yes	No	No	No	No	No	0.5	3	False	3	0	4	False	3	0
John R. Harshaw Primary School	N/A	Health and Social Services	Schools	No	Yes, Fema	High	Yes	No	No	No	No	No	0.5	3	False	3	0	4	False	3	0
Valley Christian Reformed Church	N/A	Natural and Cultural Resources	Cultural or Religious Establishments	No	Yes, Fema	Medium	Yes	No	No	No	No	No	0.5	3	False	3	0	4	False	3	0
Well #1	N/A	Infrastructure Systems	Water Supply	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	False	1	0	4	False	1	0
Church Well	N/A	Infrastructure Systems	Water Supply	Yes	No, Locally Significant	High	Yes	Yes	No	No	No	No	1	3	False	1	0	4	False	1	0
School Well	N/A	Infrastructure Systems	Water Supply	Yes	No, Locally Significant	High	Yes	Yes	No	No	No	No	1	3	False	1	0	4	False	1	0
Applewood Well	N/A	Infrastructure Systems	Water Supply	No	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	False	1	0	4	False	1	0
Chenango Heights Well	N/A	Infrastructure Systems	Water Supply	No	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	False	1	0	4	False	1	0
Maplewood Well	N/A	Infrastructure Systems	Water Supply	No	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	False	1	0	4	False	1	0



TABLE 5.5 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.5 – Risk Assessment Tool Optional: Risk Assessment (500-Year Event)			
Asset	Risk Area	Asset Class	Asset Sub-Category	Socially Vulnerable Populations	Critical Facility	Community Value	Defensive Flood Protection Measures	Elevation	Freeboard	Point Of Confluence	Stormwater Discharge	Vegetated Streambank Buffers	Landscape Attribute Score	Hazard Score	Exposure Score	Vulnerability Score	Risk Score	Hazard Score	Exposure Score	Vulnerability Score	Risk Score
Northgate Well	High	Infrastructure Systems	Water Supply	Yes	No, Locally Significant	High	Yes	Yes	No	Yes	No	No	1.5	3	2.50	2	15	4	2.50	2	20
Pennview Well	High	Infrastructure Systems	Water Supply	Yes	No, Locally Significant	High	Yes	Yes	No	No	No	No	1	3	2.00	2	12	4	2.00	2	16
Route 12A Well	High	Infrastructure Systems	Water Supply	Yes	No, Locally Significant	High	Yes	Yes	No	No	No	No	1	3	2.00	2	12	4	2.00	2	16
Runacre Well	N/A	Infrastructure Systems	Water Supply	No	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	False	1	0	4	False	1	0
Building #1 Well	N/A	Infrastructure Systems	Water Supply	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	False	1	0	4	False	1	0
Building #2, Well #2A	N/A	Infrastructure Systems	Water Supply	Yes	No, Locally Significant	High	Yes	Yes	No	No	No	No	1	3	False	1	0	4	False	1	0
Building #3 Well	N/A	Infrastructure Systems	Water Supply	Yes	No, Locally Significant	High	Yes	Yes	No	No	No	No	1	3	False	1	0	4	False	1	0
Building #4 Well	N/A	Infrastructure Systems	Water Supply	Yes	No, Locally Significant	High	Yes	Yes	No	No	No	No	1	3	False	1	0	4	False	1	0
Building #5 Well	N/A	Infrastructure Systems	Water Supply	Yes	No, Locally Significant	High	Yes	Yes	No	No	No	No	1	3	False	1	0	4	False	1	0
Building #1 Well	N/A	Infrastructure Systems	Water Supply	No	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	False	1	0	4	False	1	0
Building #2 Well	N/A	Infrastructure Systems	Water Supply	No	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	False	1	0	4	False	1	0
Lower Lots Well	N/A	Infrastructure Systems	Water Supply	No	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	False	1	0	4	False	1	0
Upper Lots Well	N/A	Infrastructure Systems	Water Supply	No	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	False	1	0	4	False	1	0
Well #1	N/A	Infrastructure Systems	Water Supply	Yes	No, Locally Significant	High	Yes	Yes	No	No	No	No	1	3	False	1	0	4	False	1	0
Well #1	N/A	Infrastructure Systems	Water Supply	No	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	False	1	0	4	False	1	0
Well #2 (Well Outside House)	N/A	Infrastructure Systems	Water Supply	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	False	1	0	4	False	1	0
Well #3 (New Well)	N/A	Infrastructure Systems	Water Supply	Yes	No, Locally Significant	High	Yes	Yes	No	No	No	No	1	3	False	1	0	4	False	1	0
Well #1	N/A	Infrastructure Systems	Water Supply	Yes	No, Locally Significant	High	Yes	Yes	No	No	No	No	1	3	False	1	0	4	False	1	0



TABLE 5.5 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.5 – Risk Assessment Tool Optional: Risk Assessment (500-Year Event)			
Asset	Risk Area	Asset Class	Asset Sub-Category	Socially Vulnerable Populations	Critical Facility	Community Value	Defensive Flood Protection Measures	Elevation	Freeboard	Point Of Confluence	Stormwater Discharge	Vegetated Streambank Buffers	Landscape Attribute Score	Hazard Score	Exposure Score	Vulnerability Score	Risk Score	Hazard Score	Exposure Score	Vulnerability Score	Risk Score
Route 11 (Front Street) Bridge Over Castle Creek	Extreme	Infrastructure Systems	Transportation	Yes	No	High	Yes	No	Yes	No	No	Yes	1.5	3	3.50	3	32	4	3.50	3	42
Route 11 Bridge Over Brooks Creek	N/A	Infrastructure Systems	Transportation	No	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	False	2	0	4	False	2	0
Chenango Briidge Road – Bridge	Extreme	Infrastructure Systems	Transportation	No	No, Locally Significant	High	Yes	No	Yes	No	No	Yes	1.5	3	3.50	3	32	4	3.50	3	42
Town of Chenango Sewer District #10	N/A	Infrastructure Systems	Wastewater	Yes	No	High	Yes	No	No	No	No	No	0.5	3	False	3	0	4	False	3	0
Private Wwtp 1249 River Road Chenango Heights Disposal	N/A	Infrastructure Systems	Wastewater	No	No	High	Yes	No	No	No	No	No	0.5	3	False	3	0	4	False	3	0
Fendick's Campground	N/A	Natural and Cultural Resources	Parks And Recreation	No	No	High	Yes	No	No	No	No	No	0.5	3	False	1	0	4	False	1	0
"Mcgirk's" Pump Station	High	Infrastructure Systems	Wastewater	No	No	High	Yes	No	No	No	No	No	0.5	3	1.50	3	14	4	1.50	3	18
Hostel 11929	N/A	Housing	Supportive Housing	No	Yes, Fema	Low	Yes	No	No	No	No	No	0.5	3	False	3	0	4	False	3	0
Broome Hostel #11698	N/A	Housing	Supportive Housing	No	Yes, Fema	Low	Yes	No	No	No	No	No	0.5	3	False	3	0	4	False	3	0
Saint Christopher's Church	N/A	Natural and Cultural Resources	Cultural or Religious Establishments	Yes	No	Medium	Yes	Yes	No	No	No	No	1	3	False	3	0	4	False	3	0
Chenango Ice Rink	N/A	Natural and Cultural Resources	Museums, Performing Arts Centers, Stadiums	No	Yes, Fema	Medium	Yes	Yes	No	No	No	No	1	3	False	3	0	4	False	3	0
Route 12 Mine (Gorick)	N/A	Economic	Industrial, Warehousing and Manufacturing	No	No	Low	Yes	Yes	No	No	No	No	1	3	False	1	0	4	False	1	0
Rose Pit (Bert Adams Parcel)	N/A	Economic	Industrial, Warehousing and Manufacturing	Yes	No	Low	Yes	Yes	No	No	No	No	1	3	False	3	0	4	False	3	0
Our Lady of Lourdes Memorial Hospital At Lourdes Family Health Front St	N/A	Health and Social Services	Healthcare Facilities	Yes	Yes, Fema	High	Yes	No	No	No	No	No	0.5	3	False	3	0	4	False	3	0



TABLE 5.5 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.5 – Risk Assessment Tool Optional: Risk Assessment (500-Year Event)			
Asset	Risk Area	Asset Class	Asset Sub-Category	Socially Vulnerable Populations	Critical Facility	Community Value	Defensive Flood Protection Measures	Elevation	Freeboard	Point Of Confluence	Stormwater Discharge	Vegetated Streambank Buffers	Landscape Attribute Score	Hazard Score	Exposure Score	Vulnerability Score	Risk Score	Hazard Score	Exposure Score	Vulnerability Score	Risk Score
Little Choconut Creek	N/A	Natural and Cultural Resources	Water Bodies	Yes	No	High	Yes	No	No	No	No	No	0.5	3	False	1	0	4	False	1	0
Thomas Creek	High	Natural and Cultural Resources	Water Bodies	Yes	No	High	Yes	Yes	No	No	No	No	1	3	2.00	2	12	4	2.00	2	16
Gilbert Creek	N/A	Natural and Cultural Resources	Water Bodies	No	No	High	Yes	No	No	No	No	No	0.5	3	False	1	0	4	False	1	0
Castle Creek	High	Natural and Cultural Resources	Water Bodies	Yes	No	High	Yes	Yes	No	No	No	No	1	3	2.00	2	12	4	2.00	2	16
Potato Creek	N/A	Natural and Cultural Resources	Water Bodies	No	No	High	Yes	Yes	No	No	No	No	1	3	False	1	0	4	False	1	0
Brooks Creek	High	Natural and Cultural Resources	Water Bodies	No	No	High	Yes	Yes	No	No	No	No	1	3	2.00	2	12	4	2.00	2	16
Chenango River	Extreme	Natural and Cultural Resources	Water Bodies	No	No	High	Yes	No	No	No	No	Yes	1	3	3.00	2	18	4	3.00	2	24
Tioughnioga River	Extreme	Natural and Cultural Resources	Water Bodies	No	No	High	Yes	No	No	No	No	Yes	1	3	3.00	2	18	4	3.00	2	24
NYS Dec Wetland On Gilbert Creek (North of Utility Line)	N/A	Natural and Cultural Resources	Wetlands and Marshes	No	No	Medium	Yes	No	No	No	No	No	0.5	3	False	1	0	4	False	1	0
NYS Dec Wetland Between Port Road and East Hill Road (Isolated)	N/A	Natural and Cultural Resources	Wetlands and Marshes	No	No	Low	Yes	No	No	No	No	No	0.5	3	False	1	0	4	False	1	0
NYS Dec Wetland On Gilbert Creek at Utility Line	N/A	Natural and Cultural Resources	Wetlands and Marshes	No	No	Low	No	No	No	No	No	No	0	3	False	1	0	4	False	1	0
NYS Dec Wetland	N/A	Natural and Cultural Resources	Wetlands and Marshes	No	No	Medium	Yes	No	No	No	No	No	0.5	3	False	1	0	4	False	1	0
NYS Dec Wetland on Castle Creek	High	Natural and Cultural Resources	Wetlands And Marshes	Yes	No	Low	Yes	Yes	No	No	No	No	1	3	2.00	2	12	4	2.00	2	16



TABLE 5.5 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.5 – Risk Assessment Tool Optional: Risk Assessment (500-Year Event)			
Asset	Risk Area	Asset Class	Asset Sub-Category	Socially Vulnerable Populations	Critical Facility	Community Value	Defensive Flood Protection Measures	Elevation	Freeboard	Point Of Confluence	Stormwater Discharge	Vegetated Streambank Buffers	Landscape Attribute Score	Hazard Score	Exposure Score	Vulnerability Score	Risk Score	Hazard Score	Exposure Score	Vulnerability Score	Risk Score
NYS Dec Wetland on Kattell Creek	High	Natural and Cultural Resources	Wetlands And Marshes	Yes	No	High	Yes	Yes	No	No	No	No	1	3	2.00	2	12	4	2.00	2	16
NYS Dec Wetland Along Thomas Creek	High	Natural and Cultural Resources	Wetlands And Marshes	Yes	No	High	Yes	Yes	No	No	No	No	1	3	2.00	2	12	4	2.00	2	16
NYS Dec Wetland (Isolated)	N/A	Natural and Cultural Resources	Wetlands And Marshes	Yes	No	Medium	Yes	No	No	No	No	No	0.5	3	False	1	0	4	False	1	0
Chenango Commons – Mcgirk's (Golf Course) And Offices	Moderate	Economic	Small Business	No	No, Locally Significant	Medium	No	Yes	No	No	No	No	0.5	3	1.00	1	3	4	1.00	1	4
Northgate Plaza	High	Economic	Small Business	Yes	No	Medium	Yes	Yes	No	Yes	No	No	1.5	3	2.50	5	38	4	2.50	5	50
Lowe's	N/A	Economic	Large Business	Yes	No	Medium	No	Yes	No	No	No	No	0.5	3	False	3	0	4	False	3	0
United Health Services Primary Care	N/A	Health and Social Services	Healthcare Facilities	Yes	No, Locally Significant	High	Yes	Yes	No	No	No	No	1	3	False	3	0	4	False	3	0
United Health Service Urgent Care	N/A	Health and Social Services	Healthcare Facilities	Yes	No, Locally Significant	High	Yes	No	No	No	No	No	0.5	3	False	3	0	4	False	3	0
Northgate Well Pumphouse	High	Infrastructure Systems	Water Supply	Yes	No, Locally Significant	High	No	Yes	No	Yes	No	No	1	3	2.00	2	12	4	2.00	2	16
Interstate 81 Bridge Over Castle Creek	Extreme	Infrastructure Systems	Transportation	Yes	No, Locally Significant	High	Yes	No	Yes	No	No	Yes	1.5	3	3.50	3	32	4	3.50	3	42
Route 12 (Front Street) Bridge Over Castle Creek	Extreme	Infrastructure Systems	Transportation	Yes	No, Locally Significant	High	Yes	No	Yes	No	No	Yes	1.5	3	3.50	3	32	4	3.50	3	42
Castle Creek Park	N/A	Natural And Cultural Resources	Parks And Recreation	No	No	Medium	No	Yes	No	No	No	No	0.5	3	False	1	0	4	False	1	0
Wolfe Park	N/A	Natural and Cultural Resources	Parks and Recreation	Yes	No	Low	No	No	No	No	No	No	0	3	False	1	0	4	False	1	0
Otsiningo Park	Extreme	Natural and Cultural Resources	Parks and Recreation	Yes	No	Medium	No	No	No	No	No	Yes	0.5	3	2.50	2	15	4	2.50	2	20



TABLE 5.5 – RISK ASSESSMENT TOOL (CONT'D)

Asset Information							Landscape Attributes							Risk Assessment				Table 5.5 – Risk Assessment Tool Optional: Risk Assessment (500-Year Event)			
Asset	Risk Area	Asset Class	Asset Sub-Category	Socially Vulnerable Populations	Critical Facility	Community Value	Defensive Flood Protection Measures	Elevation	Freeboard	Point Of Confluence	Stormwater Discharge	Vegetated Streambank Buffers	Landscape Attribute Score	Hazard Score	Exposure Score	Vulnerability Score	Risk Score	Hazard Score	Exposure Score	Vulnerability Score	Risk Score
Hider Park	N/A	Natural and Cultural Resources	Parks And Recreation	Yes	No	Low	No	No	No	No	No	No	0	3	False	1	0	4	False	1	0
Broad Acres Park	High	Natural and Cultural Resources	Parks and Recreation	Yes	No	Low	No	No	No	No	No	No	0	3	1	2	6	4	1	2	8
Chenango Bridge Park	High	Natural and Cultural Resources	Parks and Recreation	No	No	Medium	No	Yes	No	No	No	No	0.5	3	1.5	2	9	4	1.5	2	12
Kattell Creek	High	Natural and Cultural Resources	Water Bodies	No	No	High	No	Yes	No	Yes	No	No	1	3	2	2	12	4	2	2	16
Chenango Street Bus Route	N/A	Infrastructure Systems	Transportation	No	No	High	Yes	No	No	No	No	No	0.5	3	False	2	0	4	False	2	0
Front Street Bus Route	High	Infrastructure Systems	Transportation	Yes	No	High	Yes	No	No	No	No	No	0.5	3	1.5	3	13.5	4	1.5	3	18
Wallace Road Stormwater System	Moderate	Infrastructure Systems	Stormwater	Yes	No	High	Yes	No	No	No	No	No	0.5	3	1	2	6	4	1	2	8
Commercial Corridor	High	Economic	0	Yes	Yes, Fema	High	Yes	Yes	No	Yes	No	No	1.5	3	2.5	5	37.5	4	2.5	5	50
Jason Drive Wetland (Federal Designation)	Moderate	Natural and Cultural Resources	Wetlands and Marshes	No	No, Locally Significant	High	Yes	No	No	No	No	Yes	1	3	1.5	1	4.5	4	1.5	1	6



GLOSSARY

BCIDA	Broome County Industrial Development Agency
BFE	Base Flood Elevation
BMP	Best-Management Practice
CD	Commercial Development
CDBG	Community Development Block Grant
CDBG-DR	Community Development Block Grant Disaster Recovery
cfs	Cubic Feet Per Second
Committee	Town Of Chenango Nyrccr Planning Committee
Community	Town Of Chenango Nyrccr Community
CRS	Community Ratings System
CS	Community Service
ESRI	Environmental Systems Research Institute
FEMA	Federal Emergency Management Agency
FHA	Flood Hazard Area
FTE	Full-Time Equivalent
HMGP	Hazard Mitigation Grant Proposal
HMP	Hazard Mitigation Plan
HUD	U.s. Department Of Housing And Urban Development
HEC-RAS	Hydrologic Engineering Center – River Analysis System
kW	Kilowatt
MSA	Metropolitan Statistical Area
N/A	Not Applicable
NCDC	National Climate Data Center
NFIP	National Flood Insurance Program
NOAA	National Oceanic And Atmospheric Administration
NYRCR	New York Rising Community Reconstruction

GLOSSARY (CONT'D)

NYRCR Plan	Town Of Chenango New York Rising Community Reconstruction Plan
NYS	New York State
NYS DEC	New York State Department Of Environmental Conservation
NYS DOS	New York State Department Of State
NYS DOT	New York State Department Of Transportation
PDD	Planned Development
POC	Point Of Confluence
REDC	Regional Economic Development Council
RSF	Recovery Support Function
SART	State Agency Resource Team
SOVI	Social Vulnerability Index
sq. mi.	Square Mile
SUNY	State University Of New York
SWMS	Stormwater Management System
TBD	To Be Determined
Tetra Tech	Tetra Tech, Inc.
Town	Town Of Chenango
UofSC	University Of South Carolina
WWTP	Waste Water Treatment Plan Or Plant



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