

NY RISING COMMUNITY RECONSTRUCTION PROGRAM

NYRCR TIOGA

NY RISING COMMUNITY RECONSTRUCTION PLAN

MARCH 2014

NYRCR Tioga Planning Committee

Dr. John Baust, Co-Chair

Cindy Bennett, Co-Chair

Don Castellucci, Committee Member*

Barb Crannell, Committee Member*

Ron Dougherty, Committee Member

Drew Griffin, Committee Member

Elaine Jardine, Committee Member

Ed Kuhlman, Committee Member

Kevin Millar, Committee Member*

Erik Miller, Committee Member

Bob Pass, Committee Member

Lesley Pelotte, Committee Member*

Martha Sauerbrey, Committee Member*

Debra Standing, Committee Member

Loretta Sullivan, Committee Member*

LeeAnn Tinney, Committee Member

Wendy Walsh, Committee Member

Bob Williams, Committee Member*

Lou Zorn, Committee Member*

** Non-voting member*

This document was developed by the NYRCR Tioga Planning Committee as part of the NY Rising Community Reconstruction (NYRCR) Program within the Governor's Office of Storm Recovery. The NYRCR Program is supported by NYS Homes and Community Renewal, NYS Department of State, and NYS Department of Transportation. The document was prepared by the following consulting firms: Parsons Transportation Group of New York, Inc.; Elan.3 Consulting; and M.J. Engineering and Land Surveying, PC.



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 empowers the State's most impacted communities with the technical expertise needed to develop thorough and implementable reconstruction plans to build physically, socially, and economically resilient and sustainable communities.

Program Overview

The NYRCR Program, announced by Governor Cuomo in April of 2013, is a more than \$650 million planning and implementation process established to provide rebuilding and resiliency assistance to communities severely damaged by Hurricane Irene, Tropical Storm Lee, and Superstorm Sandy. Drawing on lessons learned from past recovery efforts, the 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 in rigorous analysis and informed by the latest innovative solutions.

One hundred and two storm-affected localities across the State were originally designated to participate in the NYRCR Program. The State has allocated each locality between \$3 million and \$25 million to implement eligible projects identified in the NYRCR Plan. The funding for these projects is provided through the U.S. Department of Housing and Urban Development (HUD) Community Development Block Grant – Disaster Recovery (CDBG-DR) program.^{F1}

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

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

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

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

F1 Five of the 102 localities in the program—Niagara, Herkimer, Oneida, Madison, and Montgomery Counties—are not funded through the CDBG-DR program.

The NYRCR Program has successfully coordinated with State and Federal agencies to help guide the development of feasible projects. The program has leveraged the Regional Economic Development Council's State Agency Review Teams (SARTs), comprised of representatives from dozens of State agencies and authorities, for feedback on projects proposed by NYRCR Communities. The SARTs review projects with an eye toward regulatory and permitting needs, policy objectives, and preexisting agency funding sources. The 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 NYRCR Planning Committees, passionately committed to realizing brighter, more resilient futures for their communities.

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 NYRCR Community's prioritization of these projects and actions. **Proposed Projects** are projects proposed for funding through a NYRCR Community's allocation of CDBG-DR funding. **Featured Projects** are projects and actions that the Planning Committee has identified as important resiliency recommendations and has analyzed in depth, but has not 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 official voting members of the Planning Committee. Those voting members with conflicts of interest recused themselves from voting on any affected projects, as required by the NYRCR Ethics Handbook and Code of Conduct.

NYRCR Tioga Community is eligible for up to \$15 million in CDBG-DR implementation funds.^{F2}

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

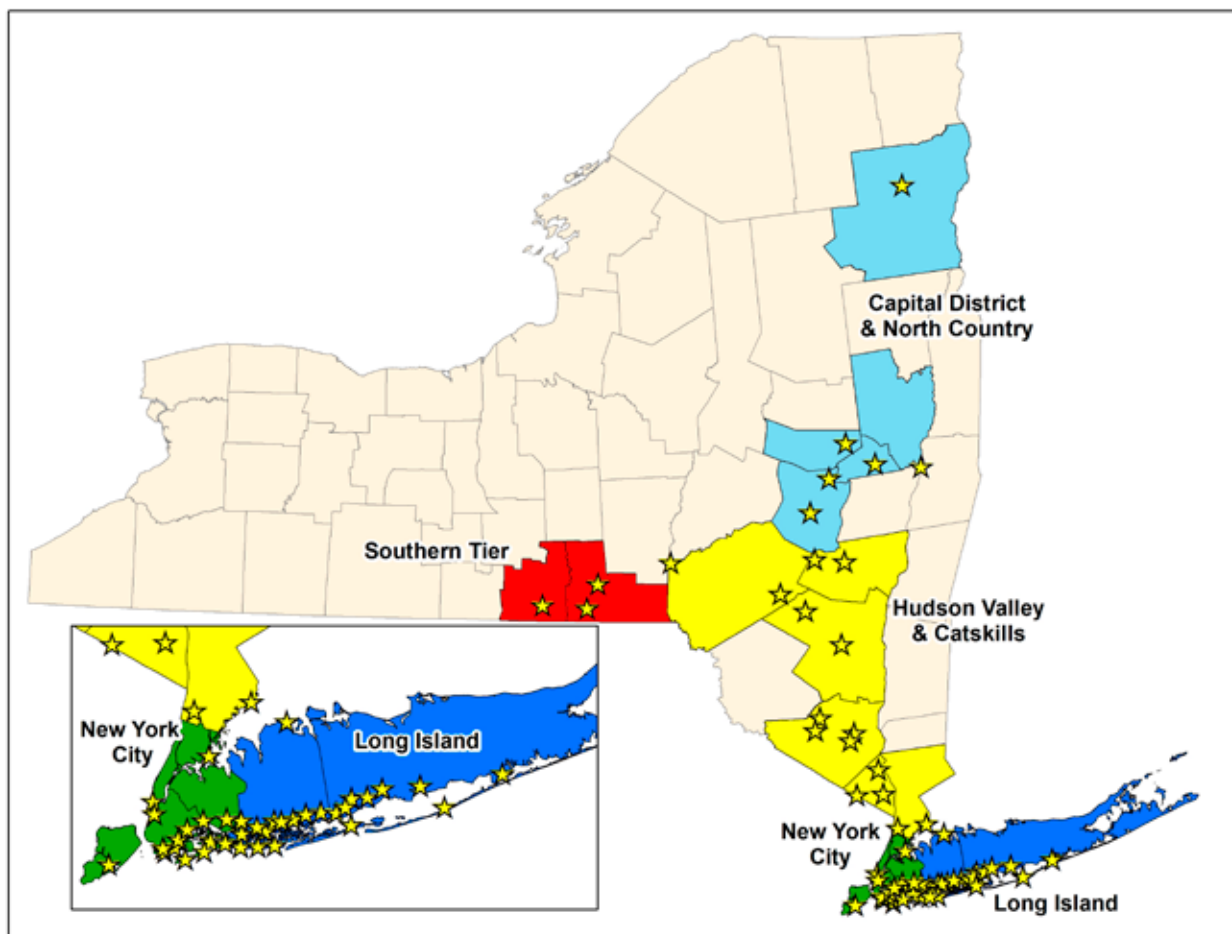
F2 The following localities' allocations comprise the NYRCR Community's total allocation: Town of Nichols - \$3 million; Village of Nichols - \$3 million; Town of Owego - \$3 million; Village of Owego - \$3 million; and the Town of Tioga \$3 million.

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 Community's CDBG-DR allocation to allow for flexibility if some Proposed Projects cannot be implemented due to environmental review,

HUD eligibility, technical feasibility, or other factors. Implementation of the projects and actions found in this NYRCR Plan are subject to applicable Federal, State, and local laws and regulations, including the Americans with Disabilities Act (ADA). Inclusion of a project or action in this NYRCR Plan does not guarantee that a particular project or action will be eligible for CDBG-DR funding or that it will be implemented. The Governor's Office of Storm Recovery will actively seek to match projects with funding sources.

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

NYRCR Communities^{F3}



F3 Note: map includes those NYRCR Communities funded through the CDBG-DR program, including the NYRCR Communities announced in January 2014. Find out more at: StormRecovery.ny.gov/Community-Reconstruction-Program.

Table of Contents

Executive Summary

| | |
|---|------|
| A. Overview..... | ES-1 |
| B. Summary of Storm Impacts | ES-2 |
| C. Summary of Critical Issues | ES-2 |
| D. Community-Driven Process | ES-3 |
| E. Final Plan as Blueprint for Implementation | ES-4 |

Section I: Community Overview

| | |
|---|------|
| A. Geographic Scope of NYRCR Plan | 1-1 |
| i. Town and Village of Nichols..... | 1-5 |
| ii. Town and Village of Owego | 1-7 |
| iii. Town of Tioga..... | 1-9 |
| B. Description of Storm Damage..... | 1-10 |
| i. Town and Village of Nichols..... | 1-11 |
| ii. Town and Village of Owego | 1-13 |
| iii. Town of Tioga..... | 1-15 |
| C. Critical Issues | 1-16 |
| D. Community Vision | 1-18 |
| E. Relationship to Regional Plans | 1-18 |

Section II: Assessment of Risk and Needs

| | |
|---|------|
| A. Description of Community Assets and Assessment of Risk | 2-1 |
| i. Description of Community Assets | 2-1 |
| ii. Assessment of Risk to Assets and Systems | 2-2 |
| B. Assessment of Needs and Opportunities..... | 2-16 |
| i. Community Planning and Capacity Building..... | 2-17 |
| ii. Economic Development..... | 2-18 |

iii. Health and Social Services 2-19
iv. Housing 2-20
v. Infrastructure 2-20
vi. Natural and Cultural Resources 2-21

Section III: Reconstruction and Resiliency Strategies

A. Reconstruction and Resiliency Strategies 3-1

Section IV: Implementation—Project Profiles

A. Introduction 4-1

Section V: Additional Materials

A. Additional Resiliency Recommendations 5-1
B. Master Table of Projects 5-1
C. Public Engagement Process 5-5
D. Community Asset Inventory 5-9
E. End Notes 5-15
F. Glossary 5-18

List of Figures

| | |
|---|------|
| 1.1. Planning Area | 1-3 |
| 2.1. Risk Areas | 2-3 |
| 2.2. Assets and Risk Areas | 2-5 |
| 2.3A. Assets and Risk Areas - Northwest Detail..... | 2-7 |
| 2.3B. Assets and Risk Areas - Northeast Detail..... | 2-9 |
| 2.3C. Assets and Risk Areas - Southeast Detail..... | 2-11 |
| 2.3D. Assets and Risk Areas - Southwest Detail..... | 2-13 |

List of Tables

| | |
|---|------|
| 1.1 Tioga Community Overview | 1-5 |
| 1.2 FEMA Buyouts | 1-11 |
| 3.1 Projects to Strengthen Plans/Local Laws to Minimize Future Flood Damage | 3-2 |
| 3.2 Projects to Ensure New Development/Redevelopment are Flood Resistant | 3-3 |
| 3.3 Projects to Comprehensively Prepare the Tioga Community for Disasters | 3-4 |
| 3.4 Projects to Increase Emergency Preparedness Among Residents | 3-5 |
| 3.5 Projects to Enhance Staff Capacity | 3-6 |
| 3.6 Projects to Improve Residents' Quality of Life..... | 3-7 |
| 3.7 Projects to Create a Diversified Economy | 3-8 |
| 3.8 Projects to Ensure Emergency Services for Vulnerable Populations | 3-10 |
| 3.9 Projects to Reduce Future Flood Damage to Homes..... | 3-11 |
| 3.10 Projects to Protect Key Areas and Critical Facilities..... | 3-12 |
| 3.11 Projects to Preserve and Restore Natural Areas..... | 3-13 |

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Executive Summary

Tropical Storm Lee, the worst flood of record for the Southern Tier of New York, severely impacted the riverine communities in Tioga County. Banding together to build back better, the municipalities that make up the NYRCR Tioga Community are a warm and resilient group of riverine communities that work together to restore, redevelop and revitalize their economy, quality of life, housing; infrastructure, and the natural resources that make up their cultural fabric.

A. Overview

The NYRCR Tioga Community comprises five municipalities located in Tioga County: the Town and Village of Nichols, the Town and Village of Owego, and the Town of Tioga. Each of the five communities profiled in the NYRCR Tioga Plan is eligible to receive up to \$3 million in CDBG-DR implementation funds.

Tioga County, located in the Southern Tier region of New York State, measures 523 square miles, and according to the 2010 U.S. Census has a population of 51,125 residents, approximately 53 percent of which live in the towns and villages that make up the Tioga Community. While these communities vary greatly in their geographic size, population, and local economy, they all share their borders with the Susquehanna River, and have experienced a similar history of flood damage and loss due to extreme storm events.

The Susquehanna River, one of the longest rivers on the east coast, flows across the southern-most portion of Tioga County from east to west. The river flows for 464 miles through three states, starting in Upstate New York (Cooperstown), and proceeding west through the Southern Tier, across rural southeastern Pennsylvania, finally terminating in the Chesapeake Bay in Maryland. Since record keeping began nearly 200 years ago, the U.S. Weather Service has reported flooding along the main stem of the Susquehanna River every 15 years on average. This, coupled with localized flash flooding that occurs annually on smaller tributaries, led to the Susquehanna River Basin being identified as one of the most flood-prone watersheds in the country.

B. Summary of Storm Impacts

The 2011 Atlantic hurricane season brought tremendous devastation to communities along the Susquehanna River. Hurricane Irene made landfall in New York on August 28, 2011 and produced 6 to 8 inches of rain and heavy winds that knocked down trees and power lines. In some locations, power was out for a week.

On September 7, 2011, not long after Hurricane Irene passed through the region, Tropical Storm Lee dropped an additional 11 inches of rain on Tioga County during a 24-hour period. The torrential rains, coupled with saturated grounds and the fact that the Susquehanna River was still swollen from Hurricane Irene, led to record high water levels. Reports indicate that the flood waters in Tioga County associated with Tropical Storm Lee measured 4 feet higher than those reported during the flood of 2006.



Elan 3 Consulting

Tropical Storm Lee produced record high flood levels.

The extreme rains associated with Tropical Storm Lee also caused the water in the Susquehanna's primary tributaries within the Tioga Community to overrun their banks. Increased velocity, coupled with abundant sediment and debris in the creeks, caused excessive flooding and left critical roads impassable or entirely washed out. The flooding also inundated stormwater and sewer utility infrastructure, damaging pump systems or causing total failure throughout the five communities. This resulted in extensive damage to the commercial districts in the Villages of Owego and Nichols, and the closure of critical municipal facilities in the Town and Village of Owego, as well as the Town and Village of Nichols. The Village of Owego was particularly hard-hit, with 85 percent of the community under water.

The flooding associated with Hurricane Irene and Tropical Storm Lee not only caused damage to residential, municipal and commercial property, but to agricultural lands as well. Stream bank erosion resulting from the storms has reduced the amount of productive agricultural acreage, negatively impacting farming operations that play a large role in the Tioga Community economy.

In total, flooding from Hurricane Irene and Tropical Storm Lee destroyed 82 homes, damaged over 3,750 homes and caused millions of dollars of property and infrastructure damage in the Tioga Community. Tropical Storm Lee is considered the worst flood of record for the Southern Tier of New York.

C. Summary of Critical Issues

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

- **Regionalism.** Successful flood recovery will be dependent on municipalities working together.

- **Flood Recovery Assistance Programs.** Economic recovery has become more difficult with subsequent floods, property damage, and loss.
- **Infrastructure.** There is a need to relocate critical facilities outside of the floodplain.
- **Emergency Response.** Communities need to be able to educate the public, keep them informed and provide continuous services before, during and after a storm.
- **Planning, Capacity Building, and Sustainability.** Municipalities require additional staff capacity to implement flood recovery projects, and need to update their local laws and plans to increase flood resiliency.

D. Community-Driven Process

Development of the NYRCR Tioga Community Plan was a community-driven process that involved extensive public engagement. During the first public workshop, held on September 24, 2013, residents were asked to talk about the strengths of their town or village and their vision for the future of the Tioga Community. To help inspire and guide the planning process, the Tioga NYRCR Planning Committee used this information to develop the following vision statement:

“Through our collaborative efforts, the Tioga Community is capitalizing on opportunities to rebuild stronger, smarter, and safer. We are a warm and resilient group of riverine communities that work together to restore, redevelop and revitalize our economy, quality of life, housing, infrastructure and natural resources that make up our cultural fabric.”



Members of the NYRCR Tioga Planning Committee at the Regional Resiliency Summit.

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

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

A fourth public engagement event is scheduled to be held before May 12, 2014 to present the final NYRCR Tioga Plan and discuss implementation of its proposed projects. As with all public meetings, a wide range of media will be used to inform the community of this event and the NYRCR Tioga plan. Media outlets include the NYRCR website, social media, electronic mail, and print advertising. In addition to advertised public meetings, stakeholders (i.e., residents, public and private agencies, community organizations, and local businesses) were encouraged to provide feedback to the Committee throughout the planning process using the NYRCR website and Facebook page. The Committee Co-chairs made numerous public presentations and gave media interviews to publicize the NYRCR Program and the Tioga Plan.

E. Final Plan as Blueprint for Implementation

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

Once the Committee identified the resiliency strategies, they developed a list of projects and management measures to implement each strategy. These projects were classified as proposed, featured or additional resiliency recommendations. A list of the Community's resiliency strategies and projects that support them is provided below. Projects are not ranked or listed in priority order.

1. Strengthen or create new plans or local laws to minimize damage from future flooding.

- Stormwater Management Plan and Improvements, Village of Owego - Proposed.
- Resiliency Tools Update, Village of Owego - Proposed.
- Resiliency Tools Update, Town of Nichols - Proposed.

2. Ensure new development and redevelopment are resistant to flood damage.

- Highway Garage Relocation, Town of Nichols - Proposed.
- Joint Fire Station, Village and Town of Nichols - Proposed.
- DPW, Parks, and Utilities Office Relocation, Town of Owego - Proposed.
- DPW and Codes Office Relocation, Village of Owego - Proposed.
- Salt Storage Facility and Cover, Town of Tioga - Proposed.

3. Comprehensively prepare the Tioga Community for disasters.

- Regional Soil and Water Conservation District Projects, Tioga County - Proposed.
- Regional Susquehanna River Initiative, Tioga County - Proposed.
- Emergency Weather Alert and Warning System, Town and Village of Nichols and Village of Owego - Proposed.

4. Increase awareness among residents regarding home preparedness and emergency notifications.

- Emergency Preparedness and Notification Plan, Village of Owego - Proposed.
- Emergency Weather Alert and Warning System, Town and Village of Nichols and Village of Owego - Proposed.
- Solar-Powered Electronic Message Board, Village of Nichols - Proposed.

5. Ensure that flood-affected communities have the necessary staff capacity to apply for and administer flood mitigation and community revitalization funds.

- Regional Flood Recovery and Revitalization Office, NYRCR Tioga Community - Proposed.
- Regional Soil and Water Conservation District Projects, Tioga County - Proposed.

6. Improve the quality of life for residents after flood recovery.

- Commercial District Enhancements, Village of Nichols - Proposed.
- Regional Incubator Node, Village of Owego - Proposed.
- Alternative Energy Study, Town of Tioga - Proposed.
- Recreation Improvements and Creek Stabilization, Village of Nichols - Proposed.
- Revitalization Plan, Town of Nichols - Featured - Proposed.

7. Create a diversified economy in the Tioga Communities, supported by tourism, light industry, and small business.

- Commercial District Enhancements, Village of Nichols - Proposed.
- Regional Incubator Node, Village of Owego - Proposed.
- Alternative Energy Study, Town of Tioga - Proposed.
- Sewer Expansion, Town of Tioga - Proposed.
- Revitalization Plan, Town of Nichols - Featured.
- Healthy Main Street Economy / Sewer Expansion, Town and Village of Nichols - Featured.
- Water and Sewer Extensions along Route 434, Town of Owego - Featured.

8. Ensure emergency services for vulnerable populations, including provision of medical supplies and pharmaceuticals.

- Emergency Preparedness and Notification Plan, Village of Owego - Proposed.
- Emergency Weather Alert and Warning System, Town and Village of Nichols and Village of Owego - Proposed.

9. Reduce future flood damage to existing homes through adoption of stricter land use controls and undertake infrastructure improvements that further protect and allow for the new construction of affordable and market-rate housing.

- Resiliency Tools Update, Village of Owego - Proposed.
- Resiliency Tools Update, Town of Nichols - Proposed.
- Sewer Expansion, Town of Tioga - Proposed.
- Levee Accreditation, Village of Nichols - Proposed.
- Healthy Main Street Economy / Sewer Expansion, Town and Village of Nichols - Featured.

10. Protect key areas and critical facilities in the Tioga Community.

- Town Highway Facility Relocation, Town of Nichols - Proposed.
- Joint Fire Station, Town and Village of Nichols - Proposed.
- Bridge and Culvert Inspection and Upgrades, Town of Nichols - Proposed.
- Emergency Operations Center Generator, Village of Nichols - Proposed.
- DPW, Parks and Utilities Office Relocation, Town of Owego - Proposed.
- DPW and Codes Office Relocation, Village of Owego - Proposed.
- Main Street Water Pump House and Well Head Replacement, Town of Owego - Proposed.
- Gaylord Road Culvert Replacement, Town of Owego - Proposed.
- Salt Storage Shed and Cover, Town of Tioga - Proposed.
- Levee Accreditation, Village of Nichols - Proposed.

11. Preserve and restore natural areas, including floodplains, streams, and wetlands, which can slow floodwater's momentum, reduce erosion, and increase a community's flood resiliency.

- Regional Soil and Water Conservation District Projects, Tioga County - Proposed.
- Regional Susquehanna River Initiative, Tioga County - Proposed.
- Recreation Improvements and Creek Stabilization, Village of Nichols - Proposed.
- Stormwater Management Plan and Improvements, Village of Owego - Proposed.

Section I: Community Overview

Five riverine municipalities in Tioga County face similar critical issues related to flood protection and resiliency. Collectively they have created a shared vision of a Tioga Community working to restore, redevelop, and revitalize its economy, quality of life, housing, infrastructure, and natural resources.

A. Geographic Scope of NYRCR Plan

The geographic study area of the New York Rising Community Reconstruction (NYRCR) Tioga Community includes five Susquehanna riverine municipalities located in Tioga County: the Town and Village of Nichols, Town and Village of Owego, and the Town of Tioga (see Figure 1.1).

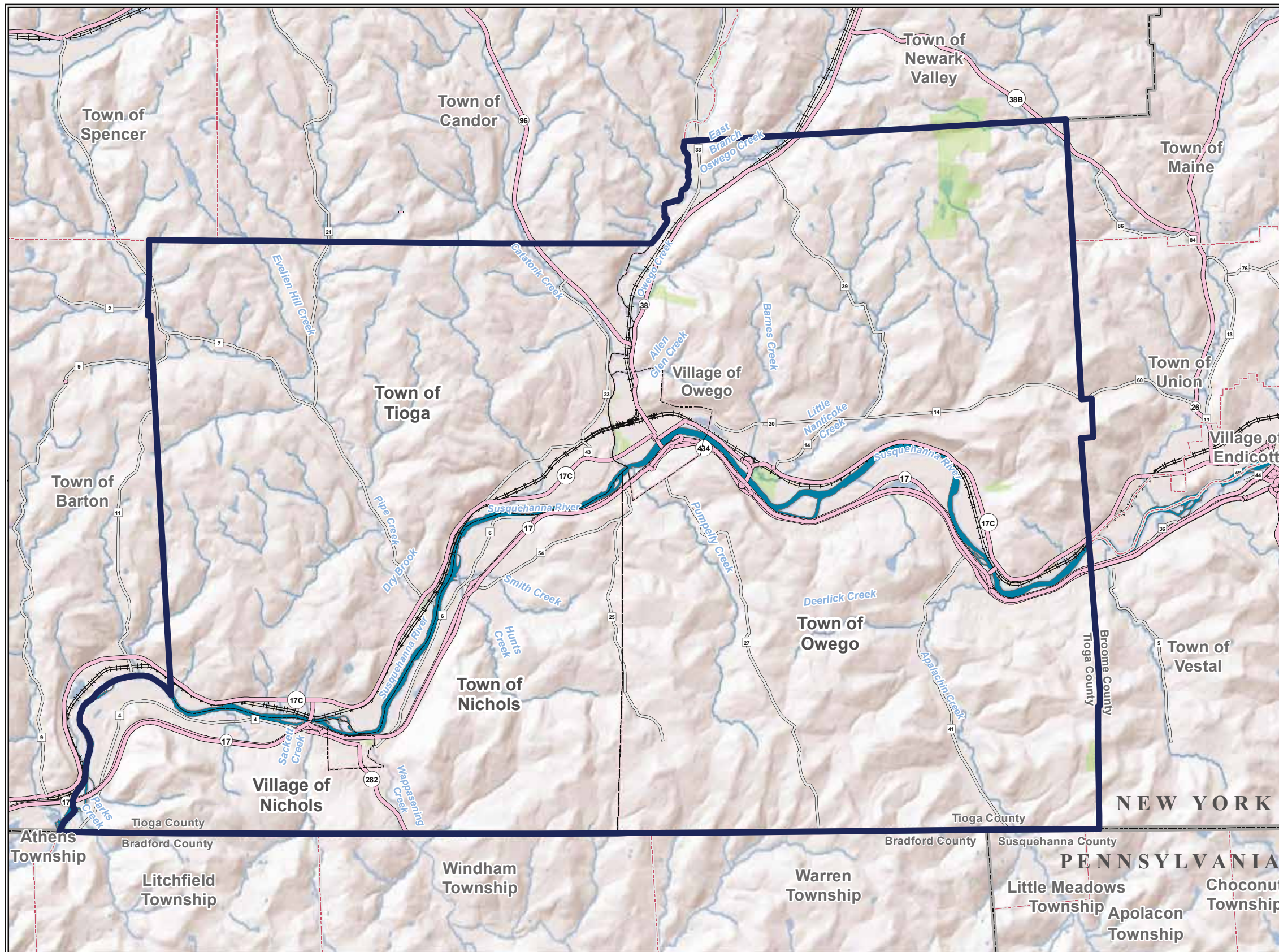
Tioga County is located in south-central New York State (NYS), directly north of the border with Pennsylvania in a section of New York called the Southern Tier. Tioga County borders six counties in New York and Pennsylvania: Cortland County, Broome County, Chemung County, and Tompkins County in New York and Susquehanna and Bradford Counties in Pennsylvania. It measures 523 square miles and is located approximately 30 miles west of the City of Binghamton¹.

According to the 2010 U.S. Census, Tioga County, which comprises nine towns and six villages, has more than 51,125 residents, the majority of whom live in the Town of Owego. A network of interstate, State, and local highways serve the County, including NYS Routes 17 (future I-86), 17C, 34, 38, 79, 96, 186, 282, and 434. The local economy is based on a wide variety of industries, including agriculture, tourism, retail, manufacturing, and education².

The five municipalities that compose the NYRCR Tioga Community include the county seat and are populated by more than 27,000 residents. This encompasses over half of the total Tioga County population. The majority of Tioga County's industrial economy is also situated here.

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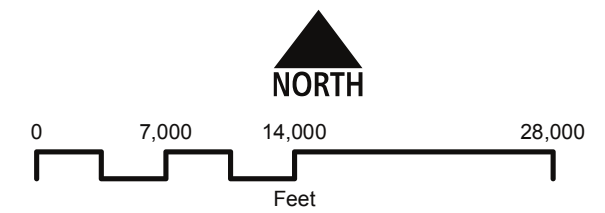
Figure 1.1: Planning Area



Legend

- Planning Area Boundary
- Municipal Boundary
- County Boundary
- State Boundary
- Park
- River
- Railroad

Data Sources:
 Base Imagery – ESRI ArcGIS Online Server.
 Planimetric Features – CIRIS.



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The Susquehanna River, one of the longest rivers on the east coast, flows across the southern-most portion of Tioga County from east to west. The river flows for 464 miles through three states, starting in Upstate New York (Cooperstown), and proceeding west through the Southern Tier, across rural southeastern Pennsylvania, finally terminating in the Chesapeake Bay in Maryland. Since record keeping began nearly 200 years ago, the U.S. Weather Service has reported flooding along the main stem of the Susquehanna River every 15 years, on average. This, coupled with localized flash flooding that occurs annually on smaller tributaries, led to the Susquehanna River Basin being identified as one of the most flood-prone watersheds in the country³.

While the towns and villages that compose the Tioga Community share their borders with the Susquehanna River, they are very different in their geographic size, population, and their local economies, which range from primarily agrarian to a dense village center with a wide mix of uses. A snapshot of each of the riverine municipalities is provided below.

Table 1.1 Tioga Community Overview

| Municipality | Land Area in Sq. Mi. | 2010 Population |
|--------------------|----------------------|-----------------|
| Tioga County | 523 | 51,125 |
| Town of Owego | 106 | 19,883 |
| Town of Tioga | 59 | 4,877 |
| Village of Owego | 2.7 | 3,896 |
| Town of Nichols | 34 | 2,525 |
| Village of Nichols | 0.25 | 512 |

i. Town and Village of Nichols

The Town of Nichols is a rural community located in the Southern Tier Region of New York State. The Town, established in 1824, encompasses approximately 34 square miles and shares its entire northern border with the Susquehanna River and its southern border with Bradford County, Pennsylvania. The Town is easily accessible by the Southern Tier Expressway (NYS 17/I-86), Main Street (NYS Route 282), and East and West River Roads. Major employers in the Town of Nichols are the Best Buy Warehouse/Distribution Center and Tioga Downs Casino, Racing and Entertainment (Tioga Downs). Other key employment includes the agriculture and gravel mining industries⁴.



Nichols Gateway.

Elan 3 Consulting

The Town has experienced a relatively stable population during the past decade, which has helped to preserve the small-town feel of the community. In 2010, the U.S. Census reported the population of the Town of Nichols as 2,525 residents. This represents a 59-person decrease from the 2,584-person population reported in 2000. The median age of community residents was 41.6 years, slightly less than the 42.6 years of

age reported for the County. The 2010 census also reported the Town population as predominately white (96.2%), the median household income as \$47,009 (slightly less than the County figure of \$53,789 and the NYS reported figure of \$56,951), and that approximately 81.6% of the Town’s housing units were owner occupied and the remaining 18.4% were rentals⁵.



Elan.3.Consulting

Tioga Downs Casino is a major employer in the Town of Nichols.

While the population is somewhat stable and the household income is slightly less than Tioga County, it is important to preserve the existing community structure and to enhance the economy. A stable or increasing population and increased wealth will ensure long-term sustainability.

Communities in New York State use land use tools such as zoning ordinances, comprehensive plans, subdivision regulations, and other policy documents to shape development that fits with the community’s vision. These tools can also be used to reduce the risk of flood damage during a storm event. The Town of Nichols is currently guiding its local land use decisions

based on the following plans and local land use laws: Town of Nichols Zoning Ordinance, Flood Damage Prevention Local Law, and the 2011 Nichols Agriculture and Farmland Protection Plan. In 2006, the Town completed the Greater Nichols 2020 Plan (a comprehensive plan). Although a document was completed, the Town Board still has not officially adopted the 2020 Plan⁶.

The Village of Nichols, which is approximately a quarter square mile area, is located in the heart of the Town and serves as the community’s “Downtown”, providing restaurants, a hardware store, banks, a general store, and other similar uses. It is protected by a levee system that was constructed in 1972 by the U.S. Army Corps of Engineers (USACE). The Village is surrounded to the west, south, and east by forested and agricultural land. It is also home to Kirby Park, a popular recreation area located along the west bank of the Wappasening Creek⁷. The Village of Nichols has an adopted Comprehensive Plan.



Elan.3.Consulting

Historic Kirby Park Bandstand.

Outstanding among the water features in Nichols are the Susquehanna River, and the Wappasening and Sackett Creeks. The Wappasening Creek is located at the eastern edge of the Village. It has a watershed of 71.8 square miles and approximately 66% of its watershed is covered by forest. The creek historically tops its banks during large rain events causing flooding and damage to parts of the Town’s infrastructure, including roads and stormwater sewers. This, coupled with undersized culverts that become clogged with debris, is thought to be the cause of extensive erosion and flooding⁸.

ii. Town and Village of Owego

The Town of Owego is located in the southeast corner of Tioga County. The eastern town line is the border of Broome County and the southern town line is the border of Pennsylvania (Bradford and Susquehanna Counties). The Susquehanna River flows across the Town, dividing it into two parts. Owego Creek flows into the Susquehanna River at the Village of Owego and marks the west town line.

The Town of Owego has an adopted Comprehensive Plan (1997), Zoning Ordinance, Flood Damage Prevention Local Law (April 2012), subdivision review, and a wellhead protection ordinance in place. These plans and local laws help guide safe development that reduces or eliminates the risk of flood damage.

The Town has a total area of 106 square miles. Land coverage within the Town includes residential neighborhoods, commercial businesses, light industrial uses, agricultural land, grassy open space, forested areas, and open water areas. According to the Town of Owego Comprehensive Plan (1997), the community is “a rural town of farms and open space, a suburban residential community, and a town of industry and commerce⁹.”

According to the U.S. Census, the Town’s 2010 population includes 19,883 residents. Major employers in the Town include Lockheed Martin Systems Integration, Sanmina Corporation, Ensco Inc., and the Tioga County Government¹⁰.

One of the major attractions in the Town is Hickories Park, a 118-acre municipal recreation area located along the banks of the Susquehanna River, near NYS Route 17C. Hickories Park sustained extensive damage during Hurricane Irene and Tropical Storm Lee. As a result, the park was only open for limited use from 2011 to 2013, which negatively impacted the Town’s tourism economy. During a WNFB Radio interview on February 6, 2013, the Town reported that it will spend “well over a million dollars” to cover flood-related expenses, including repairs to the bridge at the park entrance and electrical work. The Town requested financial assistance from FEMA to help underwrite some of these costs¹¹.

The Village of Owego is located mostly on the north bank of the Susquehanna River. The northern portion of the Village is situated on a former floodplain created by an outer bend of the Susquehanna River. The western boundary of the Village is formed by Owego Creek, which flows from north to south, terminating in the Susquehanna River on the southwestern edge of the



The Village of Owego lies on the banks of the Susquehanna River.



“Coolest Small Town in America.”

Elan.3.Consulting

Elan.3.Consulting

Village. Huntington Creek creates the northernmost boundary, which flows in an east to west direction, connecting to Owego Creek at the northwestern corner of the Village boundary.

The Village, which has served as the Tioga County Seat since 1822, encompasses approximately 2.7 square miles within the Town with a high point elevation of approximately 850 feet near the northern village boundary. It is estimated that 61% of the buildings in the Village lie within the floodplain. Topography of the village area slopes to the south-southeast toward the Susquehanna River, with a low point of approximately 786 feet¹².

Tree-lined streets, historical 19th century architecture, scenic views of the Susquehanna River, and a quaint downtown filled with shops, restaurants, and art galleries characterize the Village of Owego. By virtue of its cultural amenities, festivals, and scenic waterfront parks and walkway, Budget Travel Magazine named the Village of Owego the “Coolest Small Town in America” in 2009. Major employers in the Village are the Tioga County Government and the Owego/Apalachin School system. Other key employment sectors include tourism, manufacturing, and retail trade¹³.

In 2010, the U.S. Census reported that the Village of Owego’s population was 3,896 residents. This represents a 15 person decrease from the 3,911 population reported in 2000. The median age of community residents was 39.6 years, which is slightly less than the 42.6 years of age reported for the County. The 2010 census also reported that the Village population was predominately white (97%), the median household income was \$53,093 (similar to the County figure of \$53,789 and the \$56,951 reported for NYS), and that approximately 50% of the Village’s housing units are owner-occupied and the remaining 50% are rentals¹⁴.

As with other rural communities in Tioga County, preserving the existing population, maintaining and increasing wealth, and maintaining the existing housing stock is of critical importance to the long-term sustainability of the Village of Owego.



Owego Creek at normal stage.

The Village has an adopted Comprehensive Plan, Zoning Ordinance, site plan review, Flood Damage Prevention Local Law (adopted April 2012), and subdivision review in place¹⁵. These plans are critical to help guide safe development that reduces or eliminates the risk of flood damage.

Significant water features in the Town and Village include the Susquehanna River and Huntington Creek and Owego Creek. The Susquehanna River flows from east to west, bending in a southerly direction at the Village of Owego. The outer bend

of the river has faster flowing water that produces incisive force that cuts away at the outer bank. This faster flowing water makes the Village more susceptible to flooding during storms that cause the river to overflow its banks. Although the velocity of floodwaters at the outer bend of the Susquehanna River is generally much lower than the velocity flow from the tributaries, the effects can be more severe due to the greater volume of water in the Susquehanna.

Huntington Creek is located on the northern edge of the Village. It has a watershed of 1.95 square miles, and approximately 77% of its watershed is covered by forest. This creek historically tops its banks during large rain events, flooding and damaging parts of the Village’s infrastructure. Asphalt paving, undersized culverts, and other impervious surfaces are the probable causes of its flooding. The Village has worked with the Tioga County Soil and Water Conservation District to reduce the effects of flooding; implementation of some mitigation measures is currently underway¹⁶.

Owego Creek flows along the western boundary of the Village. It has a watershed of 341 square miles and drains from the north to the south, meeting the Susquehanna River at the south-western corner of the Village boundary. When the Susquehanna River elevation rises, Owego Creek can flood the fairgrounds, Marvin Park, residential neighborhoods such as “The Flats,” and adjacent roads¹⁷.

iii. Town of Tioga

The Town of Tioga is primarily an agricultural community located in the center of Tioga County and encompasses approximately 59 square miles. There are four hamlets located within the Town: Tioga Center, Smithboro, Halsey Valley, and Straits Corners. Tioga is bounded by the Susquehanna River to the south, the Village of Owego and Glen Mary Drive to the east, the Town of Candor to the north, and the Town of Barton to the west. A double rail line located south of NYS Route 17C runs along the floodplain of the Susquehanna River and Tioga is easily accessible by NYS Route 17C and the Southern Tier Expressway (I-86). The primary industry in the Town of Tioga is agriculture. Other key employment sectors include management and manufacturing¹⁸.



Elan.3 Consulting

The Town of Tioga is an agricultural community.

The Town is home to the Ransom Memorial Park, the Town’s only community park, and the Tioga Central School, an important educational and community resource. Tourist attractions include motor sports entertainment at Skyview Drags and the Shangri-La II Motor Speedway, the annual Tioga Center Pumpkin Festival, and sports and outdoor recreation, including hunting, skiing and snowmobiling.

In 2010, the U.S. Census reported the Town of Tioga’s population as 4,877 residents. This represents a 37 person increase from the 4,840 population reported in 2000. The median age of community residents was 43.9 years, which is slightly older than the 42.6 years of age reported for the County. The 2010 Census also reported the Town population as predominately white (99.6%), the median household income as \$43,360 (less than the County figure of \$53,789 and the NYS reported figure of \$56,951), and that approximately 81% of the Town’s housing units are owner occupied and the remaining 19% are rentals¹⁹. Maintaining or increasing the population and increasing wealth of the community will help create a stable community.



Elan.3 Consulting

Tioga has a planning board and subdivision review procedures.

The Town does not have an adopted comprehensive plan, zoning ordinance, or site plan review. On the other hand, it has established a planning board and subdivision review procedures that provide some overview of commercial development in the community, though not as comprehensive as established zoning regulations would provide²⁰.

Major drainage features in the Town include the Susquehanna River to the south and east, Owego Creek, and Pipe Creek to the east. The Tioga Town Center is located approximately 0.3 mile west of the north bank of the Susquehanna River in its historical upper floodplain. The section of the Susquehanna River between Smithboro and Tioga Town Center has a series of floodplains with varied elevations that step down to river level.

The flow, direction, and watershed of the Susquehanna River are important considerations when assessing flood risk. The Susquehanna River flows northeast to southwest along the Town of Tioga's boundary and lacks significant changes in flow direction. The Susquehanna River turns slightly away from Tioga Town Center in a southeasterly direction. This flow sculpted a floodplain as the river deposited sediment from the slow moving waters near the Town Center. This shift in the River's flow, direction and speed has also caused significant erosion to agricultural land.

Pipe Creek is located at the northern edge of the Town. It has a watershed of 46.4 square miles and approximately 68% of its watershed is covered by forest. Pipe Creek historically tops its banks during heavy rains, causing flooding and damaging parts of the Town's infrastructure, including flooding of the Tioga Central School District's bus garage²¹.

Smithboro Creek is located on the western side of the Town. It has a watershed of 1.14 square miles and drains from the north to south of the village of Smithboro. It flows under Route 17C and meets the Susquehanna River at the southwestern side of the Town boundary. Smithboro Creek historically tops its banks during large localized rain events. This creek is highly prone to flash flooding. The flash floods cause large volumes of eroded material to flow downstream and clog culverts. The clogged culverts then impound water behind the plugged structure, causing upstream flood hazards and threats to downstream areas²².

Owego Creek is located on the eastern boundary of the Town. It has a watershed of 341 square miles and drains from the north to the south, meeting the Susquehanna River at the southwestern corner of the Town boundary. Owego Creek historically tops its banks during large floods. When the Susquehanna River rises and backs water up into the mouth of the creek, it floods in the direction of Owego. Owego Creek's tributaries also back up creating localized flooding within Tioga²².

B. Description of Storm Damage

On September 7, 2011, Tropical Storm Lee stalled over the Southern Tier and dropped over 11 inches of rain on Tioga County during a 24-hour period. Torrential rains, coupled with saturated soil and a swollen Susquehanna River from Hurricane Irene, which occurred the week of August 28, 2011, led to record high water levels.

In addition, Hurricane Irene and Tropical Storm Lee altered the streams, creeks, and river within the Tioga Community by eroding their banks and creating unstable riparian areas. Sediment and debris that eroded from the upslope areas of the various watersheds moved downstream and settled in areas already

impounded by culverts or debris, or located in “slack water” areas of the Susquehanna River. The erosion and sedimentation created flooding situations in the Tioga Community where the streams were blocked due to undersized culverts or where the waters of the Susquehanna were ‘backing up’ into the stream bed.

The Southern Tier Regional Economic Development Council (REDC) reported that as a result of Tropical Storm Lee, “Tioga County assessed that 120 small businesses were impacted by the flood, affecting more than 540 workers with an estimated damage/loss and amount needed to resume business operations at \$25.1 million²⁴.



Wappasening Creek post-flood.

Elan.3 Consulting

According to New York State Electric and Gas (NYSEG), as of September 22, 2011, 1,628 electric meters and 1,457 natural gas meters were disconnected in affected areas of Tioga County, leaving a majority of residents and businesses without gas or electricity. The Federal Emergency Management Agency’s (FEMA) total assessed eligibility for the Individual and Households Program, Housing Assistance, and Other Needs Assistance totaled over \$25 million in Tioga County²⁵.

Table 1.2 FEMA Buyouts

| Municipality | 2012 FEMA Buyouts |
|--------------------|-------------------|
| Village of Owego | 34 |
| Town of Owego | 26 |
| Town of Tioga | 14 |
| Town of Nichols | 8 |
| Village of Nichols | 0 |

While all Tioga Community municipalities are located in the same County and share the common water body of the Susquehanna River, each municipality felt the impact of Hurricane Irene and Tropical Storm Lee differently.

i. Town and Village of Nichols

During Hurricane Irene and Tropical Storm Lee, rising waters of both the Susquehanna River and Wappasening Creek caused severe flash flooding and damaged homes, businesses, and infrastructure in the Town and Village of Nichols. While the levee system protected many structures



Cleaning up after Tropical Storm Lee.

Engelburt Farms LLC.

Section I: Community Overview

located in the Village from the full force of flood events, rising ground waters associated with the heavy rains caused most of the basements and ground floors of homes, businesses, and municipal facilities to flood.

Flooding closed many roads, including NYS Route 17/I-86, NYS Route 282, West River Road, South Main Street, Moore Hill, Briggs Hill, Decker Hill, and Sulpher Springs Road. Closure of critical access routes like NYS Route 17 left residents with no access to medical facilities, supplies or the Tioga County emergency response team. A member of the Nichols volunteer fire department reported that respondents had to rescue several people located along NYS Route 282 using a front loader, and that during the first 24 hours of the storm, the fire department performed water rescue to save an additional 72 residents.

Residents stated the flood waters rose so quickly they did not have enough advance warning to evacuate, or were not sure of where to go. They also stated that once the flood waters had receded, the community still did not have power or cell phone coverage and there was no way for the Town and Village to communicate with residents to let them know where to find emergency supplies, bottled water, and other essential storm recovery information. During a public meeting, it was recommended that an electronic signboard near the Fire Department be installed to provide residents with up to date information.

Those residents and stranded motorists who were able to evacuate took shelter in the satellite Emergency Operations Center located at Nichols Elementary School. The storm knocked out power for an entire week, and left the emergency shelter without electricity. A local elected official provided a small generator to power several lights in the hallway, but the remainder of the building was dark.

Residential areas hardest hit were located along the banks of the Susquehanna River (e.g., River Road) and the Wappasening Creek. Most households that suffered flood damage reported the need to replace all items located on the ground floor of their homes, including heating systems and water tanks. The State Disaster Assistance Response Team (DART) inspected one hundred homes in the Town of Nichols in September 2011. In 2012, the Town requested and received buyout assistance from FEMA for eight homes²⁶.

Many of the local business owners located in the commercial corridor and those along East and West River Roads suffered extensive damage to their property as a direct result of Tropical Storm Lee. Power was not



Engelbert Farms in the Town of Nichols before the floodwaters crested.

Engelbert Farms LLC



Engelbert Farms in the Town of Nichols after the floodwaters crested.

Engelbert Farms LLC

restored for over a week, and it took several weeks to properly clean up from the mud and water damage. Most businesses had to close their doors during that time and lost sales as a result. Some of the businesses stated that they still have not fully recovered financially from the impact of the storm.

Most buildings in the commercial district and along East and West River Roads use individual septic systems. As stormwaters rose, many of these systems failed, resulting in environmental contamination, and in several cases, demolition of buildings and loss of business. The Town does have a sewer system in place that serves the Best Buy Distribution Center and Army Reserve Center, located on Stanton Hill Road. An opportunity exists to extend the municipal sewer system to Nichols' Main Street to provide sanitary sewer for the Village and surrounding area within the Town of Nichols helping to reduce future environmental impacts.

In addition to homes and businesses, stormwater severely damaged many critical municipal facilities and recreation areas in the Town and Village of Nichols. The Town highway facility (commonly referred to as the highway barn) where equipment and offices are located, was flooded, which led to limited service provision during and immediately following the flood.

The Joint Fire Station, which the levee protected from exposure to stormwater runoff, sustained flooding due to rising groundwater. Critical emergency equipment and the command center that connects Nichols to the Tioga County Emergency Management Office located on the ground floor of the facility were in jeopardy because of rising flood waters.

Kirby Park, the Village's premier recreation area, is located just outside the levee along the banks of the Wappasening. Floodwaters devastated this historical park. Local officials reported that the flood covered 90% of the Park in mud and silt. The storm caused severe damage to soccer fields, the historic bandstand, and a pavilion in the park. Community residents and businesses volunteered their time to clean up the park. Kirby Park reopened in May 2013.



The flood covered 90% of Kirby Park in mud and silt.

Englebert Farms LLC

ii. Town and Village of Owego

When Hurricane Irene and Tropical Storm Lee hit the Town and Village of Owego, many residents were caught unprepared. Rapidly rising waters of the Susquehanna River and the Owego and Huntington Creeks caused severe flash flooding, destroying homes, businesses, and infrastructure in the Village of Owego. For three days, high water flowed through these communities, resulting in flood damage to 85% of the homes, businesses, and municipal structures within the Village.

During public meetings, residents and business owners said they did not have proper warning or were not sufficiently prepared for the storm. Many stated they heard emergency vehicles in the street, but the message announcing evacuation procedures was garbled and difficult to understand. As a result, many members of the community, including vulnerable populations, were not able to safely evacuate from their homes or move irreplaceable family heirlooms to higher floors in their homes.

Section I: Community Overview

During and immediately after Tropical Storm Lee, the weather conditions severely impacted travel along Route 17, the primary roadway access to the Town and Village of Owego. The Village of Owego became an island. The underpass along North Street flooded such that Downtown Owego and the Flats neighborhood were isolated, and passenger and emergency response vehicles could not maneuver between the two locations.

Major road closures included Dutchtown Road, Gary Hunt Road, Route 17C, Main Street, Taylor Road, Bodle Hill Road, Route 86, Marshland Road, Hilton Road, Long Creek Road, Pennsylvania Avenue, Sulpher Springs Road, and Valley Road. During public outreach meetings, residents talked about not being able to access critical medical and veterinary services, groceries, gasoline, or emergency supplies in the days immediately following Tropical Storm Lee.

Rising floodwaters also negatively affected municipal service provision. Critical facilities, including a number of the Town and Village municipal offices and storage buildings for highway equipment, were flooded. In addition to flood damage to buildings and equipment, a number of official Village and Town records were destroyed. The Town created a temporary shelter located outside the floodplain to house the highway equipment and staff for a period of 6 months following Tropical Storm Lee.

The Town of Owego suffered extensive damage to public infrastructure as a result of Hurricane Irene and Tropical Storm Lee including public drinking wells, the Waste Water Treatment Plant, and sewer mains. The sewer treatment plants and fuel storage tanks that were damaged during the storms resulted in floodwaters being contaminated with raw sewage and fuel oil. The Main Street Pump House and Well Head, which provides public water to residents in the Town of Owego, were severely damaged and have been out of service since 2011 because of Tropical Storm Lee. In addition to public infrastructure, a number of residential structures were damaged. In 2012, the Town of Owego applied for and received buyout assistance from FEMA for 26 homes that were damaged as a result of Tropical Storm Lee.

The State DART inspection of Tioga County included 3,000 homes located in the Village of Owego. Residents living in the low-lying neighborhoods of Turtle Town and the Flats suffered the most extensive damage as a result of the flooding. In 2012, the Village requested and received buyout or acquisition assistance for 34 severely damaged homes. In addition to residential structures, the Owego Apalachin Elementary School, which has served the residents in the neighborhood since 1965, was significantly damaged. FEMA declared a major disaster for the area of impact, and in 2013, the Owego Apalachin Central School District received Federal funds to rebuild the facility in order to restore the community's elementary education services²⁷.



Low-lying neighborhoods in Owego suffered extensive damage.

Elan.e Consulting

Today, the Village of Owego is still recovering from the devastation caused by Hurricane Irene and Tropical Storm Lee. Businesses have reopened, but have not been able to fully recover fiscally from the building damage and the loss experienced during the post storm economy.

iii. Town of Tioga

Rising waters of the Susquehanna River associated with Hurricane Irene and Tropical Storm Lee caused severe flash flooding, and destroyed homes, businesses, infrastructure, and agricultural land in the Town of Tioga. Because of the storms, many roads in Tioga were closed, including Halsey Valley, State Highway 96, Glen Mary Drive, and sections of NYS Route 17C. The southern portion of Halsey Valley Road that connects to 17C is a critical connector in the Town and its closure limited emergency vehicles' access during and immediately after the storm.



Elan,e Consulting.

Halsey Valley Road and adjacent homes were flooded.

The extreme rains also caused water in Pipe Creek to overrun its banks. Excess velocity, coupled with sediment and debris in the Creek, resulted in an estimated \$1.6 million in culvert repairs. The Tioga Central School District bus garage located in Tioga Center sustained approximately \$300,000 in damage, and the Town's Ransom Park required \$100,000 in repairs. Floodwaters associated with Tropical Storm Lee also washed away the Town's unprotected salt supply, causing potential environmental contamination, which can negatively affect the productivity of nearby agricultural lands²⁸.

The majority of septic systems in Tioga Center consist of a tank and a dry well, most of which failed during the flooding associated with Hurricane Irene and Tropical Storm Lee. This led to the discharge of untreated wastewater into the Town's groundwater and surface waters.

In addition to physical damage, floodwaters associated with Tropical Storm Lee negatively impacted the quality of life for residents in the Town of Tioga. The local branch of the U.S. Post Office, located in Tioga Center, was flooded with 8 feet of water because of the storm and as a result, was permanently closed, and the community's zip code was removed from service. When talking about the damage associated with Tropical Storm Lee during a public workshop, one resident stated, "...a couple more floods like we've had and I'm afraid we will be a ghost town."

On September 10, 2011, the Tioga County Emergency Management Office requested the assistance of the State DART to inspect 3,750 homes in Tioga County. Of those homes requiring inspection, 400 were located in the Town of Tioga. Residential areas hardest hit were located along 5th Avenue, NYS Route 17C, and Halsey Valley Road. FEMA estimates the damage to residential structures in the Town of Tioga to be \$1.5 million. In 2012, the Town requested and received FEMA buyout assistance for 14 homes²⁹. Floodwaters not only caused damage to residential property, but to agricultural lands as well. Stream bank erosion resulting from Tropical Storm Lee reduced the number of productive agricultural acreage, negatively affecting farming operations in the community.



David Pipher

The Tioga Post Office flooded and closed.



Elan,3,Consulting

Ransom Park required \$100,000 of repairs.



David Pipher

Tioga Center General Store under 8 feet of water immediately following Tropical Storm Lee.

C. Critical Issues

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

Regionalism. The Susquehanna River affects all riverine municipalities in Tioga County, as well as neighboring communities in New York and Pennsylvania. Because the Susquehanna River and its watershed touch so many communities it is critical to work together to reduce the impacts of flooding. What happens in one community could severely affect another; therefore, when discussing flood mitigation efforts, regional thinking will be required for mitigation efforts to be effective.

Flood Recovery Assistance. Community leaders expressed concern for both residential structures as well as the impact of flood waters on businesses. The Committee expressed interest in speeding up the process of buyouts related to Hurricane Irene and Tropical Storm Lee. In addition, many small businesses struggled to recover from the impacts of Hurricane Irene and Tropical Storm Lee; the Committee supports creating new diversified economies linked to regional assets, such as Binghamton University and Lockheed-Martin.

After Tropical Storm Lee, many businesses were closed for an extended period of time and business owners expressed concern that economic recovery has been difficult. For the majority of the Tioga Community the median household income was near or below the County as a whole. In an effort to sustain the Tioga Community into the future, wealth must continue to increase.

Infrastructure. Providing sewer and water along Route 434 along the south side of the Susquehanna River in the Town and Village of Owego is of

paramount importance to the Tioga NY Rising Committee. Both communities worked with the Tioga County Industrial Development Agency to prepare a site master plan to develop a mixed-use (commercial, residential, light industrial) development outside of the floodplain. However, the lack of infrastructure is a severe hindrance to any development.

In 1972, the U.S. Army Corps of Engineers (USACE) constructed a levee system that protects the Village of Nichols during flood events. In 2004, the Federal Emergency Management Agency (FEMA) initiated the Flood Map Modernization initiative (Map Mod) to provide communities with up-to-date, accurate, and reliable flood hazard information. As FEMA began work on the program, they determined that some levees might no longer be in compliance with FEMA regulations, which would lead to the decertification (removal of accreditation) of these levees. The Village of Nichols levee is now provisionally accredited (a temporary designation) and is in imminent jeopardy of losing all accreditation. If that were to happen, most property owners within the Village would be required to obtain flood insurance. This would create a serious financial burden on existing residents and businesses and would impede efforts to attract new residents or businesses to the Village.

While the levee protected most of the structures in the Village of Nichols, the homes and businesses in the Town experienced significant flood damage as a result of Tropical Storm Lee. There were several contributing factors leading to the massive erosion and flooding of the Wappasening Creek including undersized culverts that become clogged with debris, poor stormwater management, roadside ditch connections, and overall degradation of the stream corridor.

Many critical government facilities in the Tioga Community are located in the floodplain. As a result, town and village halls, wastewater treatment plants, schools, and public works buildings were under water during Hurricane Irene and Tropical Storm Lee in 2011, resulting in the inability of municipalities to deliver basic government services. The U.S. Post Office in the Town of Tioga was under 8 feet of water because of flooding due to Tropical Storm Lee and the U.S. Postal Service ultimately closed it. As a result, Tioga Center residents must travel to neighboring communities for mail service.

Emergency Responding. Emergency response issues include the need to keep residents informed when danger is imminent, keep emergency personnel updated on road closures, and ensure the provision of electricity to emergency shelters. For example, during public workshops, community residents stated they did not hear emergency sirens or did not know what to do or where to go once the sirens sounded. Some municipalities within the Tioga Community did not have the means (e.g., generators) to run their emergency operations centers.

Floodwaters in the 2011 (and 2006) storm events forced the closure of a number of roads within the Tioga Community. These road closures created temporary islands that cut off vulnerable populations, including senior citizens, from neighbors and left them unable to access emergency services, food, or medical care.

A coordinated Emergency Response effort amongst the five NYRCR participating municipalities, in conjunction with the Tioga County Emergency Management Office, is needed to ensure an on-going and timely emergency response effectiveness. This should be detailed in a Memorandum of Understanding with all parties. An assessment of Emergency Plan effectiveness will be conducted in the 3rd quarter of 2014.

Planning, Capacity Building, and Sustainability. For some municipalities within the Tioga Community, there is very little land available for development that is located outside of the 100-year floodplain. Community

leaders cited the need to update zoning ordinances, customize local floodplain management laws, and strengthen site plan review to encourage development outside of the 100-year floodplain where possible. In addition to having good local land use laws, community leaders cited the need for capacity to implement the NYRCR Plan including project administration and seeking additional grants. Local municipalities with limited staffs and budget lack the long-term capacity (i.e., planning and grant writing staff) to implement large numbers of strategies, programs, and projects.

D. Community Vision

To help inspire and guide the planning process, the Tioga NYRCR Planning Committee (Committee) developed a community vision statement at its first meeting. The draft vision statement was presented to the broader public for input. Based on feedback received from committee members and the public, the draft vision statement was further refined to express a resilient, vibrant, and safe future for the communities along the Susquehanna River.

NYRCR Tioga Vision Statement

Through our collaborative efforts, the Tioga Community is capitalizing on opportunities to rebuild stronger, smarter, and safer. We are a warm and resilient group of riverine communities that work together to restore, redevelop and revitalize our economy, quality of life, housing, infrastructure and natural resources that make up our cultural fabric.

E. Relationship to Regional Plans

The Tioga Community comprises five municipalities that have a long-standing history of working together to develop and implement regional plans. After Hurricane Irene and Tropical Storm Lee, these riverine communities worked side by side to prepare the Tioga County Multi-jurisdictional Hazard Mitigation Plan (HMP) (2012)²⁹. The HMP is a planning document that is prepared every five years, and is designed to help communities prepare for and reduce the potential impacts of natural disasters.

They also collaborated to prepare the Long Term Community Recovery Strategies (LTCRS) (2013) for the Town of Nichols, the Village of Owego, and the Town of Tioga. During the LTCRS planning process, each of the communities participating in the program recognized that what one community does with respect to flood control directly impacts neighboring communities, as well as those located downriver. To that end, each of the communities participating in the LTCRS program stated that when it came to flood mitigation and recovery, it was important to not only think of how these long term recovery strategies would impact their own community, but there needed to be a regional approach to flood control as well.

This idea of thinking beyond county lines carried over into the NYRCR planning process. The Tioga Community pledged to work with the NYRCR municipalities in Broome County and Delaware County to address Susquehanna River issues regionally. In November 2013, the Tioga Community collaborated with its neighboring Susquehanna River NYRCR communities in Broome County and the Village of Sidney to host the Regional Resiliency Summit, a daylong event focused on regional cooperation, information sharing, and sustainable recovery strategies, plans, and actions.

Based on the success of the Summit, these communities have agreed to collaborate with each other to develop a Regional River Initiative that will identify and implement regional flood mitigation projects and educate local officials and the public about flood resiliency. This project will build on the feasibility phase of the Upper Susquehanna River Basin Comprehensive Flood Risk Management Study.

In another example of regional cooperation, when the NYRCR program was first announced, only four of the five riverine communities in Tioga County severely impacted by Tropical Storm Lee were eligible to participate. Representatives from the Towns and Villages of Nichols and Owego immediately stepped up and invited the Town of Tioga to join the NYRCR Tioga Community planning process. In addition, the Town and Village of Nichols collaborated with the Town of Tioga to form the 2-2-2 Committee. This group recognized that flood resiliency projects that were implemented in the Town of Tioga could benefit the residents in the neighboring Nichols communities. The Town and Village of Nichols were willing to split the \$6 million that they were eligible to apply for with the Town of Tioga, so that each community could potentially receive \$2 million in assistance, hence the name 2-2-2.

The Town of Tioga was formally found eligible to participate in the program in January 2014. The Town is now eligible to receive up to \$3 million in CDBG-DR implementation funds.

The Tioga municipalities continue to coordinate on specific programs and projects that will benefit the region. For example, they have formally agreed that, if awarded, each municipality will contribute a portion of their grant dollars to establish a regional flood recovery and revitalization office to secure and administer flood-related grants. The projects proposed in the Tioga Community NYRCR support the strategies and recommendations of several established regional plans, including the Southern Tier Regional Economic Development Council and the Susquehanna-Chemung Action Plan.

Southern Tier Regional Economic Development Council. In its 2011-2016 Strategic Plan, the Southern Tier Regional Economic Development Council (REDC) placed an emphasis on revitalization of communities impacted by flooding from Hurricane Irene and Tropical Storm Lee. The REDC subsequently developed programs to help rebuild flood-impacted and other distressed communities. These include innovative grant/loan programs to help revitalize downtowns, main streets and neighborhoods, finance infrastructure improvements for creation of shovel ready sites and provide assistance to farm operations. In addition, the REDC's 2013 Progress Report specifically identifies support of the NYRCR Program and the Southern Tier municipalities participating in it as a strategic priority³¹.

The NYRCR Tioga Plan proposes a number of projects that support REDC strategies. The following text shows how selected projects make effective use of REDC strategies outlined in the REDC Strategic Plan.

Leader in Energy Efficiency & Renewable Energy Technology (REDC Strategy)

Tioga NYRCR projects:

- Increasing implementation of the cleaner, greener initiatives and offering several green infrastructure demonstration projects for high capacity floodplain restoration that could serve as models for other communities, particularly those at risk of flooding.

- Exploring low cost energy alternatives (micro-grids, solar, wind, biomass, and or natural gas) to reduce the cost of long-term operations of public and private facilities, including agricultural uses.

Economic Development Backbone (REDC Strategy)

Tioga NYRCR projects:

Municipalities that compose the Tioga Community are capable of strengthening the region’s economic backbone through a number of strategic public/private partnerships and projects. The tourism industry and small businesses in Tioga will be supported by improvements to infrastructure, including:

- Extending water, sewer, and broadband infrastructure to shovel ready sites located outside of the floodplain;
- Revitalizing Main Streets; and
- Enhancing tourism potential through enhanced recreation opportunities.

Technology Development and Transfer (REDC Strategy)

Tioga NYRCR projects:

- Establish an incubator node in the Village of Owego as part of a new REDC Regional Incubator Initiative anchored by Cornell University, Binghamton University and Corning Incorporated.

The Tioga Community is committed to working with the Southern Tier Regional Economic Development Council to implement a shared vision of building vibrant and resilient communities and will seek to leverage funding for community revitalization and resiliency initiatives through a partnership with the REDC.

Susquehanna-Chemung Action Plan. Completed in February 2012, the plan is a two-year water quality management-planning project intended to conserve and protect water resources of the Susquehanna and Chemung Basins in New York and Pennsylvania. Eleven goals seek to promote sustainable use of waterways through enhanced preservation, economic development, land use patterns, conservation, and transportation planning. Maintenance of flood control structures, enhancing flood-warning systems, regulation of high hazard areas, and mitigation of future development risk are strategies that seek to achieve the goal of flood preparation in Tioga County and surrounding jurisdictions.

Section II: Assessment of Risk and Needs

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

A. Description of Community Assets and Assessment of Risk

i. Description of Community Assets

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

The Committee, with input from the public at engagement events, identified and evaluated 210 community assets. These assets included major employment centers like the Historic Owego Marketplace, Tioga Downs Casino, residences (especially those in neighborhoods with senior residents and other vulnerable populations), public infrastructure, and key human service and cultural assets. In evaluating the assets, the Committee considered:

- Assets were ranked high community value if they were “FEMA critical,” considered locally significant through the *Comprehensive Mitigation Plan for Tioga County New York (2004)*, or were deemed locally significant by the Committee. In total, 99 assets were determined to have high community value.
- Assets were ranked medium community value if they had an effect on longer term recovery or represented an important community interest reflecting a critical aspect of resiliency and quality of life in the community. Six assets are ranked medium community value.
- Assets were ranked low community value if they did not have a direct effect on relief or recovery, and helped restore the sense of normalcy and quality of life. One hundred and five assets ranked low community value.

During the inventory, a map was prepared to illustrate the location of three risk areas (see Figure 2.1):

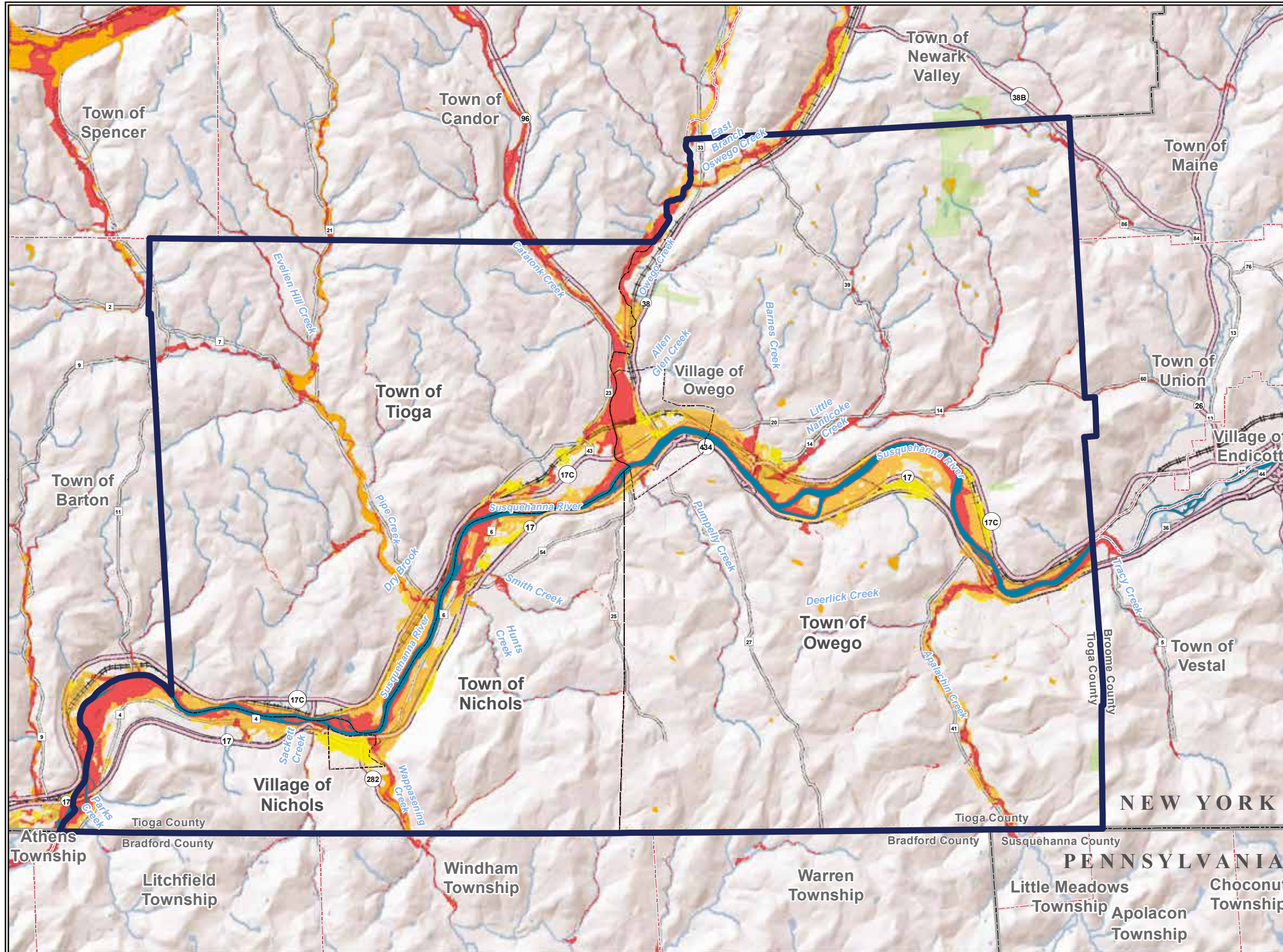
- **Extreme Risk:** The 10-year floodplain prepared by the Tioga County GIS Department using FEMA data, indicating a 10.0% probability of flooding in any given year. Twenty-nine assets were located in the extreme risk area.
- **High Risk:** The 100-year floodplain identified by FEMA, indicating a 1.0% probability of flooding in any given year. Eighty-five assets are in the high risk area.
- **Moderate:** The 500-year floodplain identified by FEMA, indicating a 0.2% probability of flooding in any given year. Forty-six assets are in the moderate risk area.
- The remaining 50 assets were located outside the extreme, high, and moderate risk areas.

Of the 210 assets, 99 high-value assets were selected by the Committee for evaluation using the risk assessment tool. These assets were either FEMA critical facilities, locally significant assets noted in the *Comprehensive Mitigation Plan for Tioga County New York (2004)*, or locally significant assets identified by the Committee. Figure 2.2 and Figures 2.3A-D illustrate the location of these high community value assets in relation to the three risk areas. The inventory of high-value assets and risk assessment is included in Section V, Additional Materials.

ii. Assessment of Risk to Assets and Systems

The purpose of the risk assessment tool was to help evaluate the potential for floods to compromise community functions. The risk assessment tool scored high-value community assets using *hazard, exposure, and vulnerability* factors associated with a storm event. These metrics assisted the Committee in identifying, supporting, and prioritizing projects to protect or reduce the risk to high-value community assets. Higher scores revealed increased threats of damage during a storm event. The tool is a formula-based spreadsheet that incorporates information related to landscape attributes (exposure factors), hazard, and vulnerability to generate a risk score for each asset. The **hazard score** is a fixed score representing storm frequency and magnitude. A hazard score of 3 was assigned to assets in a 100-year flood zone and a hazard score of 4 was assigned for a 500-year flood zone.

Figure 2.1: Risk Areas



Legend

- Extreme Risk
- High Risk Area
- Moderate Risk Area
- Planning Area Boundary
- Municipal Boundary
- County Boundary
- State Boundary
- Park
- River
- Railroad

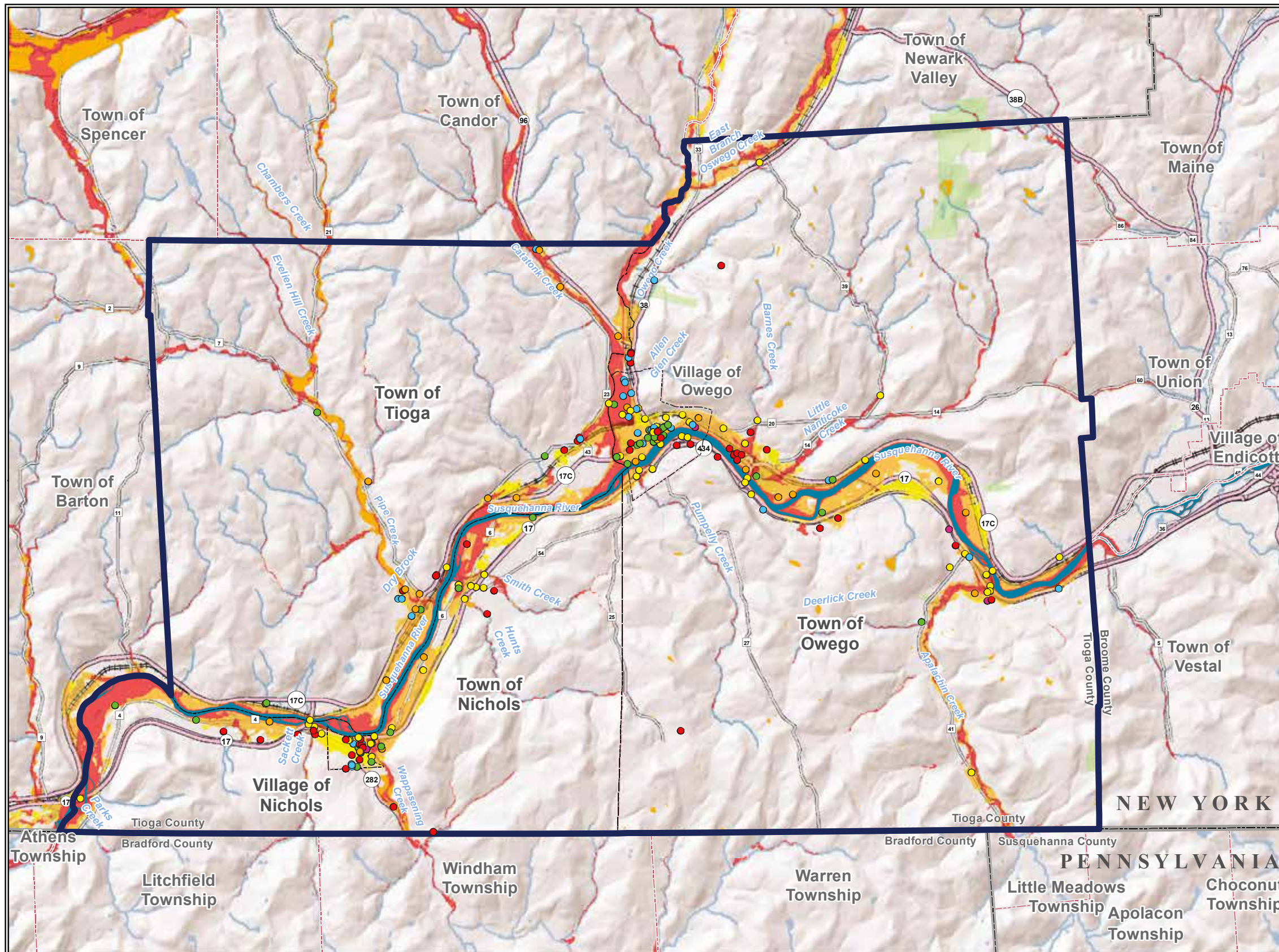
Data Sources:
 Base Imagery – ESRI ArcGIS Online Server.
 Planimetric Features – CIRIS.
 Risk Areas - FEMA; Tioga County.

NORTH

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Figure 2.2: Assets and Risk Areas



Legend

- Economic
- Health and Social Service
- Housing
- Infrastructure
- Natural and Cultural Resource
- Socially Vulnerable Population

- Extreme Risk
- High Risk Area
- Moderate Risk Area
- Planning Area Boundary
- Municipal Boundary
- County Boundary
- State Boundary
- Park
- River
- Railroad

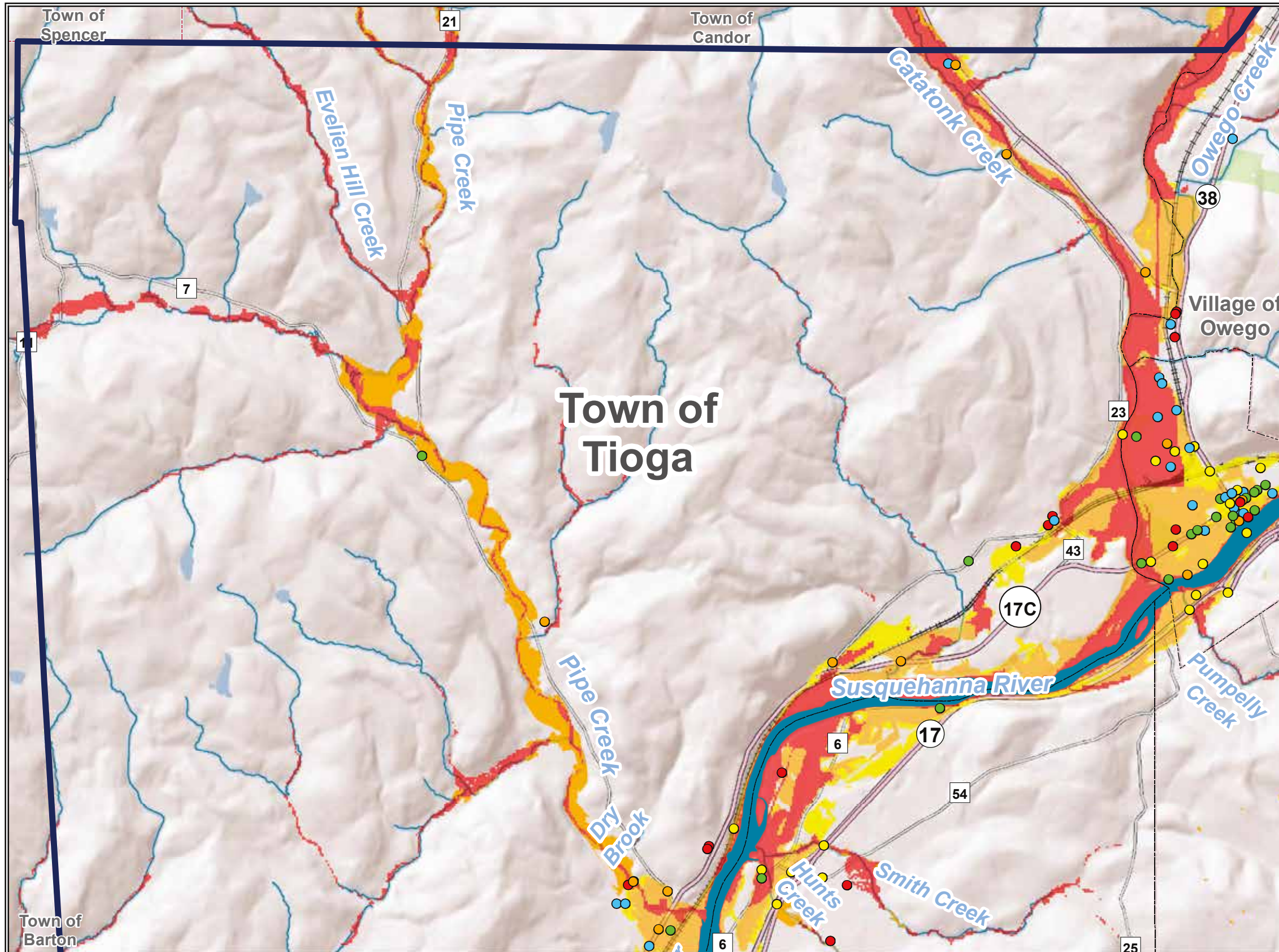
Data Sources:
 Base Imagery – ESRI ArcGIS Online Server.
 Planimetric Features – CIRIS.
 Risk Areas - FEMA; Tioga County.
 Assets: CIRIS; Parsons.

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Figure 2.3A: Assets and Risk Areas - Northwest Detail



Legend

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

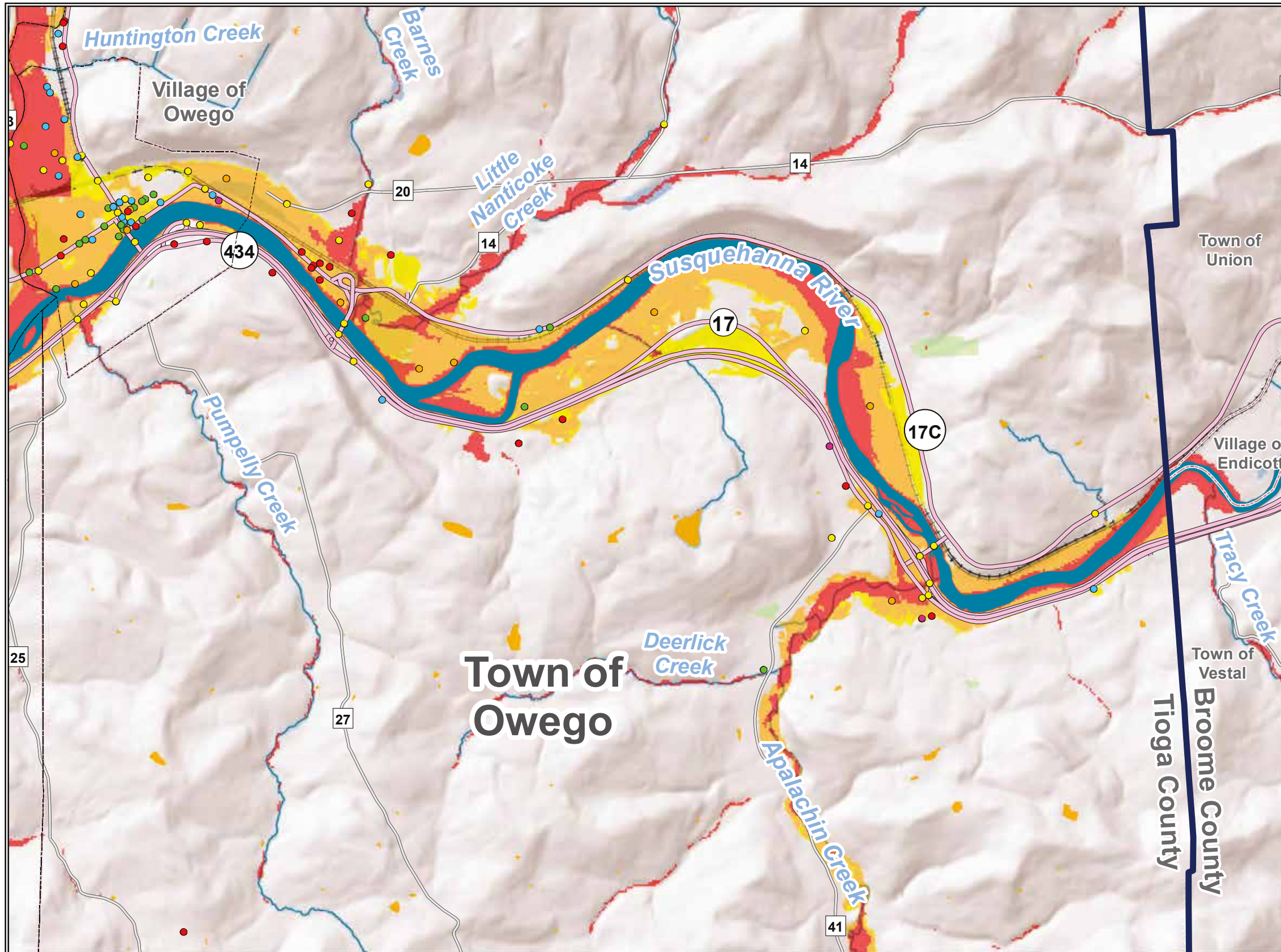
Data Sources:
 Base Imagery – ESRI ArcGIS Online Server.
 Planimetric Features – CIRIS.
 Risk Areas - FEMA; Tioga County.
 Assets: CIRIS; Parsons.

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Figure 2.3B: Assets and Risk Areas - Northeast Detail



Legend

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

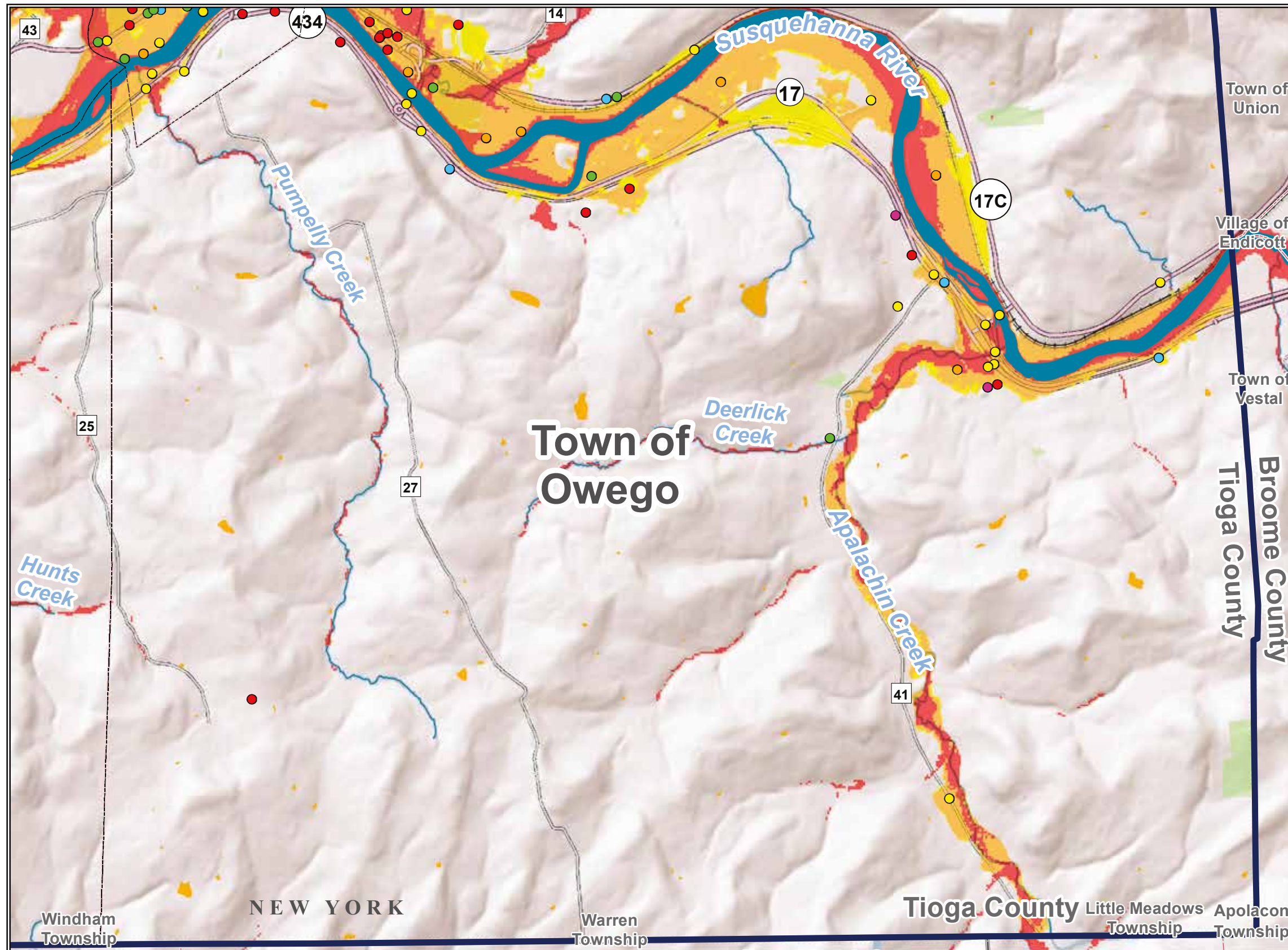
Data Sources:
 Base Imagery – ESRI ArcGIS Online Server.
 Planimetric Features – CIRIS.
 Risk Areas - FEMA; Tioga County.
 Assets: CIRIS; Parsons.

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Figure 2.3C: Assets and Risk Areas - Southeast Detail



Legend

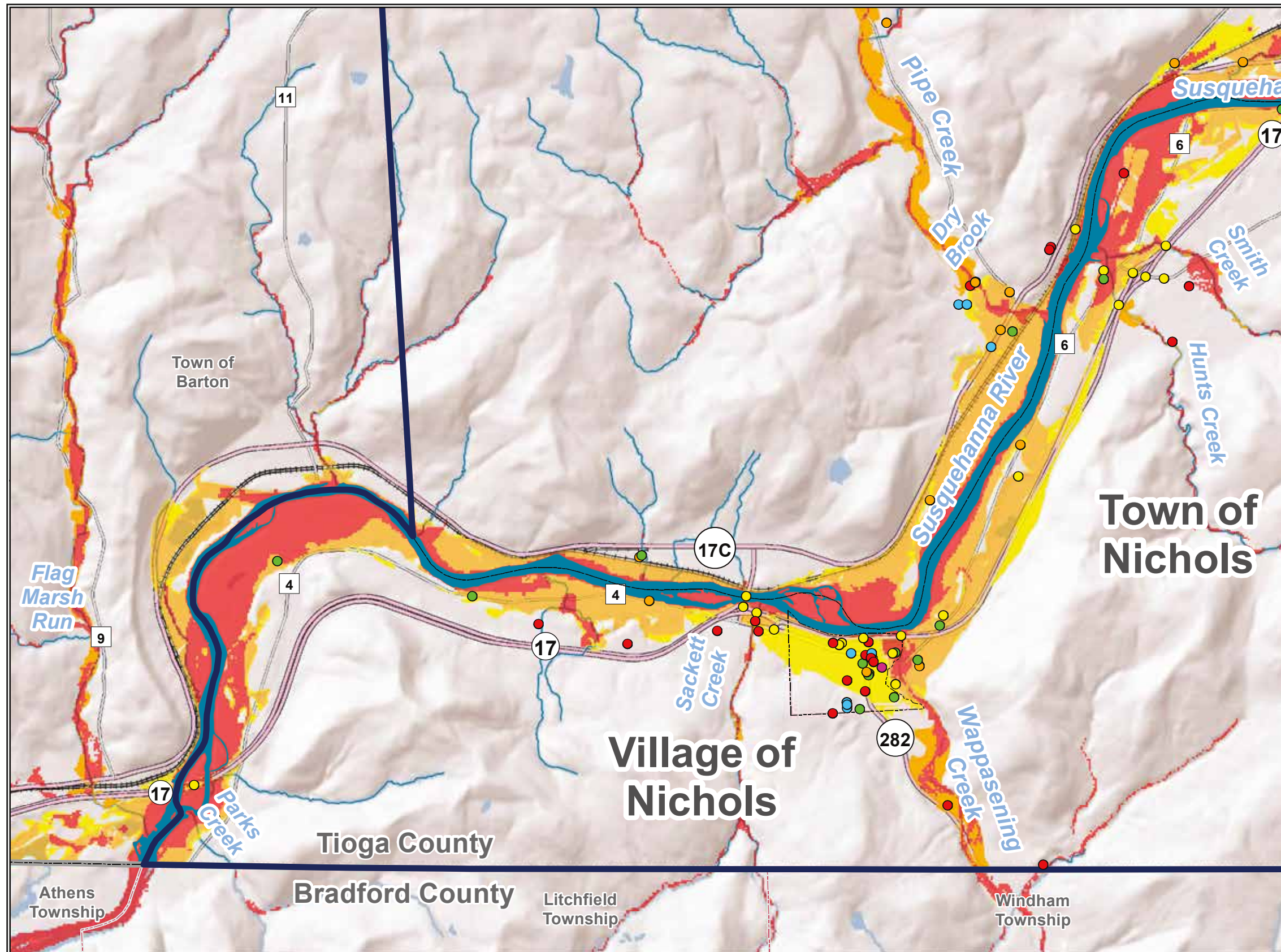
- Economic
- Health and Social Service
- Housing
- Infrastructure
- Natural and Cultural Resource
- Socially Vulnerable Population
- Extreme Risk
- High Risk Area
- Moderate Risk Area
- Planning Area Boundary
- Municipal Boundary
- County Boundary
- State Boundary
- Park
- River
- Railroad

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

NORTH

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Legend

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

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

NORTH

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- The **exposure score** was generated based on the risk area where each asset is located (Extreme, High or Moderate) plus the condition of each of the six landscape attributes. Specific point values were assigned in the Tool based on a yes or no response for each landscape attribute. These points together created the exposure score. The possible exposure scores range from 0.5 to 5.
- The **vulnerability score** ranged from 1 to 5 with a score of 1 indicating the asset was out of service for a short period and a score of 5 indicating the asset was out of service for an extended period of time or indefinitely.
- The **risk score** was generated by multiplying the hazard, exposure, and vulnerability scores.

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

- **Severe Risk** (risk score >53 for a 100-year event, >70 for a 500-year event). Assets at severe risk could be in a hazardous location and relocation of the asset may be a priority option. Although the Tioga Community has assets located in the extreme risk area, the maximum risk score calculated for these assets was 41, which is below the threshold severe risk score of 51.
- **High Risk** (risk score range of 24-53 for a 100-year event and 32-70 for a 500 year event). Significant negative outcomes from a storm could result, which could include the likely loss of service of an asset for an extended period. In total, 47 assets received 100-year event high-risk scores ranging from 27 to 41.
- **Moderate Risk** (risk score range of 6-23 for a 100-year event and 8-31 for a 500 year event). Floods pose moderate to serious consequences. In total, 32 assets received 100-year event moderate-risk scores ranging from 9 to 23.
- **Residual Risk.** Floods poses minor or infrequent consequences. The remaining 20 assets received a residual risk score, primarily due to their location outside of a floodplain. Two assets, the Nichols levee and a flood control gate were intentionally constructed in a floodplain and did not receive a risk score.

Six economic assets received high-risk scores and eight received moderate risk scores. Approximately half of these were small businesses located across the study area. The Treadway Inn, in the Town of Owego, offers lodging and conference center services and is considered to be at high risk. Many businesses that make up the Village of Owego's downtown are at high risk. The southerly portion of the Lockheed facility, a major employer located in the Town of Owego, has a moderate risk score. Businesses in the downtown area of the Village of Nichols are also at moderate risk. Flooding negatively impacted tourism and economic development in Tioga County. Flooding severely damaged businesses large and small, and they are still recovering.

Several health and social service assets are located in high and moderate risk zones across the study area. High-risk assets include four schools, four public works facilities, two healthcare facilities, two government offices, and two emergency response agencies. Moderate risk assets include five government offices, four emergency response agencies, and Lourdes Hospital in the Village of Owego.

The majority of high-risk housing assets are neighborhoods of predominantly single-family residences, such as the Owego Flats Neighborhood in the Village of Owego. The exception was the multi-family Hickory Estates Apartments in the Town of Owego. A neighborhood of mostly single-family homes on South Main Street in the Village of Nichols received a moderate risk score. Historically, patterns of public and private development occurred in high-risk floodplains. Stricter land use regulations in floodplains and reclamation of flooded areas to natural habitats will reduce risk of flooding for new developments.

Several infrastructure systems are at high or moderate risk according to the results of the risk assessment tool. The consultants determined that, although there are several assets located in mapped extreme risk areas, no assets are exposed to severe risks from flood hazards. High-risk assets include four wastewater treatment plants, two electric substations, and multiple water wells. Moderate risk assets include two Verizon buildings and Radio WEBO in the Village of Owego. The United Water pump house and water well in the Village of Nichols are at moderate risk. Emergency service facilities, such as the Town of Nichols highway barn and the joint fire district house for the Village and Town of Nichols suffered extensive flood damage during Tropical Storms Irene and Lee. Residents in the Tioga Community noted that warning and information systems lacked capacity to reach residents in time to respond to severe weather events.

Natural and cultural resources at high risk include parks and agricultural areas. The Engelbert Farm and Martin Farm in the Town of Nichols received high-risk scores. Hickories Park in the Town of Owego, Kirby Park in the Village of Nichols, and Ransom Park in the Town of Tioga are also at high risk. The bulk of moderate risk assets in the Town of Nichols include multiple cultural and religious establishments, the Campbell Farm, and the Lloyd Farm. Another moderate risk asset is the Tioga County Historic Courthouse in the Village of Owego.

The Riverview Manor Health Care Center in the Village of Owego serves socially vulnerable populations and is at high risk. Moderate risk assets in the Socially Vulnerable Population class are the Franziska Racker Center in the Town of Owego and Schoolhouse Apartments in the Village of Nichols.

B. Assessment of Needs and Opportunities

The Tioga NYRCR Planning Committee held a series of Committee Meetings and Public Engagement events attended by residents, government leaders, and key stakeholders. During these meetings and events, participants discussed needs and opportunities related to the impacts of Hurricane Irene and Tropical Storm Lee in Tioga County. The Tioga NYRCR Planning Committee initially reviewed the community's needs and opportunities in October 2013. The Committee took advantage of this opportunity for the municipalities to increase cooperation through open dialogue on regional flood issues. Discussions included how to coordinate on identifying and securing grants, and administration of regional efforts. As the planning process continued, the Committee's list of needs and opportunities evolved. In December 2013, the Committee reviewed an expanded version of the community's needs and opportunities.

The needs, opportunities, strategies and projects identified in this Plan support the Recovery Support Functions (RSF) established by President Barack Obama in 2011 through the National Disaster Recovery Framework. The six RSFs are Community Planning and Capacity Building, Economic Development, Health and Social Services, Housing, Infrastructure, and Natural and Cultural Resources. The following sections provide a summary of the Tioga Community's needs and opportunities organized around the six recovery support functions.

Community Planning and Capacity Building

During the public outreach process, it became clear that some of the biggest concerns in the Tioga Community were the lack of staff capacity for implementation, communication during and immediately following the storm, and the need to strengthen existing plans and local laws.

i. Community Planning and Capacity Building

Need: The Planning Committee recognized early on that what one community does with respect to flood control directly impacts neighboring communities, as well as those located downriver.

Opportunity: An opportunity exists to increase the area’s capacity to plan for and respond to storm events by implementing a regional approach to flood mitigation planning and storm recovery and increasing regional cooperation among municipalities and service providers.

Need: Lack of staff and municipal capacity to obtain and administer flood-related grants were identified as among the higher concerns for the communities located in the Tioga County river region. The Town of Owego is the only municipality within the Tioga Community

that employs a planner or grant writer on its staff. The other four communities rely on technical assistance provided by the Tioga County Department of Economic Development and Planning and the Tioga County Soil and Water Conservation Department, both of which have limited staff and resources.

Opportunity: Similar to the regional approach to flood mitigation planning, an opportunity exists for the Tioga Community to continue to work together within Tioga County to ensure adequate capacity exists to build back better.

Need: Community residents stated communication of pending disasters related to rising flood waters needs to be strengthened.

Opportunity: An opportunity exists to create a system that could provide information to residents so that they have time to get out of harm’s way and/or protect critical facilities.

Opportunity: Develop a public education campaign(s) focused on: (1) emergency preparedness - what to do when you hear the siren, and (2) evacuation routes - where to go and how to get there.

Need: During and immediately following the 2011 flooding from Tropical Storm Lee, a large number of State and local roads were closed. To ensure safety during future storm events, there is a need to develop a cross-jurisdictional map of alternative evacuation routes and real-time display.

Opportunity: An opportunity exists to develop a real-time emergency evacuation system similar to the South Carolina Department of Transportation evacuation system - “Hurricane Evacuation Decision Support Solution.”



During and immediately following the 2011 flooding from Tropical Storm Lee, a large number of State and local roads were closed.

Elan 3 Consulting

The system developed for South Carolina provides a Web-based presentation of smart maps that incorporate live information from South Carolina Department of Transportation (SCDOT) GIS, remote traffic counters, evacuation route and detour maps, and real-time weather data. It is designed to put rapidly changing traffic and weather information at the fingertips of State officials who are tasked with managing evacuations. A similar opportunity exists to help the residents of the Tioga Community find evacuation routes.

Need: Meeting participants identified a need to enforce existing regulations, and strengthen existing zoning and building codes to increase resiliency in the floodplain. Some of the goals for revamping the existing codes are improved public safety and reduced damage to private property. Residents would benefit from access to resources to help them to evaluate the cost/benefit effects of various options and to make appropriate changes to their buildings and property that can bring about increased resiliency.

Opportunity: Taking the time to review zoning laws/ordinances and prepare design guidelines for development can provide the Tioga Communities the opportunity to ensure that new development is either located outside of the floodplain or built to withstand flood damage. There is also an opportunity to assist homeowners and property managers to make flood-mitigating alterations when making improvements or carrying out routine maintenance cycles on their existing properties. Consider modeling this on other successful programs used in best practices or modeled on a local program. One local example is a façade improvement program that uses financial incentives to help retrofit homes with flood proof materials or elevate them above the floodplain.

Need: Community residents voiced concern over rising flood insurance rates.

Opportunity: Developing a public education campaign(s) focused on providing current flood maps and flood insurance program information will ensure residents are aware of where the floodplains are and how it may impact their property and related insurance requirements.

Opportunity: The Community Rating System is a Federal program that provides the opportunity to residents of communities participating in the program the ability to receive discounted insurance rates. Participating in this program can alleviate some concerns.

ii. Economic Development

Need: Protect business centers (hamlets, central business districts, village centers) from future flood damage.

Opportunity: Establish a Micro-Enterprise Loan Program to assist small businesses and start-up companies in the Tioga Community to repair property damage including buildings and grounds severely affected by Hurricane Irene and Tropical Storm Lee, as well as any future storms.

Opportunity: The Village of Owego has an opportunity to partner with Binghamton University, Cornell, and Corning Inc. to establish a regional incubator node in the community.

Economic Development

To create a sustainable and economically viable community, the Committee, with confirmation from the public, identified a need to create a diversified economy, enhance the commercial districts and make them more flood resilient, and expand infrastructure to areas located in the floodplain.

Elan 3 Consulting



The Tioga Community has an opportunity to promote local agricultural resources and agri-tourism programs.

Need: There is a need to extend infrastructure (broadband, water, sewer, and natural gas) to developable properties located outside of the floodplain.

Opportunity: Focus on provision of broadband, water, sewer, and natural gas on properties located outside of the floodplain to encourage business attraction and expansion concentrated near existing centers but out of flood hazard areas.

Opportunity: Conduct a broadband study to identify existing gaps in service.

Need: When rising waters from Tropical Storm Lee flooded the Tioga Community, many downtown centers and surrounding neighborhoods and farms suffered extensive damage. In addition to property damage, the loss of homes and infrastructure, gateway signage, lighting and numerous trees and plantings were also greatly damaged. While many areas have been restored, sustained recovery and maintenance of the streetscape will help ensure that residents continue to enjoy a high quality of life, give local businesses an environment in which to thrive, and continue the area’s regional tourism draw.

Opportunity: Implement streetscape and gateway enhancements to encourage economic development and tourism.

Need: Promote tourism as a key economic engine.

Opportunity: Continue to coordinate regional tourism development opportunities.

Opportunity: Promote local agricultural resources and agri-tourism.

iii. Health and Social Services

Need: Residents stated that after the 2011 floods, many of their neighbors found themselves without access to electricity, pharmaceuticals, and critical medical supplies and equipment (oxygen, dialysis, etc.).

Opportunity: Develop a plan to ensure emergency services for vulnerable populations, including provision of medical supplies and pharmaceuticals.

Opportunity: Increase volunteerism efforts and provide enhanced training opportunities and regional coordination.

Need: Many residents stated that they were unable to access critical health, veterinary, and social service facilities during and immediately following Tropical Storm Lee.

Health and Social Services

During Tropical Storm Lee, residents stated they did not have enough advance notice or were unclear of where to go or what to do to safely evacuate during the storm. To address this issue, the Tioga Community identified opportunities to focus on emergency preparedness and notification systems for all residents, including vulnerable populations.

Opportunity: Protect key health, veterinary, and social service providers through mitigation measures, elevation of facilities, relocation of facilities, and flood proofing.

Opportunity: Install detour route signage and implement road upgrades.

Need: During Tropical Storm Lee, many residents and stranded motorists from out of town took shelter at local emergency operation centers. The storm knocked out power for a week, and several of the shelters were without electricity or lacked adequate equipment to properly power key facilities.

Opportunity: Ensure that emergency shelters and critical facilities have an adequate supply of emergency electrical power generators.

Need: Organize and increase capacity of not-for-profits to provide better service to populations after a flood event or other emergency.

Opportunity: Tie into Southern Tier National Voluntary Organizations Active in Disaster structure to ensure services to vulnerable and other populations before, during, and after disasters.

iv. Housing

Need: Provide resilient and sustainable housing choices for all income levels.

Opportunity: Continue public/private partnerships to ensure a variety of housing choices.

Need: Several Tioga Communities are known for their historical charm and character. During Tropical Storm Lee, irreplaceable historical assets suffered significant flood damage.

Housing

During the public outreach process, the Committee identified the need to reduce future flood damage by updating resiliency tools, and offering a variety of market rate housing options that will contribute to the sustainability and resilience of the Tioga Community.



Elan.3 Consulting

Many culverts were damaged and had to be replaced as a result of Tropical Storm Lee.

Opportunity: Identify ways to protect historic resources from future flooding.

v. Infrastructure

Need: All municipalities reported flood damage to their wells, Town and/or Village halls, Department of Public Works (DPW) facilities, fire stations, and water and sewage treatment facilities. Existing infrastructure needs to be upgraded or relocated to lower-risk areas.

Opportunity: Flood-proof or relocate critical government facilities and utility infrastructure out of floodplain. Locate new development in proximity to existing development and infrastructure to minimize

extensions into greenfield areas and to protect existing farmland or arable soils from encroachment by new development.

Need: The Tioga Community identified a need for municipal engineering services within Tioga County. While the Tioga County Soil & Water Conservation District provides technical assistance regarding natural disaster concerns, there is still a need for an engineer or contract engineer to provide technical assistance to the flood affected communities throughout the County.

Opportunity: An opportunity exists to establish either a part-time shared engineer or contract engineer position within Tioga County. While the position would be housed within the Tioga County Soil & Water Conservation District, it could be filled by a part-time or full-time employee, or an agreement with a consulting firm to provide a specified number of hours per week.

Need: Many culverts were damaged or overflowed because of Tropical Storm Lee.

Opportunity: Hydrologic analysis and engineering studies should be undertaken to ensure that culverts are sized properly to handle the flow of water during storm events and to analyze the effects of proposed interventions. Repair, replace, and upgrade culverts where appropriate. Consider improved stream morphology as an adjunct to the pipe re-sizing, with floodplain improvements where appropriate to alter the velocity and volume of water before it gets to stream crossings. It will be necessary to model the effects of any proposed interventions, as it is impossible to guess which combination of management measures would optimize new investments in infrastructure.

Need: Evaluation and recertification of existing flood control systems.

Opportunity: Work with State and Federal agencies to evaluate existing flood control systems and to update flood maps (if necessary).

vi. Natural and Cultural Resources

Need: During the planning process, each participating Tioga County community stated that when it came to flood mitigation and recovery, it was important not only to think of how long term recovery strategies would impact their own community, but they also recognized the need for including a regional approach to flood control.

Infrastructure

During Hurricane Irene and Tropical Storm Lee, the extreme rains and excess velocity of the Susquehanna River and its tributaries caused extensive damage to the infrastructure systems and the municipal facilities needed to support a viable, sustainable community. The Committee identified the need to relocate critical facilities out of the floodplain and other enhancement to infrastructure to withstand future flood events.

Natural and Cultural Resources

The extreme rains associated with Hurricane Irene and Tropical Storm Lee caused rivers, streams, floodplains, and wetlands in the Tioga Community to overflow their banks resulting in infrastructure damage, flooded houses, schools and businesses, and significantly altered riparian ecosystems. The Committee identified a need to explore opportunities for natural stream restoration and educating residents and municipal leaders about proper flood mitigation techniques. They further recognized the value of recreation enhancements as a way to improve quality of life and increase tourism opportunities.

Opportunity: Conduct a regional study of the Susquehanna River and its major tributaries to understand flooding issues and existing ecology related to the River.

Need: Some flood related damage was caused by debris (sediment, gravel, trees, and branches) “clogging” the streams and creeks in Tioga County. There needs to be a strategy in place to alleviate clogging.

Opportunity: Establish an environmentally sensitive maintenance of streams program for flood affected river communities.

Need: Restore existing damaged or vulnerable recreational assets and develop new recreational assets.

Opportunities: Repair and upgrade recreation facilities damaged during the flood to improve residents’ quality of life and increase tourism opportunities. In the rebuilding process, look for opportunities to introduce new resilient measures.

Need: Erosion of stream banks and loss of riparian buffers occurred after Tropical Storm Lee. A greater emphasis should be placed on protecting sensitive environmental areas.

Opportunity: Conduct watershed assessments to identify long-term mitigation approaches.

Need: Improve stormwater runoff control measures.

Opportunity: Examine areas for green infrastructure to reduce stormwater impacts. Consider cumulative improvements from both large-scaled and small projects such as permeable or semi-permeable pavement surfaces, rain barrels, vegetated swales and buffer strips, or rain gardens.

Opportunity: Ensure adequate stormwater runoff control ordinances in the Tioga Community.

Opportunity: Implement stormwater runoff control improvements.

Need: Reduce impacts from water pollution during storm events.

Opportunity: Research implementation of water pollution control measures. Determine efficacy of retention areas, catch basins, and oil separation pits under storm conditions and identify opportunities for improved resiliency.

Section III: Reconstruction and Resiliency Strategies

The strategies developed by the Tioga Community are statements of action intended to mitigate negative impacts of future flood events that the community endured during Hurricane Irene and Tropical Storm Lee.

A. Reconstruction and Resiliency Strategies

The Planning Committee identified the following eleven strategies to address how best to use community assets, capitalize on opportunities, and resolve critical issues identified during the planning process.

1 *Strengthen or create new plans or local laws to minimize damage from future flooding.*

This strategy addresses a range of needs and opportunities that enhance the community planning and capacity building recovery support function. Land use planning is an effective tool to reduce the risk to life and property in the event of a future flood event. The use and development of land located in floodplains and watersheds can have a direct impact on the movement and storage of water. If not designed and built with consideration to the floodplain or in areas vulnerable to flooding, new uses could negatively affect the community causing an increase in erosion or flood damages to the property itself or to other lands within the community.

As a result of Hurricane Irene and Tropical Storm Lee, several of the municipalities in the Tioga Community recognized that their current land use regulations are either inadequate, outdated or include incomplete cross references to existing laws as they relate to the development in the floodplain. As a result of these inadequacies, structures were damaged during the storm because they were either inappropriately located within a floodplain or were not constructed according to established standards.

Updating zoning laws/ordinances to remove antiquated language and making sure that all of the laws efficiently communicate with each other is instrumental in ensuring that new development is located outside of the floodplain or is constructed to minimize damage during flood event. Likewise, addressing stormwater through progressive regulations and advanced green infrastructure techniques is another opportunity for communities to reduce the impact of floodwaters.

To prevent and minimize damage during future flood events, and to ensure sound use and development of areas of special flood hazard so as to minimize future flood blight areas, it is recommended that the Tioga Community strengthen its existing land use regulations such as site plan review, overlay districts, and zoning regulations and institute new measures to help control the type, amount, and location of new development within the communities, especially within the floodplain. As an additional method of dealing with floodwaters, the Tioga Community can look comprehensively at stormwater systems and incorporate green infrastructure improvements.

Table 3.1 Projects to Strengthen Plans/Local Laws to Minimize Future Flood Damage

| Project Name | Description | Estimated Cost | Proposed or Featured | Regional |
|--|---|-----------------------|-----------------------------|-----------------|
| Stormwater Management Plan and improvements, Village of Owego. | Develop a Comprehensive Stormwater Management Plan and construct stormwater improvements in the Village of Owego. | \$500,000 | Proposed | No |
| Resiliency Tools Update, Village of Owego. | Update resiliency tools, including site plan review, zoning, and CRS ratings. | \$225,000 | Proposed | No |
| Resiliency Tools Update, Town of Nichols. | Update resiliency tools, including an update to Comprehensive Plan and Zoning, adopt Site Plan Review, and customize Flood Damage Prevention Local Law. | \$75,000 | Proposed | No |

2 Ensure new development and redevelopment are resistant to flood damage.

In addition to land use tools, there are a number of property protection measures that can be undertaken to ensure that new development and redevelopment are resistant to flood damage. These include relocation efforts, acquisition, retrofitting, and building with flood resilient materials.

During Hurricane Irene and Tropical Storm Lee, those municipal facilities that were located in the floodplain suffered extensive damage, compromising the provision of municipal service to community residents. Many of the facilities are used to store fuel, salt and sand. As flood- and groundwaters rose, these materials were released into the nearby area, resulting in environmental contamination.

It is essential to maintain access to critical provisions such as firefighting apparatus and rescue vehicles, heavy equipment, and generators during a flood event. If these facilities are located in the floodplain and access is cut off, then the residents of the Tioga Community, especially vulnerable populations, are left in harm’s way. Ensuring unrestricted access to life saving equipment and the provision of municipal services during storm events is essential to the health, safety, and welfare of the Tioga Community.

This strategy ensures that all residents of the Tioga Community and the environment are protected in future flood events by developing new municipal facilities that are constructed of flood resistant materials and/or located outside the floodplain. Projects that align with this strategy are provided below.

| Project Name | Description | Estimated Cost | Proposed or Featured | Regional |
|---|---|-----------------------|-----------------------------|-----------------|
| Highway Garage Relocation, Town of Nichols. | Construct a new facility to house the Town’s highway equipment and DPW offices located out of the floodplain. | \$2,500,000 | Proposed | No |
| DPW and Codes Office Relocation, Village of Owego. | Create a new Owego shared services campus located out of the floodplain to house the Village’s DPW and Codes Office. | \$2,500,000 | Proposed | No |
| DPW, Parks, and Utilities Office Relocation, Town of Owego. | Create a new Owego shared services campus located out of the floodplain to house the Town’s Highway Equipment, and Utilities and Parks offices. | \$2,300,000 | Proposed | No |
| Joint Fire Station, Village and Town of Nichols. | The Town and Village of Nichols will collaborate to construct a new flood resilient Joint Fire Station located out of the floodplain. | \$1,500,000 | Proposed | No |
| Salt Storage Facility and Cover, Town of Tioga. | Purchase and install a salt storage facility (shed) and cover to protect municipal resources and reduce the potential for environmental contamination during future storm events. | \$460,000 | Proposed | No |

3 *Comprehensively prepare the Tioga Community for disasters.*

“Working together to build back better” is a common theme among the Tioga Community. Each community involved with the NYRCR planning process understands that what one community does impacts another as it relates to living along the Susquehanna River.

As development occurs in the floodplain it has consequences both for the municipality itself and other municipalities in the same watershed. Likewise, as flood mitigation projects take place within a watershed they can have positive and negative impacts on neighboring communities depending on how it is designed and constructed. The need to work together to comprehensively understand how large watersheds function and behave is critical to eliminating adverse effects during future storm events.

Given that the Tioga Community, the Broome Community, and the Village of Sidney all share their borders with the Susquehanna River and are located within its watershed, there is a unique opportunity to work together to comprehensively address flooding issues in the Upper Susquehanna River watershed. Each of the NYRCR communities have met and discussed this issue, agreeing to work together with existing organizations such as the Upper Susquehanna Coalition. Its mission is to protect and improve water quality and natural resources in the Upper Susquehanna River Basin through involvement of citizens and agencies to educate, partner, plan, implement, and advocate.

This strategy specifically addresses this need and opportunity by outlining steps for the NYRCR communities of Tioga, Broome, and Sidney to work together to think broadly about flood mitigation techniques and education throughout the Upper Susquehanna watershed. It further addresses the critical need of early warning communication to foster the safe evacuation of people and facilities in the watershed.

Table 3.3 Projects to Comprehensively Prepare the Tioga Community for Disasters

| Project Name | Description | Estimated Cost | Proposed or Featured | Regional |
|---|--|----------------|----------------------|----------|
| Regional Susquehanna River Initiative, Tioga County. | Partner with Broome County and the Village of Sidney to conduct a regional river study and identify improvements. | \$3,000,000 | Proposed | Yes |
| Regional Soil and Water Conservation District Projects, Tioga County. | Undertake regional Soil and Water Conservation District related projects to increase staff capacity and identify and implement natural systems that will provide greater protection to assets during future flood events. | \$935,000 | Proposed | Yes |
| Emergency Weather Alert and Warning System, Town and Village of Nichols and Village of Owego. | Purchase and install siren/alarm systems for the Town and Village of Nichols, as well as the Village of Owego and develop and distribute an information packet designed to educate residents about the warnings and how to respond in the event of an emergency to ensure all residents, including vulnerable populations, are safely evacuated from their homes during future storm events. | \$150,000 | Proposed | Yes |

4 Increase awareness among residents regarding home preparedness and emergency notifications.

Education and preparedness are critical elements to ensure that the Tioga Community is safe from future storm events. Understanding key procedures, how emergency service providers work together to eliminate redundancies and to provide a high level of service, and having adequate advance warning are essential to keeping the residents of the Tioga Community out of danger.

Although the arrival of Hurricane Irene and Tropical Storm Lee were well publicized on the national and local news, many residents indicated during the public engagement meetings that they were either not aware of the imminent threat or, if they heard the siren, did not know what to do next. Additionally, many residents were cut off from any form of communication due to power outages or impacts to cell service.

The opportunity exists to think comprehensively about emergency services and to understand how all of the different providers fit together and complement each other. Likewise, residents of the Tioga Community must also understand the protocol to follow when a siren is sounded.

This strategy enhances the community planning and capacity building support functions by implementing emergency notification systems and enhancing home preparedness through education.

Table 3.4 Projects to Increase Emergency Preparedness Among Residents

| Project Name | Description | Estimated Cost | Proposed or Featured | Regional |
|---|---|----------------|----------------------|----------|
| Emergency Weather Alert and Warning System, Town and Village of Nichols and Village of Owego. | Purchase and install siren/alarm systems for the Town and Village of Nichols, as well as the Village of Owego, and develop and distribute an information packet designed to educate residents about the warnings these systems issue and how to respond in the event of an emergency to ensure all residents, including vulnerable populations, are safely evacuated from their homes during future storm events. | \$150,000 | Proposed | Yes |
| Emergency Preparedness and Notification Plan, Village of Owego. | Implement an Emergency Preparedness and Notification Plan in the Village of Owego to increase voluntary enrollment in the County's Hyper-reach and NYS Alerts programs, establish a Block Emergency Preparedness Program, conduct emergency testing/flood drills, develop a Comprehensive Information System to raise awareness of flood hazards, and create a Pet Evacuation Plan System. | \$125,000 | Proposed | No |
| Solar-Powered Electronic Message Board, Village of Nichols. | Purchase and install a mounted, solar-powered electronic message board to ensure all Nichols residents, including vulnerable populations, are notified/updated of evacuation procedures during future storm events. | \$25,000 | Proposed | No |

5 *Ensure that flood-affected communities have the necessary staff capacity to apply for and administer flood mitigation and community revitalization funds.*

Four of the five municipalities that comprise the Tioga Community do not have a Planner or Grant Writer on staff and rely on technical assistance provided by the Tioga County Department of Economic Development and Planning and the Soil and Water Conservation Department. Creating a plan that outlines a set of projects and recommendations is the first step toward recovery. However, implementation of the ideas is the final step needed towards the realization of the vision as set forth in this plan.

As a set of rural communities in the Southern Tier of New York State, the Tioga Community has limited capacity in which to ensure the long-term sustainability as it relates to flood recovery and the host of recommendations and project ideas presented in this plan. This lack of capacity will hinder the ability of the Tioga Community to rebuild and recover in an efficient and sustainable manner. It is critical to ensure that the Tioga Community has the capacity to implement projects and recommendations specific to their community as well as implement other policy recommendations related to flood recovery.

The Tioga Community agreed early in the plan making process to work together amongst themselves and with existing agencies, such as the Tioga County Department of Planning and Economic Development and the Tioga County Soil and Water Conservation District, to share in their resources. The projects listed in relationship to this strategy illustrate how the resources will be allocated and address the critical need of the rural Tioga Community to build capacity to ensure the efficient implementation of recommendations of this plan and other initiatives as they relate to flood preparedness and recovery.

Table 3.5 Projects to Enhance Staff Capacity

| Project Name | Description | Estimated Cost | Proposed or Featured | Regional |
|---|---|----------------|----------------------|----------|
| Regional Soil and Water Conservation District Projects, Tioga County. | Undertake regional Soil and Water Conservation District-related projects to increase staff capacity and identify and implement natural systems that will provide greater protection to assets during future flood events. | \$935,000 | Proposed | Yes |
| Regional Flood Recovery and Revitalization Office, Tioga NYRCR Community. | Provide rural communities with the staff capacity to secure grant funding and implement Tioga Community NYRCR Plan. | \$150,000 | Proposed | Yes |

6 Improve the quality of life for residents after flood recovery.

Oftentimes when communities are badly affected by major storm events it presents an opportunity to consider improvements that are more comprehensive than the more immediate needs such as infrastructure replacement. In the context of “building back better” the Tioga Community considered ideas that will enhance the broader community by providing opportunities for a wide variety of residents.

Having a healthy ‘Main Street’, recreational opportunities, low cost energy, and access to jobs is critical for a high quality of life. Like many communities in New York State, the local economy in the towns and villages of Nichols, Owego and Tioga have been hard hit by reductions in tax base, job loss and a decreasing population. Revitalizing the central business districts, providing new and expanded recreational facilities, and linking to employment centers and economic generators is critical to enhancing the Tioga Community’s ability to attract and retain businesses.

Given that there are central business districts, existing recreational opportunities, and major employers (Tioga Downs and Lockheed Martin), there is an opportunity to enhance what is already in place. Likewise, the Tioga Community considered ways to build upon what they have to further the quality of life for area residents. Whether it is revitalizing Main Street in the Village of Nichols or developing a business incubator node in the Village of Owego, this set of projects will comprehensively enhance the quality of life and economy in the Tioga Community.

This strategy specifically addresses this need and opportunity by completing projects that will have a direct impact on the public realm within the Tioga Community. Enhancements to Kirby Park (the Village of Nichols’ recreational centerpiece), developing new trails along the Susquehanna River, or upgrading streets and sidewalks will result in a clean and functional environment that will enhance the quality of life for Tioga Community residents, as well as attract potential tourists and visitors, new residents, and businesses.

Table 3.6 Projects to Improve Residents' Quality of Life

| Project Name | Description | Estimated Cost | Proposed or Featured | Regional |
|--|--|----------------|----------------------|----------|
| Revitalization Plan, Town of Nichols. | Develop and implement a revitalization plan to enhance tourism and economic development in Nichols including: streetscape enhancements, wayfinding and gateway signage, beautification enhancements to the two existing DEC boat launches, and development of a 5-mile multi-purpose shoreline trail connecting Tioga Downs to the commercial district and recreation areas. | \$3,000,000 | Featured | No |
| Commercial District Enhancements, Village of Nichols. | Upgrade streets, sidewalks and lighting along the Village's commercial district to encourage tourism and economic growth during the post-storm economy. | \$1,000,000 | Proposed | No |
| Recreation Improvements and Creek Stabilization, Village of Nichols. | Implement the recreation and creek stabilization improvements recommended in the LTCRS to increase resiliency and positively contribute to the character of the community, particularly recreation areas. | \$1,000,000 | Proposed | No |
| Regional Incubator Node, Village of Owego. | Partner with Binghamton University, Cornell, and Corning Inc. to establish a regional incubator node in the Village of Owego, which will encourage future economic growth and allow entrepreneurs to thrive in the post-storm economy. | \$350,000 | Proposed | Yes |
| Alternative Energy Study, Town of Tioga. | Explore use of micro-grids to help reduce the cost of long-term operations and help residents, businesses and municipal facilities to thrive in the post-storm economy. | \$75,000 | Proposed | No |

7 Create a diversified economy in the Tioga Community, supported by tourism, light industry, and small business.

Recovering after a major storm event takes time, hard work and perseverance. After Hurricane Irene and Tropical Storm Lee, the Tioga Community suffered damage to many aspects of their economy and many businesses have still not recovered. Creating a diversified economy will help ensure the long-term sustainability of the Tioga Community.

Over the years the Tioga Community has witnessed a loss of jobs similar to other communities in the Southern Tier of New York State. These job losses have resulted in population loss and loss of wealth. The Committee discussed the need to retain a younger workforce, provide new and expanded opportunities for economic development, and maintaining healthy and vibrant central business districts.

According to the 2011 U.S. Census County Business Patterns, the Tioga economy consists of a little over 800 businesses, with half of the business activity in the retail trade, construction, other services, and lodging and food services sectors. The County has experienced a prolonged stagnation that has stunted economic growth in the region³².

Section III: Reconstruction and Resiliency Strategies

The downturn economic trend can be reversed, helping to increase wealth among area residents. The Committee proposed this strategy for providing access to a diversity of jobs related to tourism and light industry, linking to larger area institutions such as Binghamton University or Cornell, or providing opportunities for growth of small businesses.

This strategy specifically addresses the need to expand and enhance economic development in the Tioga Community. Whether it is developing new sewer and water on Route 434 to access land outside of the floodplain, providing options for low cost energy, or expanding sewer to an established hamlet, each project provides a distinct way in which to expand the Tioga Community economy.

Table 3.7 Projects to Create a Diversified Economy

| Project Name | Description | Estimated Cost | Proposed or Featured | Regional |
|---|--|----------------|----------------------|----------|
| Healthy Main Street Economy / Sewer Expansion, Town and Village of Nichols. | Serve businesses located downtown with municipal sewer in the Village of Nichols. | \$10,400,000 | Featured | No |
| Water and Sewer Extensions along Route 434, Town of Owego. | Extend public water and sewer along Route 434 to encourage economic development located outside of the floodplain to promote economic growth and provide greater resiliency during future flood events. | \$4,887,970 | Featured | No |
| Revitalization Plan, Town of Nichols. | Develop and implement a revitalization plan to enhance tourism and economic development in Nichols including: streetscape enhancements, wayfinding and gateway signage, beautification enhancements to the two existing DEC boat launches, and development of a 5-mile multi-purpose shoreline trail connecting Tioga Downs to the commercial district and recreation areas. | \$3,000,000 | Featured | No |
| Sewer Expansion, Town of Tioga. | Design and construct municipal sewer usage with Tioga Center School to encourage economic growth and reduce potential environmental contamination during future storm events. | \$2,000,000 | Proposed | No |
| Commercial District Enhancements, Village of Nichols. | Upgrade streets, sidewalks and lighting along the Village's commercial district to encourage tourism and economic growth during the post storm economy. | \$1,000,000 | Proposed | No |
| Regional Incubator Node, Village of Owego. | Partner with Binghamton University, Cornell, and Corning Inc. to establish a regional incubator node in the Village of Owego which will encourage future economic growth and allow entrepreneurs to thrive in the post storm economy. | \$350,000 | Proposed | Yes |
| Alternative Energy Study, Town of Tioga. | Explore use of micro-grids to help reduce the cost of long term operations and help residents, businesses and municipal facilities to thrive in the post storm economy. | \$75,000 | Proposed | No |

8 *Ensure emergency services for vulnerable populations, including provision of medical supplies and pharmaceuticals.*

During storm events, oftentimes the most vulnerable populations such as the elderly or handicapped are at high risk and can be left stranded without the necessary medical attention or supplies needed. Ensuring adequate services for these populations is paramount in order to maintain a resilient community.

For the purpose of this plan, the Committee identified vulnerable populations as senior and elderly citizens, the medically fragile or disabled, persons with limited English proficiency, the homeless, and the mentally disabled. The Committee stated that during a storm event these populations may need evacuation assistance, attention to special dietary needs, and/or special medical care.

This strategy addresses another area where the Tioga Community agreed to work together and pool their resources. They recognize that all communities have vulnerable populations and that a comprehensive and coordinated approach will best address this critical need.

To ensure emergency services, these projects enhance the health and social services support function through planning and education on emergency preparedness. Two broad approaches will help to achieve this strategy. One is development and implementation of an emergency preparedness and notification plan. Another approach involves installation of a comprehensive emergency siren system supplemented with emergency preparedness materials.

Table 3.8 Projects to Ensure Emergency Services for Vulnerable Populations

| Project Name | Description | Estimated Cost | Proposed or Featured | Regional |
|---|--|----------------|----------------------|----------|
| Emergency Weather Alert and Warning System, Town and Village of Nichols and Village of Owego. | Purchase and install siren/alarm systems for the Town and Village of Nichols, as well as the Village of Owego, and develop and distribute an information packet designed to educate residents about the warnings these systems issue and how to respond in the event of an emergency to ensure all residents, including vulnerable populations, are safely evacuated from their homes during future storm event. | \$150,000 | Proposed | Yes |
| Emergency Preparedness and Notification Plan, Village of Owego. | Implement an Emergency Preparedness and Notification Plan in the Village of Owego to increase voluntary enrollment in the County's Hyper-reach and NYS Alerts programs, establish a Block Emergency Preparedness Program, conduct emergency testing/flood drills, develop a Comprehensive Information System to raise awareness of flood hazards, and create a Pet Evacuation Plan System. | \$125,000 | Proposed | No |

9 Reduce future flood damage to existing homes through adoption of stricter land use controls and undertake infrastructure improvements that further protect and allow for the new construction of affordable and market-rate housing.

While many homes experienced flooding during Hurricane Irene and Tropical Storm Lee, housing was not identified as a critical issue or need during the public outreach process, the needs and opportunities analysis, or during subsequent review by the Committee. There was discussion of steps communities could take to reduce future flood damage and loss. Several concepts were developed, such as the adoption of stricter land use controls, public education on land use controls, the elevation of structures or other measures for housing resiliency, and offering a variety of market-rate housing options that could promote sustainability.

Having an adequate market-rate housing stock outside of the floodplain was a need identified by the Committee to ensure that existing and incoming residents have a safe place to live. Additionally, the Committee identified the need to protect the existing housing stock by providing new infrastructure, protecting existing infrastructure, or by updating land use laws.

To ensure diversity of safe, affordable market rate housing options in the Tioga Community, it is recommended that communities update their resiliency tools, extend public water and sewer, and recertify the Town and Village of Nichols levee system.

| Project Name | Description | Estimated Cost | Proposed or Featured | Regional |
|--|--|-----------------------|-----------------------------|-----------------|
| Water and Sewer Extensions along Route 434, Town of Owego. | Extend public water and sewer along Route 434 in the Town of Owego. | \$4,887,970 | Featured | No |
| Sewer Expansion, Town of Tioga. | Design and construct municipal sewer usage with Tioga Center School to encourage economic growth and reduce potential environmental contamination during future storm events. | \$2,000,000 | Proposed | No |
| Levee Accreditation, Village of Nichols. | Secure levee accreditation, which will protect the investments in new and rebuilt homes and buildings, as well as help homeowners and owners of rental properties to avoid high flood insurance costs. | \$700,000 | Proposed | No |
| Resiliency Tools Update, Village of Owego. | Update the Village’s resiliency tools, including site plan review, zoning, and CRS ratings, to lessen the impact of storms on homes, businesses and key assets during future flood events. | \$225,000 | Proposed | No |
| Resiliency Tools Update, Town of Nichols. | Update the Town’s Comprehensive Plan, Zoning Ordinance , Site Plan Review, and Flood Damage Prevention Local Law. | \$75,000 | Proposed | No |

10 *Protect key areas and critical facilities in the Tioga Community.*

Municipal government maintains public facilities and infrastructure in order to ensure a safe and resilient community. In addition to facilities such as highway garages and fire stations, other public infrastructure elements such as water wells, culverts, bridges, and roads are critical to maintain a functioning society both during and after major storm events.

The Committee identified critical needs associated with various infrastructure elements. For example, several of the Town of Owego's public water wells were damaged during Hurricane Irene and Tropical Storm Lee, leaving residents without an adequate and safe supply of water. The damage to the Town's Main Street well was so extensive that it has been offline since 2011. Other pieces of infrastructure, while in place, are in need of full evaluation to ensure their longevity and ability to protect residents from future flood events.

Projects relating to this strategy range from rebuilding or moving large scale facilities to culvert replacements. While this is a diversified set of projects, all are essential to ensure safe and adequate public infrastructure for the Tioga Community residents.

This strategy enhances the infrastructure systems support function through implementation of projects that repair or replace utility infrastructure to reduce flooding impacts or rehabilitate or relocate government facilities and equipment out of the floodplain.

Table 3.10 Projects to Protect Key Areas and Critical Facilities

| Project Name | Description | Estimated Cost | Proposed or Featured | Regional |
|--|---|----------------|----------------------|----------|
| Town Highway Facility Relocation, Town of Nichols. | Construct a new facility to house the Town's highway equipment and DPW offices located out of the floodplain. | \$2,500,000 | Proposed | No |
| DPW, Parks, and Utilities Office Relocation, Town of Owego. | Create a new Owego shared services campus located out of the floodplain to house the Town's highway equipment, and Utilities and Parks Offices. | \$2,300,000 | Proposed | No |
| Joint Fire Station, Town and Village of Nichols. | Town and Village of Nichols will collaborate to construct a new flood resilient Joint Fire Station facility located outside of the floodplain. | \$1,500,000 | Proposed | No |
| Bridge and Culvert Inspection and Upgrades, Town of Nichols. | Conduct a comprehensive bridge/culvert inspection and appraisal, and make necessary upgrades to reduce vulnerability in the Town of Nichols. | \$258,000 | Proposed | No |
| Emergency Operations Center Generator, Village of Nichols. | Purchase and install a generator for the Nichols Emergency Operations Center. | \$70,000 | Proposed | No |

Table 3.10 Projects to Protect Key Areas and Critical Facilities

| Project Name | Description | Estimated Cost | Proposed or Featured | Regional |
|--|--|----------------|----------------------|----------|
| DPW and Codes Office Relocation, Village of Owego. | Create a new Owego shared services campus located out of the floodplain to house the Village's DPW and Codes Office. | \$2,500,000 | Proposed | No |
| Halsey Valley Road Elevation, Town of Tioga. | Raise a 1/4 mile section of the south end of Halsey Valley Road to match the elevation of NYS Route 17C to ensure vehicular access during future storm events. | \$1,900,000 | Proposed | No |
| Main Street Water Pump House and Well Head Replacement, Town of Owego. | Meet an urgent need to replace Main Street Water Pump House & Well Head redevelopment, which was destroyed during Tropical Storm Lee. | \$1,000,000 | Proposed | No |
| Levee Accreditation, Village of Nichols. | Secure levee accreditation, which will protect the investments in new and rebuilt homes and buildings, as well as help homeowners and owners of rental properties to avoid high flood insurance costs. | \$700,000 | Proposed | No |
| Salt Storage Shed and Cover, Town of Tioga. | Purchase and install a salt storage shed and cover to protect municipal resources and reduce the potential for environmental contamination during future storm events. | \$460,000 | Proposed | No |
| Gaylord Road Culvert Replacement, Town of Owego. | Gaylord Culvert Replacement and upgrade in the Town of Owego. | \$346,875 | Proposed | No |

11 *Preserve and restore natural areas, including floodplains, streams, and wetlands, which can slow floodwater's momentum, reduce erosion, and increase a community's flood resiliency.*

Addressing issues higher up in the watershed can help mitigate flooding further downstream. This is of particular interest in the Tioga Community as each municipality has at least one major stream leading to the Susquehanna River that experienced severe flash flooding. Identifying natural stream restoration and flood mitigation techniques such as wetland creation and reconnecting streams to their floodplains is of particular interest to the Committee.

The watershed ecosystems in the Southern Tier region were inundated by Hurricane Irene and Tropical Storm Lee. These storms caused rivers, streams, floodplains, and wetlands to overflow their banks throughout the watershed. This resulted in fractured infrastructure networks like roads, flooded houses and schools, damaged village and town centers, and a significantly altered shape and function of riparian ecosystems (the interface between land and a river or stream). Many areas within the Tioga Community were severed from emergency services due to the flooding and destruction of roads and utilities.

The Committee identified a series of projects that were specific to their municipality. In addition, collectively they recognized that natural stream restoration and flood mitigation was common to all. Therefore, they agreed to pool their resources and think broadly about mitigation techniques that will reduce impact from floodwaters and flash floods and that can be easily replicated.

This strategy enhances the natural resource support function through implementation of projects that consider natural ways to enhance streams and rivers on a local and regional scale.

Table 3.11 Projects to Preserve and Restore Natural Areas

| Project Name | Description | Estimated Cost | Proposed or Featured | Regional |
|---|---|-----------------------|-----------------------------|-----------------|
| Regional Susquehanna River Initiative, Tioga County. | Partner with Broome County and the Village of Sidney to conduct a regional river study and identify improvements. | \$3,000,000 | Proposed | Yes |
| Recreation Improvements and Creek Stabilization, Village of Nichols. | Implement the recreation and creek stabilization improvements recommended in the LTCRS to increase resiliency and positively contribute to the character of the community, particularly recreation areas. | \$1,000,000 | Proposed | No |
| Regional Soil and Water Conservation District Projects, Tioga County. | Undertake regional Soil and Water Conservation District-related projects to increase staff capacity and identify and implement natural systems that will provide greater protection to assets during future flood events. | \$935,000 | Proposed | Yes |
| Stormwater Management Plan and Improvements, Village of Owego. | Develop a Comprehensive Stormwater Management Plan and construct stormwater improvements using traditional and green infrastructure techniques to reduce vulnerability during future storm events. | \$500,000 | Proposed | No |

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Section IV: Implementation— Project Profiles

The Tioga NY Rising Community Reconstruction Plan deepens and enhances planning and recovery begun after Hurricane Irene and Tropical Storm Lee, identifying the overall vision, strategies, critical issues, needs and opportunities, and preliminary projects.

A. Introduction

During the NYRCR process, the Committee worked through a systematic process to identify proposed and featured projects. As a first step, the Committee identified and ranked assets relating to economic, health and social services, housing, infrastructure, and natural and cultural assets. Each asset was then evaluated and scored based upon the level of hazard, exposure, and vulnerability each faces in extreme weather. The result of this analysis found many of the Tioga Community assets to be at high risk. With this information in hand the Committee began their work to identify proposed and featured projects that were then presented and confirmed at a public engagement meeting. Once the proposed and featured projects were identified, the Committee used the risk scores, cost estimates, and identified community benefits to evaluate how feasible the projects were and how effectively they reduced risks.

The NYRCR Tioga Plan includes 28 proposed and featured projects, including five affecting multiple jurisdictions. The projects are directly linked to the strategies specified in Section III and cover the entire range of Federal Emergency Management Agency (FEMA) Recovery Support Functions.

Regional Susquehanna River Initiative Tioga County

Project Type. Proposed.

Project Description. This project would establish a regional river system initiative to build resilience. This project is intended to link the Tioga Community, Broome Community, and the Village of Sidney together to comprehensively understand and address flooding issues in the Upper Susquehanna River. The intent is to partner and build on planned USACE/NYSDEC watershed work and create regional resiliency through specific projects as well as outreach and education.



The Upper Susquehanna River watershed is the headwaters of the Chesapeake Bay.

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

Component 1: Watershed Modeling to Identify Natural Infrastructure Practices for Implementation.

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

This project component will be completed in four phases: identify and target all priority flood impacted watersheds in Tioga and Broome counties based on historic, current and projected needs; conduct a level one geomorphic analysis to identify cost-effective practices that can be implemented to reduce flood impacts in the identified watersheds; and development and then implementation of several pilot projects within each community.

The estimated cost of this component is \$2,400,000 to conduct watershed modeling for seven primary watersheds, identify natural infrastructure practices for implementation, conduct a cost-benefit analysis of each practice identified, prioritize and select potential projects, survey sites and develop preliminary designs,

and finalize and construct pilot projects in the NYRCR municipalities in Tioga, Broome and Delaware Counties. An educational workshop will be conducted in conjunction with each project construction to demonstrate the purpose and value of the project to municipal officials.

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



Before and after. Restoring stream transport of water and sediment after Tropical Storm Lee.

The second phase of this component will provide DPW and Highway Superintendents with the education and training needed to utilize a stream clearance protocol for restoring stream transport of water and sediment after major storm events. Three-day workshops will provide time for both training and on-site construction.

This project component will provide a pilot for the systemic approach to train NYRCR communities’ post-flood responders in techniques to re-establish channel capacity, identify where and when not to work and the necessity to maintain floodplain connection. This component will include both implementation of stream intervention techniques within streams, as well as provide educational presentations for legislators, environmental groups, highway supervisors, and regulators on stream and floodplain function, changing climate factors, and why channel dredging is ineffective and results in stream instability. These educational presentations are an essential component to the successful acceptance of the Post-Flood Emergency Stream Intervention program within the NYRCR communities.

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

Component 3: Education and Outreach to Municipal Officials, County Legislatures, and Residents of the NYRCR Tioga Community. The third project component will educate municipal officials, county legislators and residents in the NYRCR communities about the function of floodplains and associated land use development decisions. Workshops will include “Stream dynamics and flooding causes,” sessions with local code enforcement officers to review floodplain management ordinances, a series of workshops to educate residents that live in floodplains to help them understand actions that can be taken to minimize flooding impacts to their homes, installation of the Tioga County’s Community Visual Landmark Flood Signs, and establishing a network of trained community stormwater/floodplain outreach volunteers.

Education and outreach are critical components of the regional river initiative and has to include decision makers and residents within the NYRCR communities. Education and outreach will create awareness and understanding of the causes of flooding and stream instability as well as considerations of living in a floodplain. Workshops will focus on municipal staff and their understanding of existing floodplain regulations, municipal officials and their understanding of flooding and stream issues, and residents and their understanding of stormwater and implications of living in a floodplain. Also, the community visual landmark flood signs that were developed in Tioga County will be expanded to include all NYRCR communities. The overall objective of is having communities that are more resilient to flooding impacts as they become more knowledgeable of the functions of floodplains and make land use and development decisions based on the best available information.

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

- Conducting education workshops for municipal officials, county legislators and residents of each of twelve NYRCR municipalities;
- Conducting one-on-one training with local officials in each of the twelve NYRCR municipalities regarding locally-adopted floodplain management ordinances;
- Conducting educational workshops for residents living in floodplains within Tioga County, Broome County, and Delaware County;
- Installation of up to forty-eight Community Visual Landmark Flood Signs throughout Tioga County, Broome County, and Delaware County; and



Example Community Visual Landmark Flood Sign.

Elan.3.Consulting

- Training sessions for interested individuals to identify potential flooding and stormwater hazards.

Project Cost. The estimated cost to develop all phases and components is approximately \$3 million.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** The project will reduce the effects of floodwaters during storm events by creating new retention areas, encouraging the flow of water into the natural floodplain, and ensuring streams are correctly shaped to accommodate flood events.
- **Economic Benefits.** There will be indirect economic benefits as a result of reduced flood damage to property and infrastructure in Tioga County, Broome County, and the Village of Sidney. There will also be co-benefits in improved ability to support new opportunities for outdoor recreation, tourism development, and agricultural land protection.
- **Environmental Benefits.** Environmental benefits will include wetland creation and restoration with flood attenuation, green infrastructure, natural stream rehabilitation and floodplain enhancement through berm removal. Co-benefits may include improved habitat and carrying capacity for wildlife, enhanced outdoor recreational opportunities for people, and provision of ecosystem services such as improved water quality.

Cost-Benefit Analysis. The Regional Susquehanna River Initiative's three components collectively build resilience in the NYRCR Tioga and Broome communities. Watershed modeling will identify the critical areas affected by flooding and individual projects will be developed to mitigate the flooding issues. The stream management program develops strategies, trains responders, and implements projects to maintain stream functionality during severe storms, when large amounts of debris are possible. Community outreach and education aspects of the Initiative help to instill a culture of readiness and storm preparedness. The potential benefits of establishing the Initiative and performing its initial tasks are considered to outweigh the investment of \$3 million over a two year period.

Risk Reduction Analysis. The creation of the Regional Susquehanna River Initiative and the watershed modeling component do not explicitly reduce risk. However, projects identified by the watershed model and the training, education, and outreach aspects that are then implemented would reduce risk to assets and the public in the Tioga Community.

Timeframe for Implementation. 24 months.

Regulatory Requirements. Completion of the project may require regulatory and permitting approvals from Federal, State, and local agencies, including permits from the U.S. Army Corps of Engineers and the NYS Department of Environmental Conservation (DEC). The project will also require coordination with the Upper Susquehanna Coalition.

Jurisdiction. Tioga County, Broome County, and the Village of Sidney (portion of the Upper Susquehanna Watershed).

Regional Soil and Water Conservation District Projects Tioga County

Project Type. Proposed.

Project Description. Throughout the NYRCR process, Planning Committee members, as well as community residents, identified the need for a comprehensive approach to increasing flood resiliency in the Tioga Community. Working with the Tioga County Soil and Water Conservation District (SWCD), the Planning Committee identified a series of projects to increase staff capacity and identify and implement natural systems that will provide greater protection to assets during future flood events.



The Tioga County Soil and Water Conservation District will identify and implement natural systems to provide greater protection to assets during future flood events.

The Regional Soil and Water Conservation District project is a multi-phased project that includes: a local flood hazard mitigation analysis (LFHMA) of the four primary tributaries in the Tioga Community, a geomorphologic analysis to identify natural resource stabilization opportunities, development and implementation of a stream maintenance program, installation of an early warning river/stream gauge system, and the creation of a shared engineer position.



Elan.3.Consulting

The Susquehanna River runs through the Tioga Community.

The first component of the project is to conduct a local flood hazard mitigation analysis for four primary tributaries in the Tioga Community, the Apalachin, Owego, Pipe, and Wappasening Creeks. This study will look at the regional flooding issues and existing ecology related to the Susquehanna River tributaries. It is important to understand how these creeks react during heavy rains. Each creek reacts differently during flood events based on the amount of rain that falls, where the rain is deposited within the watershed, and the intensity of the given storm. All this information will be modeled to predict areas that will be flooded during a given storm event. This model will highlight where pinch points (e.g., undersized culverts and bridges or elevated roads that may be creating a dam situation) may be located within the watershed that slow drainage and help the community to understand how long it will take for floodwaters to rise.

Understanding the ecology of the river will help to identify overall water quality issues. Looking at vegetation patterns, sediment transport (erosion issues), habitat types be used by the animals in the region, and other

ecological features will provide the base line information needed to understand the dynamics of this living system. The information gathered will be used to support possible mitigation measures related to flooding and water quality.

It is estimated that the project cost to complete an LFHMA on the four primary tributaries is approximately \$200,000.

The second component builds on the first in that it adds to the technical LFHMA analysis. Once the mitigation analysis has been completed, a geomorphologic analysis of the major tributaries (Apalachin, Owego, Pipe, and Wappasening Creeks) will be conducted to identify natural resource stabilization opportunities. This analysis can be used to identify possible mitigation measures to be explored and modeled to reduce the flooding and ecological impacts during a given storm event. These mitigation measures include creating wetlands, reducing impervious cover, reconnecting streams with floodplains, green infrastructure practices promoting infiltration and storage, and minimizing encroachment on the tributaries. The cost to conduct a geomorphologic analysis of the four primary tributaries is estimated at \$80,000.



Tioga County SWCD

Tioga County SWCD provide municipal highway department staff with hands-on training in environmentally sensitive stream maintenance techniques.

The third component of this project provides for the development of an environmentally sensitive maintenance of streams program. One of the universal issues identified during the public participation process was the flood related damage caused by debris (sediment, gravel, trees, and branches) “clogging” the streams and creeks in Tioga County. This program would entail the SWCD working with municipalities, including municipal officials and highway department staff, to ensure scientifically sound maintenance approaches are taken in streams that will not cause further degradation of the existing streambed and worsen conditions. The program would include the following elements:

- Training by SWCD of municipal highway department staff in environmentally sensitive stream maintenance techniques.
- Municipal officials identifying locations needing maintenance and working with SWCD to identify the best approach.
- SWCD obtaining permits for the work to be conducted.

This approach would include identification of stream debris jams (e.g., log jams and gravel deposits) that will cause impact to infrastructure during future flooding events or those causing significant changes in stream dynamics. Other areas to be focused on would be the removal of gravel in order to open clogged channels and restore flow, channel realignment, and stream bank stabilization to prevent future erosion. All of the sites, which will be located within the four primary tributaries, will be evaluated by SWCD on a case-by-case basis.

Benefits of this program will include improved coordination and cooperation between municipal staff and the SWCD, as well as expediting the permitting process with regulating agencies as municipal departments show their growing knowledge of stream function and processes, while conducting environmentally sensitive maintenance on streams. Cost estimates for Stream Maintenance Program implementation include \$30,000 to conduct a series of three-day workshops over the next two years that will properly train community and emergency responders in “Post-Flood Emergency Stream Intervention Protocol”, \$150,000 to hire staff to implement the program, and a one-time expense of \$75,000 for equipment for debris removal.

The fourth component of the project provides for the installation of 15 rain gauges, 12 stream gauges, 2 weather stations, a repeater, the necessary software to implement the system and staff training. This is a comprehensive system linking four primary tributaries into one early warning system that will provide real-time information helping to reduce impacts during storm events. The cost estimate for this component of the program is approximately \$200,000. It should be noted that the Tioga County SWCD \$90,000 HMGP application for an early warning system is still pending.



Town of Owego Emergency Stream Intervention (ESI) site before and after images.

The fifth and final component of this project includes the creation of a shared Engineer position to help implement the projects outlined above. The Planning Committee identified that there is a need for additional municipal engineering services within Tioga County. While the Tioga County Soil & Water Conservation District provides technical assistance regarding natural disaster concerns, there is still a need for an engineer or contract engineer to provide technical assistance to the flood impacted communities throughout the County.

This project seeks to establish either a two-year shared engineer or contract engineer position within Tioga County. While the position would be housed within the Tioga County Soil & Water Conservation District, it could be filled by a part-time employee, or an agreement with a consulting firm to provide a specified number of hours per week. The salary and benefits cost to hire an engineer for a two-year period is estimated at \$200,000.

Project Cost. The estimated cost to develop all phases and components is approximately \$935,000.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** It is anticipated that this project will provide cost-effective floodplain and stream channel improvements that will have a positive impact on flood reduction.

- **Economic Benefits.** There will be indirect economic benefits as a result of reduced flood damage to property and infrastructure.
- **Environmental Benefits.** Implementation of the stream maintenance program will reduce the number of pollutants and increase water quality.
- **Health and Social Benefits.** Increased safety of Tioga Community residents with implementation of the early warning river/stream gauge system.

Cost-Benefit Analysis. The five components of the Regional SWCD collectively benefit the Tioga Community by increasing flood resiliency. The LFHMA for the Apalachin, Owego, Pipe, and Wappasening Creeks will identify needed improvements to reduce potential flooding caused by undersized stormwater structures or flow restrictions. The geomorphologic analysis will identify ways to reduce flooding and ecological impacts by creating environmental restoration areas. Another component of the SWCD develops an environmentally sensitive stream maintenance program which will ultimately reduce flood damage due to debris. The fourth component installs 30 devices to warn of impending flooding and help reduce impacts of future severe storms. The creation of an engineer staff position will provide technical assistance to the SWCD and coordinate implementation of the other four components of this project. Overall, the potential benefits of this project are considered to outweigh the \$935,000 investment required to implement the various SWCD projects and studies.



Tioga County SWCD

Example of stream gauge.

Risk Reduction Analysis. This project funds a staff position and performs analyses, which do not explicitly reduce risk. However, the projects developed as a result of the engineer position, LFHMA, and geomorphologic analysis would potentially reduce risk to assets and the public in the Tioga Community. Furthermore, installation of an early warning gauge system would directly reduce risks to public safety and property damage by allowing more responsive evacuation and/or flood prevention measures.

Timeframe for Implementation. 25 months.

Regulatory Requirements. Completion of the project may require regulatory and permitting approvals from Federal, State, and local agencies including consultation with the Upper Susquehanna Coalition, U.S. Army Corps of Engineers, FEMA, New York State's Historic Preservation Office, and the NYS Office of Emergency Management

(NYS OEM). The project may require a NYS Department of Environmental Conservation (DEC) Protection of Water permit, and an Environmental Impact Assessment under the NYS Environmental Quality Review Act (SEQRA).

Jurisdiction. Tioga County.

Regional Flood Recovery and Revitalization Office Tioga NYRCR Community

Project Type. Proposed.

Project Description. One of the critical issues identified by the Planning Committee was the lack of staff/ municipal capacity to obtain and administer flood-related grants after Hurricane Irene and Tropical Storm Lee. Only one of the five municipalities that comprise the Tioga Community (the Town of Owego) has a Planner on staff. For grant writing and planning assistance, the Town and Village of Nichols, the Village of Owego, and the Town of Tioga depend on the technical assistance provided by the Tioga County Department of Economic Development and Planning and the Soil and Water Conservation Department.

This project seeks to establish a Flood Recovery and Revitalization Office with one or more shared program administrator positions. This position(s) will provide the municipal capacity needed to apply for and administer the projects outlined in the NYRCR plan and other long-term recovery grants and programs for the riverine communities in Tioga County. The intent is to provide much needed capacity to ensure the successful implementation of the wide variety of projects and to secure additional resources as necessary.

Funding for the salary and benefits associated with this position(s) would be administered through a regional agency. The Tioga County Department of Economic Development and Planning will make office space available, as well as provide basic office equipment, including a phone and a computer.

Project Cost. The estimated cost to develop all phases and components is approximately \$150,000. The five municipalities have each passed resolutions stating that they are willing contribute a portion of their CDBG-DR allocations to fund this project.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** Ancillary benefits of the project may include risk reduction through project implementation.
- **Economic Benefits.** The Regional Flood Recovery and Revitalization Office is intended to secure and administer Federal, State, and local grant funds to assist local municipalities with storm recovery and flood mitigation.
- **Health and Social Benefits.** The Regional Flood Recovery and Revitalization Office may expedite administration of storm recovery programs for local residents and businesses.

Cost-Benefit Analysis. The municipalities of the Tioga Community either do not have planning departments or their department is small and lacks staff members who are highly experienced in grant writing and execution. Therefore, the Planning Committee agreed that staffing a Regional Flood Recovery and Revitalization Office would benefit every community by providing a skilled grant writer and administrator who would manage grants and projects. An investment of \$150,000 over a 25 month period would benefit each community since successful grant applications could fund projects in each municipality with risk reduction, economic, health,

and social benefits depending on the projects' objectives. The potential benefits are considered to outweigh the investment required to fund a position within the Regional Flood Recovery and Revitalization Office.

Risk Reduction Analysis. This project funds a staff position; therefore it does not explicitly reduce risk. However, a variety of projects included in this plan and funded by successful grant applications would reduce risk to assets and the public in the Tioga Community.

Timeframe for Implementation. 25 months.

Regulatory Requirements. None.

Jurisdiction: NYRCR Tioga Community

Emergency Weather Alert and Warning System Town of Nichols, Village of Nichols, and Village of Owego

Project Type. Proposed.

Project Description. During the public participation process, many Tioga Community residents stated they did not have adequate warning of the rising waters associated with Hurricane Irene and Tropical Storm Lee to safely evacuate to emergency shelters. A few residents mentioned that emergency vehicles traveled through their neighborhoods with a bullhorn announcing evacuation procedures, but stated that the message was garbled and difficult to understand.

Installing a series of Emergency Weather Alert and Warning systems will provide all residents, including vulnerable populations, with advance notice of local emergencies. The project includes the purchase and installation of siren/alarm systems for the Town of Nichols, the Village of Nichols, and the Village of Owego. Each siren will have an adequate range to notify all residents of impending storms. These sirens will be pole mounted units that have solar panels to ensure operation in the case of a power outage.

It is recommended that one siren be installed in the Village of Nichols with repeaters located along East and/or West River Road in the Town of Nichols to ensure comprehensive coverage. It is also recommended that a similar pole-mounted siren be installed at the Main Street fire station located in the Village of Owego.

In addition to the purchase of new life saving early warning systems, an information packet should be designed and distributed to educate residents about the new alarm system, including what to do in an emergency and a diagram of safe evacuation routes as well as the location of emergency shelters.

Project Cost. The estimated cost to develop all phases and components is approximately \$150,000.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** Advance warning will provide time to protect assets if possible.
- **Economic Benefits.** The advance warning provided by the Emergency Weather Alert and Warning Systems could reduce flood damage and loss to businesses and municipalities.
- **Health and Social Benefits.** The Emergency Weather Alert and Warning Systems are designed to reduce the loss of life or injury to residents during severe weather events.



Installation of early warning systems to contribute to public safety and increase preparedness for future storms.

Cost-Benefit Analysis. Early warning systems contribute to public safety and increase the community's preparedness for future storms and flooding. Based on available information and preliminary plans, installing a series of Emergency Weather Alert and Warning systems in the Town of Nichols, Village of Nichols, and Village of Owego would improve the communities' ability to alert citizens of impending storms and rising flood waters. Advance notification by means of a siren or alarm system would provide health and safety benefits to all residents, including vulnerable populations. With additional warning, residents and business owners can reduce risk to assets and subsequent economic losses by securing property or high-value items. The potential benefits of this project are considered to outweigh the \$150,000 investment to procure and install the emergency alert and warning system.

Risk Reduction Analysis. This project has the potential to reduce life safety risk to the public (including vulnerable populations) by providing advance warning of severe storms and flooding.

Timeframe for Implementation. 4 months.

Regulatory Requirements. Completion of the project may require regulatory and permitting approvals from Federal, State, and local agencies including a NYS Department of Transportation (DOT) highway work permit.

Jurisdiction. Town of Nichols, Village of Nichols, and Village of Owego.

Joint Fire Station Town of Nichols, Village of Nichols

Project Type. Proposed.

Project Description. The Nichols Joint Fire District and Wappasening Hose Company located on West River Road protects an area of approximately 35 square miles within the Village and Town of Nichols. The facility, constructed in 1991, is a one-story structure with four bays. The department is staffed by volunteers.

Although the fire station is located in the Village of Nichols, which is protected by the levee system, extreme rains associated with Hurricane Irene and Tropical Storm Lee forced the groundwater to rise, flooding the facility. As a result, fire, emergency rescue, and other emergency services were negatively impacted and critical command center equipment that keeps the Town and Village of Nichols connected to the Tioga County Emergency Management Office was at risk.

This project proposes that the Town of Nichols work in partnership with the Village to construct a new two-story fire station located outside the floodplain. The new facility will be constructed using flood-resistant materials and where possible, will incorporate green technology to increase energy efficiency. The structure will house emergency vehicles on the ground floor, and essential communication equipment and offices on the second floor. The structure will include eight bays (two trucks deep in order to accommodate the ladder truck), a kitchen/pantry, dining room, two bathrooms, conference room, office space for the Fire Chief and Fire Commissioner, a fire proof file room, storage room for supplies, gear storage, and a water rescue supply room.

The project also includes purchase of a new emergency response vehicle with a hitch and trailer to tow the Fire Company's rescue boat. Acquisition of this life saving equipment will increase efficiency during flood events and other emergencies. The vehicle will have capacity to carry passengers and emergency equipment. It is of note that during Tropical Storm Lee, the fire department reported that 72 residents required water rescue during the first 24 hours immediately following the storm.

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

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** The project mitigates flood risk by relocating the fire station from a location that is susceptible to flooding by rising groundwater.
- **Economic Benefits.** The new fire station will be built using green technologies to increase energy efficiency, thereby reducing negative impacts to the environment and reducing the Town's overall operating expenses.



Vicinity Map of Joint Fire Station.



Existing Nichols Joint Fire Station.

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- **Health and Social Benefits.** A new flood-resilient fire station will allow for the continuous operation of firefighting and emergency services during severe weather events.

Cost-Benefit Analysis. Improvements to public safety and first responder facilities increase community resilience in the face of future storms and flooding, thereby ensuring protection of the Town and Village of Nichol’s assets and the safety of their citizens. Based on available information and preliminary plans, constructing a joint fire station at a location not subject to flooding by rising groundwater would improve the Nichols Joint Fire District and Wappasening Hose Company’s ability to command and control its firefighters in response to storm events by protecting critical and high-value communications equipment. Since groundwater would not flood the vehicle apparatus bays on the ground floor, firefighters would have unimpeded access to their trucks and equipment. Since the project would include an emergency response vehicle with a hitch and trailer to tow the Fire Company’s rescue boat, the Fire Company’s ability to serve vulnerable populations requiring rescue during floods would improve. According to the U.S. Department of Commerce (DOC) Economics and Statistics Administration (ESA) report, the estimated job creation from recovery spending on infrastructure projects in New York reported 7.15 construction jobs per \$1,000,000 in construction spending³³. Using this methodology and given the \$1.5 million project cost, an estimated 11 construction jobs would be created by this project. The potential benefits of this project are considered to outweigh the \$1.5 million investment required to plan, design, and construct the joint fire station.

Risk Reduction Analysis. The existing fire station is a FEMA critical asset that was assigned a high community value by the Planning Committee. It is located in a moderate risk area that is protected by Nichol’s levee system. Despite its relatively safe location, the station was flooded by rising groundwater. Relocating the station to another location where neither riverine nor groundwater flooding would occur will reduce the risk to this critical asset.

Timeframe for Implementation. 15 months.

Regulatory Requirements. Completion of the project may require regulatory and permitting approvals from Federal, State, and local agencies including, but not limited to, review under the National Environmental Policy Act (NEPA), an Environmental Impact Assessment under the NYS Environmental Quality Review Act (SEQRA), a Stormwater State Pollutant Discharge Elimination System (SPDES) permit, a NYS Department of Transportation (DOT) highway work permit, and local construction and building permits.

Jurisdiction. Town and Village of Nichols.



Location Map of Joint Fire Station.

Healthy Main Street Economy/Sewer Expansion Town of Nichols, Village of Nichols

Project Type. Featured.

Project Description. One of the strategies identified by the Planning Committee to help communities build back better is to create a diversified economy supported by tourism, light industry, and small business in the Tioga Community. For the Town and Village of Nichols to grow a healthy Main Street economy, businesses located in the commercial district need to be served by a municipal sanitary sewer system.

The majority of residential and commercial structures located in the Town and Village of Nichols are served by individual septic systems. As flood and groundwater rose during Tropical Storm Lee, many of these systems failed, resulting in environmental contamination, and in several cases, the demolition of buildings and loss of business. The Town does have a municipal sewer system in place that serves the Best Buy Distribution Center and Army Reserve Center, located on Stanton Hill Road. This project would extend the municipal sewer system along River Road to the commercial district in the Village of Nichols to provide sanitary sewer for the Village and surrounding area within the Town of Nichols.

Project Cost. The estimated cost to develop all phases and components is approximately \$10.4 million.

Project Benefits. Benefits of the project include:

- **Economic Benefits.** Potential economic benefits if additional economic development exceeds the system's capital cost, annual debt service and operations/maintenance costs.
- **Environmental Benefits.** The extension of public water and sewer lines will improve the ability to meet regulatory requirements related to the quality of treated effluent discharges to the Susquehanna River.
- **Health and Social Benefits.** The project has the potential to reduce residents' exposure to raw sewage, which can contain bacteria, viruses, and other germs that can cause disease and make a contaminated house unfit for living. The Healthy Main Street Economy/Sewer Expansion project would benefit all residents and businesses in the proposed service area, including low to moderate-income neighborhoods.

Cost-Benefit Analysis. A strategic objective of the NYRCR Tioga Plan is to help municipalities build back better after the damaging effects of Hurricane Irene and Tropical Storm Lee by diversifying their economies. One impediment to additional economic growth is the lack of municipal sanitary sewer service in the Town and



*Vicinity Map of Healthy Main Street/
Sewer Expansion.*



Sanitary sewer service is currently limited to the Best Buy Distribution Center and Army Reserve Center on Stanton Hill Road.

Elan 3 Consulting

Village of Nichols. This project presents the opportunity to spur economic growth by the extension of municipal sewer service, while eliminating the Town and Village's reliance on septic systems that can fail during floods. The elimination of septic systems would provide environmental benefits by providing treatment at the wastewater treatment plant. Using the methodology from the U.S. DOC ESA report,³⁴ the \$10.4 million project would create an estimated 74 construction jobs. If the additional economic development exceeds the system's capital cost, annual debt service and operations/maintenance costs, the potential benefits of this project would outweigh the \$10.4 million investment required to plan, design, and construct Healthy Main Street Economy / Sewer Expansion improvements.

Risk Reduction Analysis. The Village of Nichols' core commercial area is within the moderate risk assessment area and those of the Town of Nichols are outside the moderate risk area. New development spurred by the extension of municipal sewer service would be built to current building codes and standards which would reduce the risk of exposure to raw sewage.

Timeframe for Implementation. 19 months.

Regulatory Requirements. Completion of the project may require regulatory and permitting approvals from Federal, State, and local agencies including, but not limited to an Environmental Impact Assessment under the NYS Environmental Quality Review Act (SEQRA), a Stormwater State Pollutant Discharge Elimination System (SPDES) permit, a NYS Department of Transportation (DOT) highway work permit, NYS Department of Environmental Conservation (DEC) Division of Water (DOW) approval, and local construction and building permits.

Jurisdiction: Town and Village of Nichols.



Approximate Location Map of Healthy Main Street Economy/Sewer Expansion.

Highway Garage Relocation Town of Nichols

Project Type. Proposed.

Project Description. The Town of Nichols' Highway Garage (commonly known as the Highway Barn) is located on East River Road, near the banks of the Susquehanna River. The garage stores critical highway equipment and supplies, and provides office space for Department of Public Works (DPW) staff.

During Hurricane Irene and Tropical Storm Lee, waters of the Susquehanna River and Wappasening Creek overflowed their banks. The rising floodwaters caused extensive damage to the highway garage structure and equipment, which negatively affected municipal service provision during and immediately following the storms.

Fuel, salt, and sand are stored in the facility. As flood and ground waters rose, these materials were released into the nearby area, resulting in environmental contamination.



Vicinity Map of Highway Garage Relocation.



The Nichols Highway Garage suffered extensive damage during Tropical Storm Lee.

To ensure continuous municipal service provision and reduce the risk of environmental contamination during future storms, this project relocates the Town Highway Garage outside the floodplain. When reconstructed, green technologies focusing on energy efficiency should be used to reduce operating costs and improve environmental benefits. The new flood-resistant facility will house five truck bays, a truck lift, two bathrooms, the DPW Superintendent's office, a break room, one work bay/wash station, and salt and sand storage. Existing equipment and supplies that will be stored in the new facility include a chipper, grader, loader, trailer, mower, rock rake, tire supplies, and fuel storage.

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

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** Mitigates flood risk by relocating the town highway barn out of the floodplain. The risk score for the town highway garage would be reduced from 27 to 9 for the 100-year flood.
- **Economic Benefits.** The new highway garage will be built using green technologies to increase energy efficiency, thereby reducing the Town's overall operating expenses.
- **Environmental Benefits.** Relocating the highway garage out of the floodplain will reduce the potential of fuel, salt, and sand being released into the environment during future storms.

- **Health and Social Benefits.** Construction of a new highway barn located out of the floodplain will help to ensure continuous operation of municipal services during severe weather events.

Cost-Benefit Analysis. Improvements to highway and public works facilities ensure the availability of equipment and supplies needed during and after future storms and flooding. Based on available information and preliminary plans, constructing a highway garage at a location not subject to flooding would positively benefit residents of the Town of Nichols by ensuring the availability of municipal highway and public works services, equipment, and supplies during storms and floods. Economic benefits would accrue through the use of energy-efficient building technology that can reduce the cost to operate the building. Using the methodology from the U.S. DOC ESA report³⁵ and given the \$2.5 million project cost, an estimated 18 construction jobs would be created by this project. The potential benefits of this project are considered to outweigh the \$2.5 million investment required to plan, design, and construct the new Town of Nichols Highway Garage.

Risk Reduction Analysis. The existing highway garage is a FEMA critical asset that was assigned a high community value by the Planning Committee. It is located in a high-risk area and was damaged during the 2011 flood. Relocating the highway garage to another location (yet to be determined) that is not within a floodplain will significantly reduce the risk to this critical asset and the highway maintenance and public works services it supports.

Timeframe for Implementation. 15 months.

Regulatory Requirements. Completion of the project may require regulatory and permitting approvals from Federal, State, and local agencies including, but not limited to, review under the National Environmental Policy Act (NEPA), an Environmental Impact Assessment under the NYS Environmental Quality Review Act (SEQRA), a Stormwater State Pollutant Discharge Elimination System (SPDES) permit, a NYS Department of Transportation (DOT) highway work permit, and local construction and building permits.

Jurisdiction. Town of Nichols



Location Map of Highway Garage Relocation.

Resiliency Tools Update Town of Nichols

Project Type. Proposed.

Project Description. When Hurricane Irene and Tropical Storm Lee hit the Southern Tier in 2011, the Town of Nichols did not have adequate land use tools in place to reduce the negative effects of the associated flooding. To improve resiliency and lessen the impact of storms on homes, businesses, and key assets during future floods, the Town of Nichols would update and adopt its Comprehensive Plan, update its zoning ordinance to reflect recent experience with the effect of storms on assets in the community, and customize its Flood Damage Prevention Local Law.

In 2006 the Town of Nichols prepared the Greater Nichols 2020 Plan (a Comprehensive Plan), but it was never adopted. It is recommended that the Town review the draft Comprehensive Plan and update as necessary, including incorporating references to the NYRCR Plan and the Nichols Long Term Community Recovery Strategy (LTCRS). When complete, to strengthen its legitimacy and application, it is recommended that the Town Board adopt the revised Greater Nichols 2020 Plan. This will assist the Town in securing future grant opportunities and guiding future investment by businesses and homeowners.

Once the Greater Nichols 2020 Plan is adopted, the Town should update its zoning ordinance so that it is in accordance with the Plan, and includes a site plan review article that requires applicants to file a site development plan for review and approval. The site development plan specifies the present characteristics of a particular parcel of land and its surroundings, and describes intended activities and their potential impact on the community and adjacent neighborhoods.

Site development plans have two functions. First, they illustrate the intended design, arrangement, and uses of the land to be improved. Second, they describe the proposal's physical, social, and economic effects on the community. The plans may be in either or both narrative and graphic form, as appropriate. Information on factors such as means of access, parking, landscaping, buffers, architectural features, location of structures, impact on adjacent land uses, and other elements related to the health, safety, and general welfare of the community are often considered during review of the plan. The responsibility of reviewing the site development plan typically falls to the Town Planning Board. Requiring applicants to go through this process will ensure that any and all issues associated with flooding and flood proofing are addressed during the permit approval process.

In 2012, the Town of Nichols adopted a Flood Damage Prevention Local Law (FDPLL). The law was drafted using a standard template provided by the NYS Department of Environmental Conservation (DEC). The FDPLL sets forth purpose, objectives, applicability, and definitions, and prescribes methods of building in the Special Flood Hazard Area. For example, this local law indicates that if development in the Town is to occur in a mapped flood hazard area, then the development is required to be built to



Example of an elevated home in the Tioga Community.

certain standards, identified in the National Flood Insurance Program's regulations. If development is being considered for a Special Flood Hazard Area as shown on the Flood Insurance Rate Map (FIRM), then the local floodplain administrator, an officer designated in the local law, reviews the development to ensure that construction standards have been met before issuing a floodplain development permit.

This project would consist of a review of the Town's existing FDPLL to determine whether any sections should be customized to provide stronger construction standards for development projects located along the banks of the Susquehanna River and Wappasening Creek. The revised law could incorporate text, graphics and language that easily articulate the required standards to create a "user friendly" document.

Project Cost. The estimated cost to develop all phases and components is approximately \$75,000.

Project Benefits. Benefits of the project include:

- **Economic Benefits.** Adoption of the Greater Nichols 2020 Plan will assist the Town in securing future grant opportunities and guiding future investment by businesses and homeowners
- **Environmental Benefits.** Adoption of a zoning code with a site plan review article will promote sustainable development and minimize negative environmental effects on adjacent properties and land uses.
- **Health and Social Benefits.** Adoption of a zoning code with a site plan review article will contribute to the general welfare of the community in areas such as accessibility and buffering of incompatible land uses.

Cost-Benefit Analysis. Upgrading local codes and zoning ordinances to ensure they support flood-safe future development will protect the Town of Nichols' assets and the safety of its citizens. Adopting the Greater Nichols 2020 Plan, updating the zoning code to include site plan review, and strengthening the Flood Damage Prevention Local Law will give the Town an improved set of land use tools to guide the location and form of new development in ways that are sustainable. An adopted comprehensive plan will support future grant applications which would provide economic benefits upon award. Land use controls are established means of promoting the public welfare through quality and flood-safe development. The potential benefits of this project are considered to outweigh the \$75,000 investment required to procure professional planning assistance for the revision of the Town's zoning code and FDPLL.

Risk Reduction Analysis. This project would update the Town's land use controls with the objective of ensuring they support sustainable, flood-safe development. To the extent this development is realized, the Town will avoid potential future damage to homes and businesses caused by flooding.

Timeframe for Implementation. 15 months.

Regulatory Requirements. Completion of the project may require regulatory and permitting approvals from Federal, State, and local agencies including, but not limited to an Environmental Impact Assessment under the NYS Environmental Quality Review Act (SEQRA).

Jurisdiction. Town of Nichols

Bridge and Culvert Inspection and Upgrades Town of Nichols

Project Type. Proposed.

Project Description. Culverts are used to pipe water underneath roadways. During the NYRCR public outreach process, residents in the Town of Nichols and the Town’s Department of Public Works staff expressed concern regarding the extensive flooding that resulted from culverts that were clogged with tree branches and other debris during Tropical Storm Lee. Where culverts are located to allow vehicular crossing of streams, they can sometimes become pinch points for water during extreme rain events. If the culvert is clogged with debris carried by floodwater, the culvert will reduce or obstruct a river or stream’s ability to convey the high water along the established flow channel. A clogged culvert can cause a stream to top its banks, create a ponding condition above the stream banks, and flood the adjacent areas, sometimes also damaging the roadway associated with the culvert. Culverts that have a center pier, double culverts, are especially vulnerable to this clogging phenomenon.



Example of a double culvert in Nichols.

Elan.3.Consulting

To enhance flood resiliency, the Town of Nichols should conduct a comprehensive review of existing bridges and culverts and seek to replace those damaged during Hurricane Irene and Tropical Storm Lee that were not already replaced using FEMA Public Assistance dollars. This review should include an appropriate hydrologic analysis and engineering analysis to ensure that culverts are sized properly to handle the flow of water.

This project also provides for the engineering and construction of up to one small concrete box culvert (approximately 48 inches) or three small galvanized steel culverts (35 inches). When culverts are replaced, care should be given to their installation and design to ensure they not only continue to work properly, but that they also preserve the natural characteristics of the stream.

Project Cost. The estimated cost to develop all phases and components is approximately \$258,000. This figure includes comprehensive hydrologic and engineering analysis of the Town’s bridges and culverts estimated at \$70,000, and the engineering and construction of a culvert replacement(s).

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** Having properly sized and installed culverts will reduce the potential for negative impacts to assets within the community.
- **Economic Benefits.** Implementation of improvement projects identified during the bridge and culvert inspections will result in reduced amounts of damage to adjacent property. Reduced damage will result in fewer costs incurred for emergency response and repairs.

- **Environmental Benefits.** The improvement projects identified during the bridge and culvert inspections will be designed to preserve the natural characteristics of the affected stream. The improvement projects will also protect adjacent areas, since streams will be less likely to overtop their banks and low-lying areas will be less likely to pond.

Cost-Benefit Analysis. Improvements to public infrastructure increase community resilience in the face of future storms and flooding, thereby ensuring protection of the Town of Nichols' assets and the safety of its citizens. Based on available information and preliminary plans, conducting a comprehensive inspection of the Town's unimproved bridges and culverts and performing related engineering and hydrologic analyses would identify components that need to be replaced in order to meet storm flow design requirements. Properly sized culverts will benefit the community by reducing the likelihood of flood damage to roads, stormwater infrastructure, and adjacent property. Reduced levels of damage would provide economic benefits due to cost avoidance or lower repair costs. Incorporating design techniques that help preserve natural stream characteristics would produce positive environmental benefits such as reduced erosion. The potential benefits of this project are considered to outweigh the \$258,000 investment to plan and execute the bridge and culvert inspections and upgrades.

Risk Reduction Analysis. This project has the potential to reduce the extent and severity of localized flash flooding within the Town of Nichols. The elimination of underperforming culverts would reduce the risk to the stormwater drainage system and adjacent property due to erosion.

Timeframe for Implementation. 15 months.

Regulatory Requirements. Completion of the project may require regulatory and permitting approvals from Federal, State, and local agencies including, but not limited to, review under the National Environmental Policy Act (NEPA) including consultation with New York State's Historic Preservation Office (SHPO), U.S. Army Corps of Engineers (USACE) and NYS Department of Environmental Conservation (DEC) Protection of Water and Freshwater Wetlands permits, a Stormwater State Pollutant Discharge Elimination System (SPDES) permit, a NYS Department of Transportation (DOT) highway work permit, and local construction and building permits.

Jurisdiction. Town of Nichols.

Revitalization Plan Town of Nichols

Project Type. Featured

Project Description. Many businesses in the Town and Village of Nichols are struggling to recover after the flooding associated with Hurricane Irene and Tropical Storm Lee. Rising flood and groundwater severely damaged buildings and merchandise, and caused businesses to close their doors temporarily during storm clean up. To increase economic development and tourism opportunities in the Town and Village, this project would prepare and implement a Revitalization Plan.



Tioga Downs will be linked by a multi-use trail.

Elan.3 Consulting

The Town and Village of Nichols are conveniently located off NYS 17 (future I-86). They are accessible from NYSR 17 at the same exit as the popular Tioga Downs Casino, Racing, and Entertainment. To increase economic development opportunities within the Town, this recovery project seeks to increase public awareness of the natural, cultural, and historical resources available in the Town and Village of Nichols, as well as connect visitors to the Casino to the recreation and commercial amenities available in the community.

This project proposes that the Town of Nichols collaborate with the Village and Tioga Downs Casino to enhance tourism and economic development in Nichols. Project components include streetscape enhancements, beautification enhancements to two existing NYS DEC boat launches located on East and West River Roads, and development of a 5-mile multi-purpose trail along the shore of the Susquehanna River that connects Tioga Downs to the boat launches, restaurants, retail establishments, and the Kirby Park recreation area located in or near the Town Center.



Elan.3 Consulting

Existing DEC boat launch located along East River Road.



Elan.3 Consulting

Example of one of the restaurants located in the Village of Nichols' commercial district.

The project also proposes that the Town undertake a Community Marketing and Branding campaign to promote its trails, scenic vistas, waterways, historical structures, and local restaurants and shops. Wayfinding signage, featuring the Town brand and a list of available restaurants and services, should be installed at both

NYS 17/I-86 Exit 62 (Nichols/Tioga Downs) and Exit 63 (Lounsberry) to increase visitor awareness of the resources available in the Town and Village of Nichols.



Elan.3.Consulting



Elan.3.Consulting

The proposed multi-use trail will connect Tioga Downs Casino visitors to existing recreational and cultural resources such as Kirby Park and Cady Library.

Project Cost. The estimated cost to develop all phases and components is approximately \$3.0 million.

Project Benefits. Benefits of the project include:

- **Economic Benefits.** The purpose of the Nichols Revitalization plan is to create jobs and increase tourism opportunities, and to create an improved commercial center that supports increased business activity.
- **Health and Social Benefits.** The project will provide increased outdoor recreational opportunities for residents and tourists, providing new facilities for physical activity.

Cost-Benefit Analysis. Developing a revitalization plan that combines community beautification with a strategy to increase tourism will provide public awareness to invigorate a community affected by flood damage. Based on available information and preliminary plans, enhancing the community streetscapes and developing a recreational trail to increase connectivity to the Tioga Downs Casino will economically benefit the Town and Village of Nichols through increased awareness of historical, cultural, and recreational resources and local businesses. The new trail will also provide a recreational focal point for residents. The economic benefits created by increased tourism and jobs created will help restore and maintain the Town and Village of Nichols as a sustainable community. Additionally, using the methodology from the U.S. DOC ESA report,³⁶ the \$3.0 million project would create an estimated 21 construction jobs. The potential benefits of this project are considered to outweigh the \$3.0 million investment required to plan, design, and construct the recreational trail and prepare a marketing strategy.

Risk Reduction Analysis. This project has the potential to create a recreational component for village residents that will occupy land that is at high risk for flooding during future storms. The health and safety of residents will be protected from future unsustainable development of flood prone areas.

Timeframe for Implementation. 15 months.

Regulatory Requirements. Completion of the project may require regulatory and permitting approvals from Federal, State, and local agencies including, but not limited to, U.S. Army Corps of Engineers (USACE) and NYS Department of Environmental Conservation (DEC) Protection of Water and Freshwater Wetlands permits, a NYS Department of Transportation (DOT) highway work permit, consultation with New York’s State Historic Preservation Office (SHPO), an Environmental Impact Assessment under the NYS Environmental Quality Review Act (SEQRA), a Stormwater State Pollutant Discharge Elimination System (SPDES) permit, a NYS Department of Transportation (DOT) highway work permit, and local construction and building permits.

Jurisdiction. Town of Nichols.

Levee Accreditation Village of Nichols

Project Type. Proposed.

Project Description. In 1972, USACE built a levee system in the Village of Nichols to protect people, homes, and businesses. The levee is a flat-topped earthen berm covered with lawn. The project included construction of approximately 9,700 feet of levee, commencing in the Town of Nichols at Main Street (NYS Route 282) about 2,000 feet south of River Street (NYS Route 282), running easterly to Wappasening Creek, then north along the west side of Wappasening Creek to the Susquehanna River. At the Susquehanna River, the levee turns west and runs along the south side of the river for about 3,900 feet, where a tie-out levee runs south from the river for about 1,900 feet. The levee section along the Susquehanna River was designed and constructed as part of the New York State Route 17 Southern Tier Expressway. The expressway was constructed with an impervious core that ties into the eastern and western portions of the levee, which enables it to function as part of the flood protection system, along with its primary function as a highway. During Hurricane Irene and Tropical Storm Lee, floodwaters came within several feet of breaching the levee that protects the Village.



Vicinity Map of Levee Accreditation.



Elan.3 Consulting



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The Village of Nichols' levee system.

In 2004, the Federal Emergency Management Agency (FEMA) kicked off the Flood Map Modernization initiative (Map Mod). The program was designed to provide communities with up-to-date, accurate, and reliable flood hazard information. As FEMA began work on the Map Mod Initiative, they determined that information developed for remapping of some levees revealed that those levees might no longer be in compliance with FEMA regulations, and that this would lead to the decertification (removal of accreditation) of these levees. Through the Map Modernization program, the levee in the Village of Nichols was given a temporary designation by FEMA of "provisional accreditation" and is in jeopardy of losing all accreditation. If that were to happen, most property owners within the Village would be required to obtain flood insurance. This could create a serious financial hardship for existing property owners and would impede efforts to attract new residents or businesses to the Village.

Because the Village is responsible for maintaining the levee (while USACE and NYSDEC provide inspections of it), it also is responsible for having the levee certified in order to obtain reinstatement of full accreditation (if possible). Certification that a levee meets Federal design, construction, maintenance and operation standards to adequately reduce the risk of flooding from a major flood (a flood with a 1 percent chance of occurring in any given year) requires evidence provided by an engineering analysis. If the levee can be shown as providing this standard of risk reduction, FEMA will “accredit,” or recognize, the levee on flood maps³⁷.

This project provides for the Village of Nichols to work with a licensed engineer to assess the levee and, if in compliance, provide data and/or documentation to show that the levee provides the minimum required level of flood risk reduction. This certification will provide FEMA with the documentation needed to accredit the levee, which in turn will help home and business owners avoid significant flood insurance expenses.

Project Cost. The estimated cost to develop all phases and components is approximately \$700,000.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** Once the engineering feasibility study is completed, additional improvements to the levee may be required. Assuming these improvements are made, the levee will be more capable of protecting the Village of Nichols from the design storm, thereby reducing flood risk.
- **Economic Benefits.** Economic benefits include the potential avoidance of flood insurance for homes and businesses depending on the outcome of the levee certification process. Without costly flood insurance requirements, the Village also has a greater opportunity to attract new residents and businesses.
- **Health and Social Benefits.** The project will provide continuous protection to existing homes, churches, and government facilities located inside the levee.

Cost-Benefit Analysis. This project seeks FEMA accreditation for the Village of Nichols' 9,700 foot long levee system, at a total cost of \$700,000. The levee accreditation process includes an engineering feasibility study of the levee system. This study will provide certification that the levee complies with FEMA requirements or will identify necessary improvements to the levee system to be in FEMA compliance. Assuming those improvements are made (or the Village certifies that it is currently compliant), the levee would be accredited by FEMA, likely eliminating flood insurance requirements for homes and businesses in the Village of Nichols. The potential benefits of this project are considered to outweigh the \$700,000 investment required to achieve FEMA levee accreditation.

Risk Reduction Analysis. During the levee accreditation process, potential structural weaknesses or failure points could be identified. If these issues are remedied, the risk of flooding from Wappasening Creek and Susquehanna River would be reduced.

Timeframe for Implementation. 4 months.

Regulatory Requirements. Completion of the proposed project may require regulatory and permitting approvals from Federal, State, and local agencies including, but not limited to coordination with the U.S. Army Corps of Engineers (USACE) and FEMA to determine accreditation review and approval standards, coordination with the NYS Department of Environmental Conservation (DEC) for effects to existing flood control projects, and a NYS DEC Environmental Conservation Law (ECL) Article 16 (use of flood control lands) permit.

Jurisdiction. Village of Nichols.



Location Map of Levee Accreditation.

Solar-Powered Electronic Message Board Village of Nichols

Project Type. Proposed.

Project Description. During public meetings, Nichols residents stated that flood waters rose so quickly that they did not have enough advance warning to evacuate, or were not sure of where to go. They also stated that once flood waters receded, the community still did not have power or cell phone coverage and there was no way for the Town and Village to communicate with residents to let them know where to find emergency supplies, bottled water, and essential storm recovery information.

A solar-powered, permanently-mounted LED display would provide the Village with a way to communicate with residents and visitors before, during, and after a storm event. This project would install a solar-powered electronic message board near the Joint Fire Department to allow residents to receive up to date information and important safety messages.

It is important that the message board be solar powered so that in the event power is lost community-wide, the sign can still be used to communicate messages to the public. Further, having the ability to remotely change the message allows officials to make changes immediately from wherever they may be, making for “real-time” communication.

Project Cost. The estimated cost to develop all phases and components is approximately \$25,000.

Project Benefits. Benefits of the project include:

- **Health and Social Benefits.** Installation of the message board will reduce the in loss of life or injury to residents due to increased awareness of severe weather events.

Cost-Benefit Analysis. Village of Nichols residents have expressed a desire for improved means of communication before, during, and after flood events. Based on available information and preliminary plans, installation of a solar-powered, permanently-mounted changeable message board at the fire station would have a net positive benefit on community safety by providing the means to publicize messages about pending storms, evacuation orders, availability of emergency supplies, or other important announcements. The potential benefits of this project are considered to outweigh the \$25,000 investment required to acquire and install the solar-powered electronic message board.



Vicinity Map of Solar-Powered Electronic Message Board.



Typical electronic message board.

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Risk Reduction Analysis. By providing up-to-date and highly visible messages on storm events, evacuation orders, and other official notifications, this project has the potential to reduce risks to public health and safety.

Timeframe for Implementation. 4 months.

Regulatory Requirements. Completion of the project may require regulatory and permitting approvals from Federal, State, and local agencies including, but not limited to a NYS Department of Transportation (DOT) highway work permit.

Jurisdiction. Village of Nichols.



Location Map of Solar-Powered Electronic Message Board.

Emergency Operations Center Generator Village of Nichols

Project Type. Proposed.

Project Description. During Tropical Storm Lee, and in the days immediately following, many residents and stranded motorists found shelter in the Emergency Operations Center (EOC) established at Nichols Elementary School. The storm knocked out power to the EOC. A local elected official provided a small generator that was used to power two light bulbs in the hallway. The remainder of the building was dark. To ensure adequate electrical power to the building during future disasters, this project would purchase and install a 150KW generator with a 1,000 gallon fuel tank for the satellite EOC located at Nichols Elementary School.

Project Cost. The estimated cost to develop all phases and components is approximately \$70,000.

Project Benefits. Benefits of the project include:

- **Health and Social Benefits.** A new generator will ensure continuous operation of the Village's satellite EOC during severe weather events and enable the Nichols Elementary School to function as an emergency shelter for residents and trapped motorists displaced by the storm.

Cost-Benefit Analysis. Improvements to emergency management facilities increase community resilience in the face of future storms and flooding, thereby ensuring protection of the Village of Nichols's assets and the safety of its citizens. Based on available information and preliminary plans, installing an emergency power generator at Nichols Elementary School would enhance the resiliency of the building's electrical distribution system, thereby enabling it to function as an emergency operations center and shelter for displaced residents. A fully-functioning EOC would positively benefit the community by providing adequate space for emergency management personnel to monitor changing conditions and supervise the deployment of personnel and equipment in response to storms and floods. Maintaining electrical power throughout the building will also benefit flood victims seeking shelter until the floodwaters recede. The potential benefits of this project are considered to outweigh the \$70,000 investment required to procure and install the emergency power generator.

Risk Reduction Analysis. This project would reduce risks to public health and safety by providing continuous power to the Nichols Elementary School during storm-related outages and thereby enabling the building to be used as a shelter and emergency operations center.

Timeframe for Implementation. 1 month.



Vicinity Map of Emergency Operations



Proposed generator.

Getty Images

Regulatory Requirements. Completion of the project may require regulatory and permitting approvals from Federal, State, and local agencies including, but not limited to coordination with the NYS Department of Environmental Conservation (DEC) to determine if petroleum bulk storage registrations are needed.

Jurisdiction. Village of Nichols.



Location Map of Emergency Operations Center Generator.

Recreation Improvements and Creek Stabilization Village of Nichols

Project Type. Proposed.

Project Description. One of the greatest assets in the Village of Nichols is Kirby Park, a municipal recreation area located along River Road that is the summer home to the historic Kirby Band, believed to be one of the oldest continuously performing community bands in the nation. The Park, which features soccer and baseball fields, a basketball court, the Kirby Band bandstand, pavilion, and playground equipment, is located along the west banks of the Wappasening Creek at the confluence with the Susquehanna River. The park is used by Village, Town and County residents, as well as tourists visiting the nearby Tioga Downs Casino, Racing, and Entertainment.



Vicinity Map of Recreation Improvements and Creek Stabilization.



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Wappasening Creek and Kirby Park.

During Tropical Storm Lee, the Wappasening Creek rose over its banks, flooding 90% of the Park. The force of the water was so great that it washed away goal posts and caused structural damage to both the bandstand and pavilion and left the grounds of the park covered in mud and debris. This project includes restoration of the riparian way at impacted areas along the Wappasening Creek corridor. The goal is to promote natural



Lesley Pelotte



Lesley Pelotte

Damage at Kirby Park after Tropical Storm Lee.

channel design to ensure sediment transport, stable vegetated banks, ecological diversity and connection to the floodplain.

This project includes enhancements to Kirby Park that will increase flood resiliency, stabilization of the Wappasening Creek to prevent additional erosion, and creation of a pocket park, located out of the floodplain, designed to meet the recreation needs of children and seniors.

Specific project enhancements to Kirby Park include:

- **Bandstand.** Existing structure to be removed. New bandstand to be built in same location with flood resilient design features.
- **Portable Toilets.** Portable toilets to be relocated and placed within a wood built enclosure.
- **Perimeter Multi-Use Trail.** Asphalt paved multi-use trail (10 feet wide and 1,930 feet long), with bollards located at the park entrance area to deter vehicle access.
- **Trail Connection to Creek Edge.** Asphalt paved (6 feet wide and 130 feet long) connection to the water's edge.
- **Pedestrian Walk in the Park.** Asphalt paved (8 feet wide and 250 feet long) walkway to link the park pavilion, Kirby Park memorial, children's play area, basketball courts, toilets and parking area.
- **Dedicated Pedestrian Street Crossing.** Crosswalk improvements consisting of pedestrian signage, crosswalk striping and signage to provide connection between the north and south parcels of the park on River Road and between the north parcel and the creek edge.
- **Park Entrance Realignment.** An asphalt paved (24 feet wide and 300 feet long) park entrance drive will be realigned to better accommodate vehicle traffic connecting to handicapped accessible parking and the proposed parking area to the north of the basketball courts.
- **Existing Park Landscape Enhancement.** Additional tree planting in two locations to provide shade and a visual barrier between the park, parking and River Road. Lawn replacement in disturbed areas.
- **Children's Play Area.** The children's play area will be relocated to the west of its current location to provide access to those families who will be driving to the park playground. The play area includes existing play equipment and safety surface system constructed with engineered wood.



Conceptual Plan for Kirby Park.

Elan Planning, Design & Landscape Architecture, PLLC

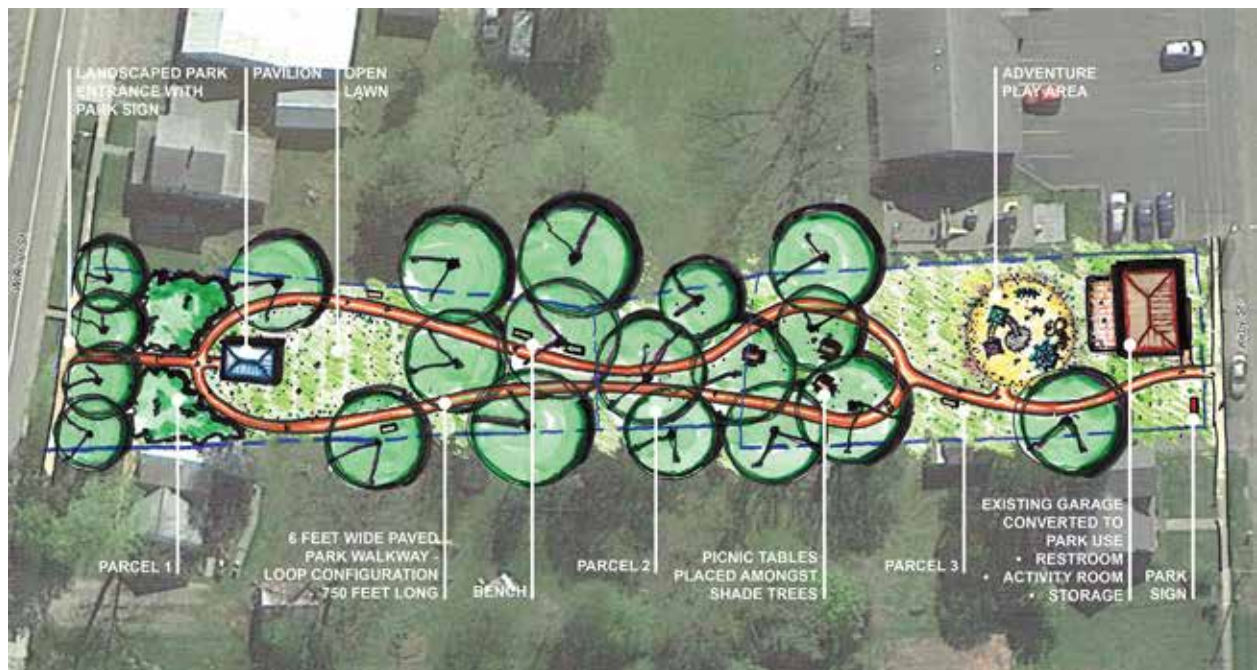
- **Reposition Baseball Field.** Existing baseball field to be relocated to the north of its current location to create a larger lawn area for expanded recreational use.
- **North Parking Area.** The existing parking area will be modified to provide landscaping and parking configuration accommodating thirty-three parking spaces.
- **Handicapped-Accessible Parking.** Four handicapped-accessible parking spaces will be provided adjacent to the basketball court.
- **Lighting.** Four area light standards with electrical connection will be installed to enhance park user safety.
- **South Parcel.** A new parking area accommodating forty-two parking spaces will be constructed. The area will include shade tree planting.
- **Creek Stabilization.** Stabilization elements include riverbank indigenous plantings and rip-rap installation at key locations.

The project also provides for the creation of a new pocket park to be located outside of the floodplain near the Village’s commercial district. Park features will include: a 20 x 15 foot open air pavilion, landscaped park entrance and signage, a walking trail loop, a children’s play area, and comfort facility.

Project Cost. The estimated cost to develop all phases and components is approximately \$1.0 million.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** Potential flood mitigation outcomes from Kirby Park improvements and creek stabilization for nearby residents and businesses.
- **Economic Benefits.** The improvements to Kirby Park are designed to improve the quality of life for residents and enhance tourism and recreation opportunities.



Conceptual Plan for new pocket park near the Village’s commercial district.

- **Environmental Benefits.** The creek stabilization improvements will reduce bank erosion and sediment in Wappasening Creek.
- **Health and Social Benefits.** Improvements to Kirby Park, and the construction of a new pocket park located in the commercial district, will increase recreational amenities for area residents and visitors.

Cost-Benefit Analysis. Residents of the Village of Nichols have expressed a desire to improve Kirby Park, which was significantly damaged by flash flooding of Wappasening Creek during Tropical Storm Lee. These improvements would make the park's amenities more flood-resistant and reduce the amount of damage and clean-up after storms. An improved Kirby Park and construction of a new pocket park in a flood-safe location would benefit the Village and Town's residents by improving quality of life and enhancing tourism and active recreational opportunities. Environmental benefits would be produced by stabilizing the banks of Wappasening Creek to minimize erosion and sediment loading in the creek. A \$1.0 million investment is required to improve Kirby Park and Wappasening Creek. Using the methodology from U.S. DOC ESA report³⁸ given the \$1.0 million project cost, an estimated 7 construction jobs would be created by this project. The potential benefits of this project are considered to outweigh the cost of implementation.

Risk Reduction Analysis. This project would reduce the risk of damage to Kirby Park's amenities by including flood-resistant design features and improvements to Wappasening Creek.

Timeframe for Implementation. 19 months.

Regulatory Requirements. Completion of the project may require regulatory and permitting approvals from Federal, State, and local agencies including, but not limited to, an Environmental Impact Assessment under the NYS Environmental Quality Review Act (SEQRA), coordination with NYS Department of Environmental Conservation (DEC) for effects on existing flood control projects, a DEC Environmental Conservation Law (ECL) Article 16 (use of flood control lands) permit, a DEC stream disturbance permit, consultation with New York's State Historic Preservation Office (SHPO), and local construction and building permits.

Jurisdiction. Village of Nichols.



Location Map of Recreation Improvements and Creek Stabilization

Commercial District Streetscape Enhancements Village of Nichols

Project Type. Proposed.

Project Description. The Village of Nichols is a charming community that features waterfront access, recreation areas and a commercial district that serves as the “downtown” for both the Village and the Town. As a result of rising groundwaters associated with Hurricane Irene and Tropical Storm Lee, many of the businesses and infrastructure, including the concrete sidewalks, in the Village’s commercial district suffered flood damage.



Vicinity Map of Commercial District Streetscape Enhancements.

To increase economic development opportunities within the Village, this project seeks to upgrade Village sidewalks in the commercial district to comply with requirements of the Americans with Disabilities Act (ADA) which will reduce tripping hazards, and replace current street lighting with historical pedestrian scale lighting. These improvements will reduce tripping hazards caused by crumbling sidewalks, reduce energy costs through the installation of new energy efficient lighting, and create an attractive commercial district that will encourage economic growth and tourism.



Elan 3 Consulting

Nichols commercial district.



Elan 3 Consulting

Project Cost. The estimated cost to develop all phases and components is approximately \$1 million.

Project Benefits. Benefits of the project include:

- **Economic Benefits.** It is anticipated that local businesses will benefit from increased activity attributed to commercial district improvements.
- **Health and Social Benefits.** Upgrade of sidewalks and intersections to be ADA-compliant which will improve accessibility for seniors and those with physical limitations.

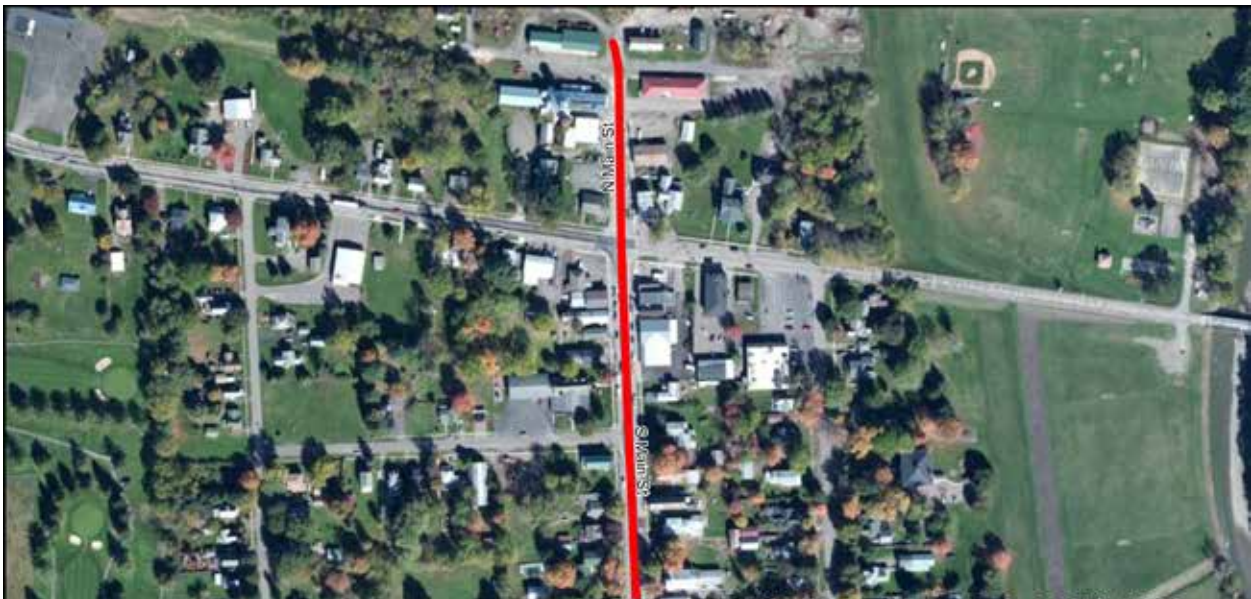
Cost-Benefit Analysis. Residents of the Village of Nichols have expressed a desire to improve their commercial district, particularly after rising groundwater caused by excessive rainfall during Hurricane Irene and Tropical Storm Lee damaged sidewalks and commercial buildings. Based on available information and preliminary plans, investing in ADA-compliant concrete sidewalks and historical pedestrian-scale lighting will economically benefit businesses in the commercial district. Disabled and elderly residents would benefit from improved accessibility. A visually interesting and accessible commercial district can produce economic benefits as a result of increased pedestrian activity adjacent to storefronts. Using the methodology from U.S. DOC ESA report,³⁹ the \$1.0 million project would create an estimated 7 construction jobs. The potential benefits of this project are considered to outweigh the \$1.0 million investment required to plan, design, and construct the streetscape improvements within the Village of Nichols' commercial district.

Risk Reduction Analysis. This project has the potential to reduce life safety risk to the public (including vulnerable populations) by providing ADA-compliant infrastructure.

Timeframe for Implementation. 19 months.

Regulatory Requirements. Completion of the project may require regulatory and permitting approvals from Federal, State, and local agencies including, but not limited to, an Environmental Impact Assessment under the NYS Environmental Quality Review Act (SEQRA), consultation with New York's State Historic Preservation Office (SHPO), a Stormwater State Pollutant Discharge Elimination System (SPDES) permit, a NYS Department of Transportation (DOT) highway work permit, and local construction and building permits.

Jurisdiction. Village of Nichols.



Location Map of Commercial District Streetscape Enhancements.

DPW, Parks and Utilities Office Relocation Town of Owego

Project Type. Proposed.

Project Description. During Hurricane Irene and Tropical Storm Lee, the Town of Owego’s Department of Public Works (DPW) facility suffered extensive damage due to flooding. The DPW offices had to be temporarily relocated to the Town Hall Campus. All related highway equipment was stored at the Town Hall Campus location, 2354 NY State Route 434, for 6 months following the storm.

This project will create a new shared services campus located outside of the 100-year floodplain. The project goal is to house the Town (and some selected Village) offices to ensure continuous municipal service delivery during future storm events.



Vicinity Map of DPW, Parks, and Utilities Office Relocation.



Existing Owego Town Hall.

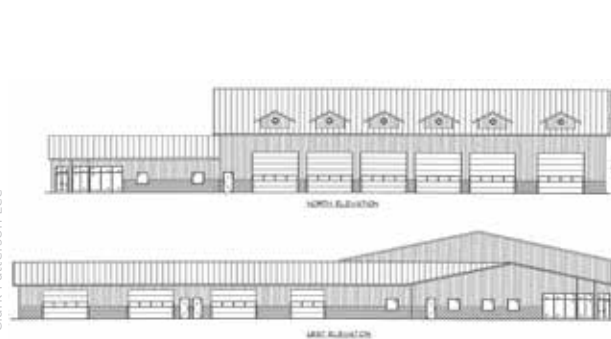
This project includes construction of a new facility at the existing Town Hall Campus that will house the Town’s highway equipment, Sewer and Water Departments, and Parks Offices in one new building. It is anticipated that the new building will measure approximately 12,620 SF, most of which will house the Town’s highway equipment.

Preliminary design of the Town’s 12,621 SF DPW building at the Town Hall Campus is complete. Final design and construction documents will need to be prepared. Preparation of these final documents will

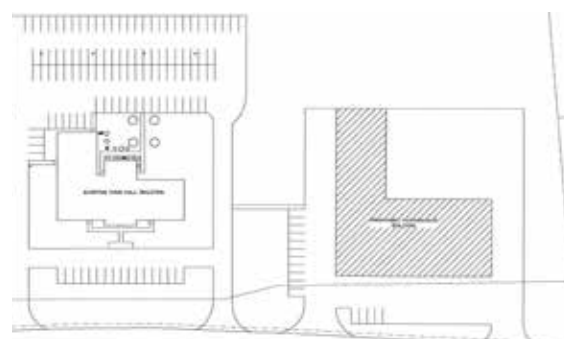
also include coordination with the Village of Owego, which plans to construct a similar structure on the Town Hall Campus to house their highway equipment, along with the Village’s DPW and Codes offices.

Project Cost. According to an estimate provided by the Town’s engineer, the cost to develop all phases and components is approximately \$2.3 million.

Project Benefits. Benefits of the project include:



Preliminary elevations of the DPW, Parks and Utilities Office.



Preliminary site plan of the DPW, Parks and Utilities Office.

- **Risk Reduction Benefits.** The project reduces the flood risk to the Town and Village of Owego’s municipal operations by constructing new facilities outside the floodplain.
- **Economic Benefits.** Consolidation of Town operations into one campus will lead to municipal cost savings.
- **Health and Social Benefits.** The relocation of critical facilities outside of the floodplain will ensure continuous operation of municipal services during severe weather events.

Cost-Benefit Analysis. Maximizing the resilience of municipal operations facilities benefits their response capabilities during future storms, ensuring the protection of the Town of Owego’s assets and the safety of its residents. Based on available information and preliminary plans, developing a consolidated municipal services building out of the floodplain would provide unimpeded service delivery for residents during future storm events. Consolidating municipal assets into one facility would also provide cost savings on utilities and other facility maintenance expenses. Using the methodology from U.S. DOC ESA report⁴⁰, and given the \$2.3 million project cost, an estimated 16 construction jobs would be created by this project. The potential benefits of this project are considered to outweigh the \$2.3 million investment required to plan, design, and construct the shared municipal facility.

Risk Reduction Analysis. By providing a shared-use facility that would reduce interruptions to municipal service delivery, this project has the potential to reduce risks to public health and safety.

Timeframe for Implementation. 19 months.

Regulatory Requirements. Completion of the project may require regulatory and permitting approvals from Federal, State, and local agencies including, but not limited to stormwater compliance (SWPPP), a NYS Department of Transportation (DOT) highway work permit, NYS Department of Health for septic, and local construction and building permits.

Jurisdiction. Town of Owego



Location Map of DPW, Parks, and Utilities Office Relocation.

Main Street Water Pump House and Well Head Replacement Town of Owego

Project Type. Proposed.

Project Description. During Hurricane Irene and Tropical Storm Lee, the Town of Owego’s Main Street Water Pump House & Well Head located at 1313 Main Street in Apalachin, was destroyed. The facility has been out of service since the 2011 flood event. This project meets an urgent need to replace this critical facility.



Vicinity Map of Main Street Water Pump House and Well Head Replacement.

Project Cost. The estimated cost to develop all phases and components is approximately \$1.0 million.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** The project would provide additional resiliency for the Town of Owego’s raw water wells and pump house.
- **Environmental Benefits.** The project will increase the Town’s ability to pump raw water to the water plant for treatment and distribution, thereby ensuring a reliable and safe supply of drinking water to the service population. The project will partially re-use existing infrastructure, thus eliminating environmental impacts from new construction.
- **Health and Social Benefits.** Replacement of the Pump House and Well Head will improve the Town’s ability to provide uninterrupted potable water supply to area residents.



Town of Owego

Owego Main Street Water Pump House.

Cost-Benefit Analysis. Improvements to public infrastructure would increase community resilience in the face of future storms and flooding, thereby ensuring protection of the Town of Owego’s assets and the safety of its citizens. Based on available information and preliminary plans, replacing the pump house and well head would provide a critical component to the Town of Owego’s ability to pump raw water to a treatment facility, thus creating safe, clean drinking water for its citizens. Using the methodology from U.S. DOC ESA report,⁴¹ the \$1.0 million project would create an estimated 7 construction jobs. The potential benefits of this project are considered to outweigh the \$1.0 million investment required to plan, design, and construct the water pump house and well head.

Risk Reduction Analysis. This project protects the health and safety of residents by improving water quality. The pump house and well head will be located so that the flood risk is minimal.

Timeframe for Implementation. 7 months.

Regulatory Requirements. Completion of the project may require regulatory and permitting approvals from Federal, State, and local agencies including, but not limited to review and approval of final construction documents by the NYS Department of Health.

Jurisdiction. Town of Owego.



Location Map of Main Street Water Pump House and Well Head Replacement.

Gaylord Road Culvert Replacement Town of Owego

Project Type. Proposed.

Project Description. This project will replace the existing Gaylord Road culvert that was destroyed by rising floodwaters during Tropical Storm Lee with 35 feet of 20 x 12 precast concrete box culvert with reinforced concrete headwalls and wing walls. Construction will also include excavation, 1,200 cubic yards of select granular fill, 45 tons of asphalt pavement, 45 feet of bridge rails and assemblies, and topsoil and seed. FEMA assistance was sought for the replacement, but has not yet been received. This is a critical culvert in the Town and should be replaced as soon as feasible.

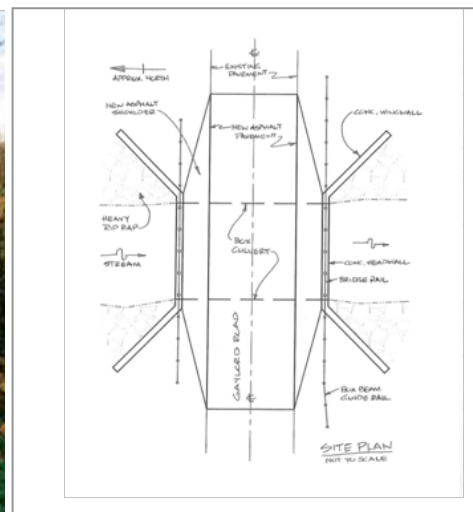


Vicinity Map of Gaylord Road Culvert Replacement.

Project Cost. The Town’s engineer provided a cost estimate of approximately \$347,000 to develop all phases and components of this project.



South elevation downstream of culvert.



Gaylord Road culvert replacement site plan.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** The replacement of the culvert will provide potential flood reduction for buildings located downstream of Gaylord Road.

Cost-Benefit Analysis. Providing high-risk flood areas with sustainable infrastructure supports community resilience to future storms and flooding. Based on available information and preliminary plans, replacing the culvert that was destroyed by flooding would provide additional flood mitigation protection for approximately 10 homes and structures downstream. The residents and property owners along Gaylord Road will benefit from having a sustainable culvert to channel flood waters from disrupting traffic utilizing the road.

The potential benefits of this project are considered to outweigh the \$347,000 investment required to plan, design, and construct the culvert.

Risk Reduction Analysis. This project protects the health and safety of residents by reducing flood risks to vehicles using Gaylord Road and the adjacent homes and structures downstream. Failure to execute the project would keep the neighborhood at a greater risk for repeated flooding.

Timeframe for Implementation. 3 months.

Regulatory Requirements. Completion of the project may require regulatory and permitting approvals from Federal, State, and local agencies including, but not limited to stormwater State Pollutant Discharge Elimination System (SPDES) and U.S. Army Corps of Engineers (USACE) permits, and approval of sewer extension plans by the NYS Department of Environmental Conservation (DEC) Division of Water (DOW).

Jurisdiction. Town of Owego.



Location Map of Gaylord Road Culvert Replacement.

Water and Sewer Extensions Along Route 434 Town of Owego

Project Type. Featured.

Project Description. This project is designed to encourage economic development outside of the floodplain by extending water and sewer along Route 434 in the Town of Owego. This investment in public infrastructure will produce both economic growth and greater resiliency in the event of future storm events. Water will be extended from Depot Street to the west end of Marshland Road and 1/2 mile up Hilton Road. Project components would include surveying, maintenance and protection of traffic, 21,400 feet of trench excavation, 400 feet of 6-inch PVC water main, 21,000 feet of PVC water main, 38 hydrants, 3,300 feet of asphalt replacement, lawn restoration, and installation of a storage tank.



Vicinity Map of Water and Sewer Extensions along Route 434.

Sanitary sewer lines would be extended from Hilton Road to the west end of Marshland Road. Project components would include surveying, maintenance and protection of traffic, 19,200 feet of trenching, 10,000 feet of 8-inch PVC gravity sewer pipe, 7,000 linear feet of 4-inch PVC force main, 2,200 linear feet of 4-inch PVC lateral, 25 manholes, asphalt pavement replacement, lawn restoration, and installation of a sewage pump station.

Project Cost. According to an estimate provided by the Town's engineer, the cost to develop all phases and components is approximately \$4.89 million.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** The project would reduce risk by encouraging new development outside of the floodplain.
- **Health and Social Benefits.** With the addition of water and sewer, property along Route 434 would provide potential sites for relocation of critical facilities outside of the floodplain, which would ensure their ability to continuously operate during severe weather events.

Cost-Benefit Analysis. Maximizing the resilience of public infrastructure benefits the system capacity and functionality during future storms, ensuring the protection of the Town of Owego's assets and the safety of its residents. Based on available information and preliminary plans, encouraging future development in areas outside of the floodplain would provide an economic benefit as well as ensure that future home and business owners' assets remain protected during flood events. The water and sewer extensions along approximately 3 miles of road would provide current and future residents and business owners a strengthened water and sewer system which would potentially influence decisions for development in the area. Using the methodology from the U.S. DOC ESA report,⁴² the \$4.89 million project would create an estimated 35 construction jobs. Assuming the development along Route 434 occurs, then potential benefits of this project would outweigh the \$4.89 million investment required to plan, design, and construct the water and sewer system extension.

Risk Reduction Analysis. This project does not reduce any risks. However, new homes and businesses constructed outside the floodplain and served by this water and sewer extension would experience a lesser risk of flooding than if they were constructed in the floodplain.

Timeframe for Implementation. 19 months.

Regulatory Requirements. Completion of the project may require regulatory and permitting approvals from Federal, State, and local agencies including, but not limited to an Environmental Impact Assessment under the NYS Environmental Quality Review Act (SEQRA), consultation with the New York’s State Historic Preservation Office (SHPO), a stormwater State Pollutant Discharge Elimination System (SPDES) permit, and approval of sewer extension plans by the NYS Department of Environmental Conservation (DEC) Division of Water (DOW).

Jurisdiction. Town of Owego.



Location Map of Water and Sewer Extensions along Route 434.

DPW and Codes Office Relocation Village of Owego

Project Type. Proposed.

Project Description. During Hurricane Irene and Tropical Storm Lee, the Village of Owego’s Department of Public Works (DPW) facility, which is located in the floodplain at 20 Elm Street, suffered extensive damage due to flooding. The facility, which houses the Village’s DPW equipment, along with offices for DPW staff and code enforcement, was difficult to access in the days immediately following the storm. This resulted in limited municipal services delivery during and immediately following the storms.



Vicinity Map of Village of Owego DPW and Codes Office Relocation.

This project will create a new shared services campus located outside of the 100-year floodplain at the Town Hall Campus located at 2354 NY State Route 434, in the Town of Owego. A new 12,000 SF facility will be constructed that will house the Village’s highway equipment, DPW and Codes office in one building. The facility will be on the shared services campus with the Town’s new DPW building, a similar structure designed to house the Town highway equipment.

Unlike the Town of Owego, which has completed basic plans for the new Town DPW building, the Village will need to prepare both preliminary and final design and construction documents. These designs will be prepared in consultation with the Town of Owego, and the Village’s DPW and Parks offices.

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

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** The project reduces the flood risk to the Village of Owego’s municipal operations by constructing new facilities outside the floodplain. The risk scores for the Highway Department and DPW would be reduced from 27 to 9 for the 100-year flood.
- **Economic Benefits.** The relocation of these critical facilities outside of the floodplain will provide the Village with cost savings by avoiding flood damage during future storms.

Cost-Benefit Analysis. During two recent severe storms, the Village’s DPW facility suffered extensive flood damage, resulting in limited municipal services delivery. In order to avoid future property damage and lost time due to flooding, the facility needs to be relocated outside the floodplain. Using the methodology from the U.S. DOC ESA report,⁴³ the \$2.5 million project would generate an estimated 18 construction jobs. The potential benefits of this project are considered to outweigh the \$2.5 million investment required to plan, design, and implement the road construction project.

Risk Reduction Analysis. This project directly reduces the risk of future flooding for the Village of Owego DPW by constructing new facilities outside the established floodplain. Failure to execute the project would put the facilities at continued risk for repeated flooding.

Timeframe for Implementation. 19 months.

Regulatory Requirements. Completion of the project may require regulatory and permitting approvals from Federal, State, and local agencies including, but not limited to stormwater compliance (SWPPP), a NYS Department of Transportation (DOT) highway work permit, NYS Department of Health for septic, and local construction and building permits.

Jurisdiction. Village of Owego.



Location Map of DPW and Codes Office Relation.

Stormwater Management Plan and Improvements Village of Owego

Project Type. Proposed.

Project Description. As a result of flooding associated with Hurricane Irene and Tropical Storm Lee, approximately 85% of the buildings in the Village of Owego were under water. To improve resiliency and reduce future flood damage, this project develops a comprehensive Stormwater Management Plan and constructs stormwater improvements using a combination of traditional and green infrastructure techniques to reduce vulnerability in the Village of Owego.

The Plan begins with mapping the existing stormwater system, which will be used to analyze and model how the existing stormwater system is performing during different storm events. The model will highlight the areas of concern; subsequently, a series of alternatives can be developed to help resolve some of these issues. The stormwater management plan should also look at the Village system as a whole, and determine if there are ways to reduce impervious cover, slow the rate of runoff, and promote infiltration using low-impact development design techniques such as porous pavement, bioswales, and rain gardens. The project provides for implementation of several priority protection projects in the traditional form as well as green infrastructure techniques.

Project Cost. The estimated cost to develop all phases and components is approximately \$500,000.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** The project will result in flood reduction benefits once the plan's recommended improvements have been funded and constructed.
- **Environmental Benefits.** The project will result in runoff reduction benefits once the plan's recommended improvements have been funded and constructed.

Cost-Benefit Analysis. Improvements to public infrastructure increase community resilience in the face of future storms and flooding, thereby ensuring protection of the Village of Owego's assets and the safety of its citizens. Based on available information and preliminary plans, conducting a comprehensive inspection of the Village's stormwater system and performing priority improvement projects would benefit the community by reducing the likelihood of flood damage to roads, stormwater infrastructure, and adjacent property. Reduced levels of damage would provide economic benefits due to cost avoidance or lower repair costs. Incorporating green infrastructure techniques would produce positive environmental benefits such as reduced erosion, lower runoff rates, and higher quality stormwater discharge. The potential benefits



Flooded Main Street in Owego.

of this project are considered to outweigh the \$500,000 investment to execute the stormwater management plan and improvements.

Risk Reduction Analysis. This project has the potential to reduce the extent and severity of localized flash flooding within the Village of Owego. The identification and execution of priority improvement projects would reduce the risk to the stormwater drainage system and adjacent property due to erosion and flooding.

Timeframe for Implementation. 25 months.

Regulatory Requirements. Completion of the project may require regulatory and permitting approvals from Federal, State, and local agencies including, but not limited to, coordination with NYS Department of Environmental Conservation (DEC) for effects to existing flood control projects, a DEC Environmental Conservation Law (ECL) Article 16 (use of flood control lands) permit, and local construction and building permits.

Jurisdiction. Village of Owego.

Regional Business Incubator Node Village of Owego

Project Type. Proposed.

Project Description. It is estimated that rising waters from the Susquehanna River and Huntington and Owego Creeks flooded approximately 85% of the Village of Owego. The community’s historic commercial district (commonly known as the Historic Owego Marketplace) is located along the banks of the Susquehanna, and was one of the areas hardest hit by the flood waters associated with Tropical Storm Lee.

Funds will establish a regional incubator node in the Village of Owego. Specifically, the funding will be used for administration and technician expenses, space rehabilitation and marketing costs. The incubator will connect to the Southern Tier Innovation Hot Spot, a strategic priority of the Southern Tier Regional Economic Development Council. The Hot Spot is designed to foster innovation by offering start-ups valuable business support services to help commercialize academic research and promote further collaboration between business and academia⁴⁴. By partnering with nearby Binghamton University, Cornell University, and Corning Inc. to establish the regional business incubator node, high tech jobs will be created by connecting small, innovative businesses to universities and private sector resources. The incubator will promote economic growth by supporting entrepreneurship and development of companies into successful business ventures, allowing entrepreneurs and small business owners to thrive in the post-storm economy.

Economic recovery after Hurricane Irene and Tropical Storm Lee has been slow in the Village of Owego. Many of the commercial businesses and restaurants located in the Historic Owego Marketplace (the downtown area) have reopened, but discussions with local business owners indicate that they are still struggling to recover after months of cleaning up their storefronts and lost sales. To increase the Village’s tax base, the Planning Committee recommended that the municipalities in the Tioga Community create a diversified economy supported by tourism, light industry and small businesses. This will also help retain a younger workforce and increase population and wealth in the community.

Project Cost. It is estimated that \$280,000 will be used for two administrator and two technician salaries for two years, \$55,000 for space rehabilitation, and \$15,000 for marketing. The estimated cost to develop all phases and components is approximately \$350,000.

Project Benefits. Benefits of the project include:

- **Economic Benefits.** Establishment of a regional incubator node in the Village of Owego will create four full time positions, as well as create high paying job opportunities for residents, increase small business activity, and increase the flow of capital from large public and private sector entities into the Village.

Cost-Benefit Analysis. Establishment of a regional incubator node in the Village of Owego will create high-paying job opportunities for residents, increase small business activity, and increase the flow of capital from large public and private sector entities into the Village. Overall, the project could lead to an increase in population and wealth in the community. The potential benefits are considered to outweigh the investment of \$350,000 over a 24 month period.

Risk Reduction Analysis. The risk of not implementing this project is that local businesses and restaurants in the Historic Owego Marketplace could close due to lost revenue. This project reduces that risk by invigorating local tourism, light industry, and small business in the Village of Owego.

Timeframe for Implementation. 24 months.

Regulatory Requirements. Completion of the project may require regulatory and permitting approvals from Federal, State, and local agencies including, but not limited to local construction and building permits.

Jurisdiction. Village of Owego.

Emergency Preparedness and Notification Plan Village of Owego

Project Type. Proposed.

Project Description. During public outreach meetings, Village residents stated that when Tropical Storm Lee hit they didn't have advance warning, were unaware of where to go in an emergency, and some reported that they didn't know what to do with their pets during an evacuation.

This project is designed to incorporate multiple components that address a wide variety of emergency preparedness needs. Project components include: increasing voluntary enrollment in the Tioga County Hyper-reach and NYS Alerts programs, establishing a Block Emergency Preparedness Program, creating a flood safety awareness brochure, conducting emergency testing/flood drills, developing a comprehensive information system to raise awareness of flood hazards, and creating a pet evacuation plan. All components are designed to work in unison to comprehensively prepare the Village for disaster during future storm events.

Project Cost. The estimated cost to develop all phases and components is approximately \$125,000.

Project Benefits. Benefits of the project include:

- **Economic Benefits.** Reduction in loss of property and inventory for local business owners due to increased awareness of severe weather events. Potential increased business activity if local businesses are used in producing the component elements.
- **Health and Social Benefits.** The Emergency Preparedness and Notification Plan is designed to provide a reduction in loss of life or injury to residents due to increased awareness of severe weather events.

Cost-Benefit Analysis. This project develops an Emergency Preparedness and Notification Plan at a cost of \$125,000 over 13 months. The economic benefits of the project include a potential reduction in property damage and personal injury for the Village's residents and business owners. Having this plan in place will allow the Village to respond quicker to impending natural disasters, whether it be protecting personal property or evacuation. The potential benefits of this project are considered to outweigh the \$125,000 investment required to develop and implement the plan.

Risk Reduction Analysis. This project develops a plan and brochure and performs emergency drills, none of which directly reduce risk. However, if properly implemented, Village residents will be more prepared for a disaster situation and would know when and where to go during an evacuation. Therefore, the project indirectly reduces risk of personal injury and property damage for the residents of the Village of Owego.

Timeframe for Implementation. 13 months.

Regulatory Requirements. Completion of the project may require regulatory and permitting approvals from Federal, State, and local agencies including coordination with the NYS Office of Emergency Management and Tioga County Emergency Management Office (TCEMO).

Jurisdiction. Village of Owego.

Resiliency Tools Update Village of Owego

Project Type. Proposed.

Project Description. The Village of Owego will update their zoning ordinance to remove inconsistencies and outdated definitions, update the site plan review article to provide additional review requirements relating to flood prevention, and update the special permit review article to ensure compliance with the Flood Damage Prevention Local Law (FDPLL). The zoning ordinance has not been updated in well over a decade resulting in an antiquated document that is not proactive in its consideration of resiliency.



Example of flood damage to a home in the Owego Flats neighborhood.

The Village will also participate in the National Flood Insurance Program’s Community Rating Service (CRS) and seek discounts on flood insurance rates.

Project Cost. The estimated cost to develop all phases and components is approximately \$225,000.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** Revisions to land use policies, zoning codes, and site plan review will reduce the threat of future flood damage to properties.
- **Economic Benefits.** Revisions to the zoning code could enhance economic activity in the Village through establishment of mixed-use districts.
- **Environmental Benefits.** Adoption of a zoning code with a site plan review article will promote sustainable development and minimize negative environmental effects on adjacent properties and land uses.
- **Health and Social Benefits.** Adoption of a zoning code with a site plan review article will contribute to general welfare of the community in areas such as accessibility and buffering of incompatible land uses.

Cost-Benefit Analysis. Upgrading local codes and zoning ordinances to ensure they support flood-safe future development will protect the Village of Owego’s assets and the safety of its citizens. Updating the zoning code to include site plan review and strengthening the Flood Damage Prevention Local Law will give the Village an improved set of land use tools to guide the location and form of new development in ways that are sustainable. Land use controls are established means of promoting the public welfare through quality and flood-safe development. Furthermore, participation in the NFIP CRS will potentially reduce flood insurance rates for Village residents. The potential benefits of this project are considered to outweigh the \$225,000 investment required to procure professional planning assistance for the revision of the Village’s zoning code and FDPLL.

Risk Reduction Analysis. This project would update the Town’s land use controls with the objective of ensuring they support sustainable, flood-safe development. To the extent this development is realized, the Town will avoid potential future damage to homes and businesses caused by flooding.

Timeframe for Implementation. 13 months.

Regulatory Requirements. Completion of the project may require regulatory and permitting approvals from Federal, State, and local agencies including, but not limited to, an Environmental Impact Assessment under the NYS Environmental Quality Review Act (SEQRA), consultation with FEMA and NYS Department of Environmental Conservation (DEC) floodplain management staff, local approval of zoning changes, and a Tioga County 239-m review.

Jurisdiction. Village of Owego.

Halsey Valley Road Elevation Town of Tioga

Project Type. Proposed.

Project Description. Extreme rains associated with Tropical Storm Lee forced the waters of the Susquehanna River and Pipe Creek to overrun their banks, forcing the closure of many roads in the Town of Tioga. One of the critical connectors that flooded during and immediately following the storm was Halsey Valley Road. This road closure cut off Tioga residents from access to medical assistance, groceries, and emergency services and supplies.



Vicinity Map of Halsey Valley Road Elevation.

This project would raise a quarter-mile stretch of the southern portion of Halsey Valley Road to match the elevation of the perpendicular crossing road, NY State Route 17C. This would reduce future flooding along Halsey Valley Road and ensure that emergency vehicles can access homes located along Halsey Valley Road and nearby medical hospitals during future storms. When constructed, the road will meet all required specifications and safety standards.



Elan 3 Consulting



Elan 3 Consulting

Flood damaged homes located along Halsey Valley Road.

Project Cost. The estimated cost to develop all phases and components is approximately \$1.9 million.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** The project is designed to reduce the flooding of Halsey Valley Road, a critical connector that provides emergency access to local medical hospitals.
- **Health and Social Benefits.** Implementation of the Halsey Valley Road project will increase emergency access and evacuation routes during future storm events.

Cost-Benefit Analysis. This project raises 1,500 feet of Halsey Valley Road to match the grade at the intersection of NY State Route 17C. During past storms, flooding from the Susquehanna River and Pipe

Creek forced the closure of the south end of Halsey Valley Road, blocking access to Route 17C. Raising this portion of the roadway will preserve one of the county’s critical connector roads during storm events. Using the methodology from the U.S. DOC ESA report,⁴⁵ the \$1.9 million project would generate an estimated 11 construction jobs. The potential benefits of this project are considered to outweigh the \$1.5 million investment required to plan, design, and implement the road construction project.

Risk Reduction Analysis. Implementing this project directly reduces the risk of town residents being separated from food, shelter, and medical facilities during a severe storm.

Timeframe for Implementation. 24 months.



David Pipher

Flooding on Halsey Valley Road.

Regulatory Requirements. Completion of the project may require regulatory and permitting approvals from Federal, State, and local agencies including, but not limited to consultation with New York’s State Historic Preservation Office (SHPO), a Stormwater State Pollutant Discharge Elimination System (SPDES) permit, a NYS Department of Transportation (DOT) highway work permit, and local construction and building permits.

Jurisdiction. Town of Tioga.



Location Map of Halsey Valley Road Elevation.

Salt Storage Facility and Cover

Jurisdiction. Town of Tioga.

Project Type. Proposed.

Project Description. The rapidly rising floodwaters associated with Hurricane Irene and Tropical Storm Lee washed away the Town's unprotected salt supply, causing potential environmental contamination to nearby groundwater and agricultural lands.

This project would purchase and install a salt storage facility and cover to reduce the likelihood of similar events in the future. The new facility will be installed on Town-owned property. The salt shed will be located at the corner of Halsey Valley and Dry Brook Road.

Project Cost. The estimated cost to develop all phases and components is approximately \$460,000.

Project Benefits. Benefits of the project include:

- **Economic Benefits.** Installation of a salt shed and cover will protect municipal resources in the event of a future storm, thereby providing a cost savings to the Town.
- **Environmental Benefits.** Reduce contamination of downstream waterways by storing salt in a more protective structure.
- **Health and Social Benefits.** Construction of the salt shed will protect salt supplies during severe winter storm events.

Cost-Benefit Analysis. This project constructs a road salt storage facility and cover in the location of the existing town salt stockpile at a cost of \$460,000. During Hurricane Irene and Tropical Storm Lee, the town's salt stockpile was washed away, resulting in both a direct financial loss as well as potential future expenses related to environmental cleanup and/or damage mitigation. Because the project protects the salt pile from damage due to severe weather, its benefits outweigh the required investment.

Risk Reduction Analysis. This project directly reduces the risk of the town's salt supply washed away by floodwaters again.



Vicinity Map of Salt Storage Facility and Cover.

Timeframe for Implementation. 6 months.

Regulatory Requirements. Completion of the project may require regulatory and permitting approvals from Federal, State, and local agencies.

Jurisdiction. Town of Tioga.



Location Map of Salt Storage Facility and Cover.



Typical salt storage facility and cover.

Elan 3 Consulting

Alternative Energy Study

Jurisdiction. Town of Tioga.

Project Type. Proposed.

Project Description. As a result of the flooding associated with Tropical Storm Lee, businesses, especially agricultural operations, in the Town of Tioga were negatively impacted. The extreme rains forced the waters of Pipe Creek to overflow its banks, eroding, and ultimately destroying, productive agricultural lands. During the public outreach process, local farmers and business owners stated that they are still trying to recover financially from the losses associated with this storm.

The goal of this project is to explore the use of a micro-grid, or other alternative energy sources, to help reduce the cost of long-term operations for homes, businesses (including agriculture), and public facilities. It is anticipated that implementation of these alternative energy systems will yield cost saving for local business owners and the local government, spurring economic growth in the Town of Tioga in a post storm economy.



Elan.3.Consulting

Project Cost. The estimated cost to develop all phases and components is approximately \$75,000. *Alternative energy sources can aid agricultural operations.*

Project Benefits. Benefits of the project include:

- **Economic Benefits.** The primary economic benefit would be the potential economic gains by homeowners, businesses, and public facilities that use low-cost energy alternatives.
- **Environmental Benefits.** The use of alternative energy sources in the Town could provide potential reductions in air and water pollution.
- **Health and Social Benefits.** A microgrid would provide an alternate means of electrical power in the event the electrical power grid goes down during a storm. Having a reliable secondary supply of power would facilitate evacuations and protection of property.

Cost-Benefit Analysis. This project conducts a detailed alternative energy study for the Town of Tioga at a cost of \$75,000. There are no guaranteed benefits, but potential benefits would include identifying potential sources or methods of low-cost energy alternatives or power generation. Additionally, the alternative energy sources identified by the study could provide power redundancy during severe storms, allowing businesses to stay open longer, residents to have heat, and power-driven sump pumps and pump stations to remain online.

Risk Reduction Analysis. This project does not specifically reduce any risks, but could identify future projects which could potentially reduce risks of energy loss due to severe storms.

Timeframe for Implementation. 12 months.

Regulatory Requirements. None.

Jurisdiction. Town of Tioga.

Sewer Expansion

Jurisdiction. Town of Tioga.

Project Type. Proposed.

Project Description. The majority of the septic systems in the Town of Tioga consist of a tank and dry well. During Hurricane Irene and Tropical Storm Lee, the flooding associated with these storms led to the failure of most of the septic systems located in the floodplain. This led to the discharge of untreated wastewater into the Town’s groundwater and surface waters, and potential environmental contamination.



Vicinity Map of Sewer Expansion.

This project proposes that the Town of Tioga partner with the Tioga Central School District to use the existing wastewater treatment plant at the school and create a shared municipal sewer system to reduce potential environmental contamination during future storm events. The project includes the engineering, design, and construction of new laterals.

Project Cost. The estimated cost to develop all phases and components is approximately \$2.0 million.

Project Benefits. Benefits of the project include:

- **Risk Reduction Benefits.** Ancillary benefit of reduced contamination to homes and businesses.
- **Economic Benefits.** The extension of public sewer to homes located in hamlet of Tioga Center could increase in resale value.
- **Environmental Benefits.** The environmental benefits would include reduced contamination of runoff to water bodies and other sensitive natural areas.
- **Health and Social Benefits.** The extension of public sewer will improve utility infrastructure to support homes and businesses.



Tioga Central School District

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Cost-Benefit Analysis. Improvements to public infrastructure increase community resilience in the face of future storms and flooding, thereby ensuring protection of the Town of Tioga’s assets and the safety of its citizens. Based on available information and preliminary plans, the existing sanitary sewer treatment plant at Tioga Central School could be expanded to serve the surrounding community of more than 60 homes and businesses. The project would improve public health and safety by eliminating the potential for disease-

causing raw sewage to back up into the numerous homes and businesses served by individual septic systems. The project would also benefit local and regional water quality since the likelihood of untreated effluent discharges would be minimized. Furthermore, land value in the Town of Tioga could be expected to increase with the addition of a reliable sewer treatment system. Using the methodology from the U.S. DOC ESA report,⁴⁶ the \$2.0 million project would generate an estimated 14 construction jobs. The potential benefits of this project are considered to outweigh the \$2.0 million investment required to implement the expanded sewer collection system.

Risk Reduction Analysis. This project would reduce the risk of sanitary sewer overflow during severe storms. Risk to public health, both locally and in downstream communities, would be reduced by ensuring sanitary sewage is properly contained and treated.

Timeframe for Implementation. 17 months.

Regulatory Requirements. Completion of the project may require regulatory and permitting approvals from Federal, State, and local agencies, including coordination with the Tioga County Department of Public Works (DPW), the Tioga Central School Board, NYS Department of Environmental Conservation (DEC) Division of Water (DOW) approval for sewer extensions, a Stormwater State Pollutant Discharge Elimination System (SPDES) permit, a NYS Department of Transportation (DOT) highway work permit, a permit for stormwater discharges from construction activity, and local construction and building permits.

Jurisdiction. Town of Tioga.



Location Map of Tioga Center, the hamlet that will benefit from the sewer expansion project.

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Section V: Additional Materials

This section includes additional resiliency recommendations, a master table of projects, a summary of NYRCR Tioga’s public engagement process, the community asset inventory, and other reference materials.

A. Additional Resiliency Recommendations

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

B. Master Table of Projects

Table 5.2 presents a comprehensive list of Tioga’s proposed and featured projects, and additional resiliency recommendations.

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Table 5.1 Additional Resiliency Recommendations

| Project Name | Short Description | Estimated Cost | Regional | Strategy |
|--|---|----------------|----------|----------|
| Gap Analysis and Consolidated Emergency Plan, Town of Tioga. | Prepare a Consolidated Emergency Plan for the Town of Tioga. This consolidated plan will identify existing gaps between Tioga County's Hazard Mitigation Plan and the Town of Tioga's Emergency Response Plan (ERP). | \$50,000 | No | 3 |
| Revitalization Plan, Village of Nichols. | The Town and Village of Nichols will partner with Tioga Downs to enhance tourism and economic development in Nichols. Project components include: streetscape enhancements, beautification enhancements to the two existing boat launches, and development of a 5-mile multi-purpose trail that would run along the shore of the Susquehanna River connecting Tioga Downs to the community, the two DEC boat launches, and the restaurants and retail establishments located in the Town Center. The project also proposes undertaking a Community Marketing and Branding Project, the design and construction of gateway and wayfinding signage, and partnering with Tioga County IDA and EDP to seek to attract light industrial/commercial to NY 17/I-86 Exit 63 Exchange. | \$3,000,000 | No | 7 |
| Regional Emergency Services Plan, Tioga County. | Residents stated that after the 2011 floods, many of their neighbors found themselves without access to electricity, pharmaceuticals, and critical medical supplies and equipment (oxygen, dialysis). An emergency services plan should be developed to ensure safe evacuations and access to medical supplies and pharmaceuticals for vulnerable and underserved populations. | \$50,000 | Yes | 8 |
| Fire Department Water Supply, Town of Tioga. | Identify an adequate and reliable water supply s in the Town of Tioga. Conduct an engineering study to identify a permanent and reliable water supply source for the Town of Tioga Fire Department. | \$50,000 | No | 10 |

Table 5.2 Master Table of Projects

| Project Name | Short Description | Project Category | Estimated Cost | Regional | Strategy |
|---|---|------------------|----------------|----------|----------|
| Regional Susquehanna River Initiative, Tioga County. | Partner with Broome County and the Village of Sidney to conduct a regional river study and identify improvements. | Proposed | \$3,000,000 | Yes | 3, 11 |
| Regional Soil and Water Conservation District Projects, Tioga County. | Undertake regional Soil and Water Conservation District related projects to increase staff capacity and identify and implement natural systems that will provide greater protection to assets during future flood events. | Proposed | \$935,000 | Yes | 3, 5, 11 |
| Regional Flood Recovery and Revitalization Office, NYRCR Tioga Community. | Provide rural communities with the staff capacity to secure grant funding and implement NYRCR Tioga Community Plan. | Proposed | \$150,000 | Yes | 3, 5 |
| Emergency Weather Alert and Warning System, Town and Village of Nichols and Village of Owego. | Purchase and install siren/alarm systems for the Town and Village of Nichols, as well as the Village of Owego, and develop and distribute an information packet designed to educate residents about the warnings and how to respond in the event of an emergency to ensure all residents, including vulnerable populations, are safely evacuated from their homes during future storm events. | Proposed | \$150,000 | Yes | 3, 4, 8 |
| Joint Fire Station, Town and Village of Nichols. | Town and Village of Nichols will collaborate to construct a new flood resilient Joint Fire Station facility located outside of the floodplain. | Proposed | \$1,500,000 | No | 2, 10 |
| Healthy Main Street Economy / Sewer Expansion, Town and Village of Nichols. | Serve businesses located downtown need with municipal sewer in the Village of Nichols | Featured | \$10,400,000 | No | 7 |
| Highway Garage Relocation, Town of Nichols. | Construct a new facility to house the Town's highway equipment and DPW offices located out of the floodplain. | Proposed | \$2,500,000 | No | 2, 10 |
| Resiliency Tools Update, Town of Nichols. | Update resiliency tools, including an update to Comprehensive Plan and Zoning, adopt Site Plan Review, and customize Flood Damage Prevention Local Law. | Proposed | \$75,000 | No | 1, 9 |
| Bridge and Culvert Inspection and Upgrades, Town of Nichols. | Conduct a comprehensive bridge/culvert inspection and appraisal, and make necessary upgrades to reduce vulnerability in the Town of Nichols. | Proposed | \$258,000 | No | 10 |
| Revitalization Plan, Town of Nichols. | Develop and implement a revitalization plan to enhance tourism and economic development in Nichols including: streetscape enhancements, wayfinding and gateway signage, beautification enhancements to the two existing DEC boat launches, and development of a 5-mile multi-purpose shoreline trail connecting Tioga Downs to the commercial district and recreation areas. | Featured | \$3,000,000 | No | 6, 7 |
| Levee Accreditation, Village of Nichols. | Secure levee accreditation, which will protect investments in new and rebuilt homes and buildings, as well as help homeowners and owners of rental properties to avoid high flood insurance costs. | Proposed | \$700,000 | No | 9, 10 |
| Solar-Powered Electronic Message Board, Village of Nichols. | Purchase and install a mounted, solar-powered electronic message board to ensure all Nichols residents, including vulnerable populations, are notified/updated of evacuation procedures during future storm events | Proposed | \$25,000 | No | 4 |
| Emergency Operations Center Generator, Village of Nichols. | Purchase and install a generator for the Nichols Emergency Operations Center. | Proposed | \$70,000 | No | 10 |
| Recreation Improvements and Creek Stabilization, Village of Nichols. | Implement the recreation and creek stabilization improvements recommended in the LTCRS to increase resiliency and positively contribute to the character of the community, particularly recreation areas. | Proposed | \$1,000,000 | No | 6, 11 |

| Table 5.2 Master Table of Projects | | | | | | |
|--|---|------------------|----------------|----------|-----------|--|
| Project Name | Short Description | Project Category | Estimated Cost | Regional | Strategy | |
| Commercial District Enhancements, Village of Nichols. | Upgrade streets, sidewalks and lighting along the Village's commercial district to encourage tourism and economic growth during the post storm economy. | Proposed | \$1,000,000 | No | 6, 7 | |
| Revitalization Plan, Village of Nichols. | The Town and Village of Nichols will partner with Tioga Downs to enhance tourism and economic development in Nichols. Project components include: streetscape enhancements, beautification enhancements to the two existing boat launches, and development of a 5-mile multi-purpose trail that would run along the shore of the Susquehanna River connecting Tioga Downs to the community, the two DEC boat launches, and the restaurants and retail establishments located in the Town Center. The project also proposes undertaking a Community Marketing and Branding Project, the design and construction of gateway and wayfinding signage, and partnering with Tioga County IDA and EDP to seek to attract light industrial/commercial to NY 17/I-86 Exit 63 Exchange. | Additional | \$3,000,000 | No | 7 | |
| DPW, Parks, and Utilities Office Relocation, Town of Owego. | Create a new Owego shared services campus located out of the floodplain to house the Town's Highway Equipment, and Utilities and Parks offices. | Proposed | \$2,300,000 | No | 2, 10 | |
| Main Street Water Pump House and Well Head Replacement, Town of Owego. | Meet an urgent need to replace Main Street Water Pump House & Well Head redevelopment, which was destroyed during Tropical Storm Lee. | Proposed | \$1,000,000 | No | 10 | |
| Gaylord Road Culvert Replacement, Town of Owego. | Gaylord Culvert Replacement and upgrade in the Town of Owego. | Proposed | \$346,875 | No | 10 | |
| Water and Sewer Extensions along Route 434, Town of Owego. | Extend public water and sewer along Route 434 to encourage economic development located outside of the floodplain to promote economic growth and provide greater resiliency in the wake of future flood events | Featured | \$4,887,970 | No | 7, 9 | |
| DPW and Codes Office Relocation, Village of Owego. | Create a new Owego shared services campus located out of the floodplain to house the Village's DPW and Codes Office. | Proposed | \$2,500,000 | No | 2, 10 | |
| Stormwater Management Plan and Improvements, Village of Owego. | Develop a Comprehensive Stormwater Management Plan and construct stormwater improvements in the Village of Owego. | Proposed | \$500,000 | No | 1, 11 | |
| Regional Incubator Node, Village of Owego. | Partner with Binghamton University, Cornell, and Corning Inc. to establish a regional incubator node in the Village of Owego, which will encourage future economic growth and allow entrepreneurs to thrive in the post storm economy. | Proposed | \$350,000 | Yes | 6, 7 | |
| Emergency Preparedness and Notification Plan, Village of Owego. | Implement an Emergency Preparedness and Notification Plan in the Village of Owego to increase voluntary enrollment in the County's Hyper-reach and NYS Alerts programs, establish a Block Emergency Preparedness Program, conduct emergency testing/flood drills, develop a Comprehensive Information System to raise awareness of flood hazards, and create a Pet Evacuation Plan System | Proposed | \$125,000 | No | 4, 8 | |
| Resiliency Tools Update, Village of Owego. | Update the Village's resiliency tools, including site plan review, zoning, and CRS ratings, to lessen the impact of storms on homes, businesses and key assets during future flood events. | Proposed | \$225,000 | No | 1, 9 | |
| Halsey Valley Road Elevation, Town of Tioga. | Raise a 1/4 mile section of the south end of Halsey Valley Road to match the elevation of NYS Route 17c to ensure emergency vehicles access during future storm events. | Proposed | \$1,900,000 | No | 6, 10, 11 | |
| Salt Storage Facility and Cover, Town of Tioga. | Purchase and install a salt storage facility (shed) and cover to protect municipal resources and reduce the potential for environmental contamination during future storm events. | Proposed | \$460,000 | No | 2, 10 | |
| Alternative Energy Study, Town of Tioga. | Explore use of micro-grids to help reduce the cost of long term operations and help residents, businesses and municipal facilities to thrive in the post storm economy. | Proposed | \$75,000 | No | 6, 7 | |
| Sewer Expansion, Town of Tioga. | Design and construct municipal sewer usage with Tioga Center School to encourage economic growth and reduce potential environmental contamination during future storm events | Proposed | \$2,000,000 | No | 7, 9 | |
| Gap Analysis and Consolidated Emergency Plan, Town of Tioga. | Prepare a Consolidated Emergency Plan for the Town of Tioga. This consolidated plan will identify existing gaps between Tioga County's Hazard Mitigation Plan and the Town of Tioga's Emergency Response Plan (ERP). | Additional | \$50,000 | No | 3 | |
| Fire Department Water Supply, Town of Tioga. | Identify an adequate and reliable water supply s in the Town of Tioga. Conduct an engineering study to identify a permanent and reliable water supply source for the Town of Tioga Fire Department. | Additional | \$50,000 | No | 10 | |
| Regional Emergency Services Plan, Tioga County. | Residents stated that after the 2011 floods, many of their neighbors found themselves without access to electricity, pharmaceuticals, and critical medical supplies and equipment (oxygen, dialysis). An emergency services plan should be developed to ensure safe evacuations and access to medical supplies and pharmaceuticals for vulnerable and underserved populations. | Additional | \$50,000 | Yes | 8 | |

C. Public Engagement Process

Overview of the Public Engagement Process

The public engagement process to develop the New York Rising Community Reconstruction (NYRCR) Tioga Plan was multi-faceted. An important goal of this planning process was to develop a regional approach to resiliency. The process was based on bringing the five municipalities of the Tioga Community together to work cooperatively to address hazard mitigation, economic development, and other related issues. At the same time, it was necessary to recognize that the communities also have unique concerns that reflect their varied characters, differing experiences during Hurricane Irene and Tropical Storm Lee, and distinct local organizational structures.

To accomplish these objectives, the NYRCR public engagement process included establishing the NYRCR Tioga Community Planning Committee (Committee), organizing three public engagement meetings (including the Regional Resiliency Summit), and organizing a series of Committee meetings.

Tioga Community Planning Committee

In July of 2013, the Committee was established and was tasked with the responsibility of preparing the Tioga Community NYRCR Plan, which serves as a guide to making flood-related decisions to ensure a more sustainable and resilient future for the Town and Village of Nichols, the Town and Village of Owego, and the Town of Tioga – the Tioga Community.



Planning Committee members at work.

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The Committee includes representatives from each of the five municipalities that compose the Tioga Community plus key social service providers, representatives of county and regional government agencies, business owners, and community residents. The Committee also had a number of non-voting elected officials from each of the representative communities. By design, the Committee brings to the planning process a wide range of views from areas and groups throughout Tioga County.

A list of the Tioga Community Planning Committee members is provided on the inside front cover of this plan.

Planning Committee Meetings

The NYRCR Planning Committee conducted eight formal meetings. During these meetings, the members of the Committee developed a vision statement, identified strategies to support the vision, identified and shared potential project ideas being considered in each municipality, and considered ways in which inter-municipal cooperation and coordination could improve regional resiliency. Committee members openly discussed potential projects with their respective Boards and community residents and served as a conduit for input from the public.

All meetings were open to the public, and advertised on the NYRCR website, local community websites, and via word of mouth. Several community residents, business owners and local elected officials attended Committee meetings and provided valuable input regarding project selection.

In addition to the formal meetings, members of the Committee met as smaller sub-committees to identify community assets, discuss potential projects and funding sources by community, and collaborate on a regional river initiative. Several Committee members organized a site visit to Corning, NY to learn more about their automated rain and stream gauge system. Those in attendance were given a tour of Corning’s system as the Town and Village of Nichols and the Village of Owego are interested in installing a similar flood warning system in their communities.

The Committee has agreed to continue to meet on a regular basis, after the NYRCR Tioga Plan is submitted, to oversee project implementation and identify ways to increase regional resiliency.

Regional Initiative Meetings

As part of the planning process, the Committee recognized the need to think broadly about flood mitigation and prevention techniques. They understood early that what happens in one community can adversely affect another. Toward this end, the Tioga Community had a number of meetings with other NYRCR communities in the Upper Susquehanna River Watershed including Broome Community and the Village of Sidney. Each County’s Soil and Water Conservation District and County Planning Office and the Upper Susquehanna Coalition also participated in the meetings. The result from the meetings was the development of the Regional River Initiative project aimed at reducing impacts from future flood events through natural mitigation techniques and public education.



Committee members evaluate proposed and featured projects.

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Public Engagement Events

Citizen participation provided an opportunity to collect the public's knowledge of the community and understand the public's hopes, concerns and vision as they relate to storm recovery. The Consultant Team, NYRCR Program staff, and the Committee organized a series of public engagement events for residents and other stakeholders to attend. The first event was held on September 24, 2013 in the auditorium of Tioga Center School Middle School, from 7:00 pm to 9:00 pm. It was advertised to the community by means of flyers, media release, and a digital e-vite. At the event, the Committee worked with staff from the NYS DOS and the planning team to:

- Inform the public about the NY Rising Community Reconstruction program, the Tioga Community NYRCR Plan, and schedule;
- Solicit their input concerning problems they faced during past flood events and the assets they think are most important to protect;
- Discuss with them the vision driving the development of the NYRCR Plan; and
- Brainstorm potential strategies or specific projects for enhancing regional resiliency.



Committee members at the Regional Resiliency Summit.

The event resulted in the Consultant Team obtaining extensive input that was used to draft the conceptual NYRCR Tioga Plan and established direction for the rest of the NYRCR planning process.

On November 18, 2013, the Tioga Community partnered with communities from Broome County and the Village of Sidney in Delaware County to host the NY Rising Southern Tier Regional Resiliency Summit. The Planning Committees, in partnership with the Department of State and Consultant Team, conducted an extensive public outreach campaign for the event. The campaign included media blasts to local and regional print and electronic media, digital invitations, interviews of Committee members on local radio stations, distribution of flyers, and notices posted to local government and non-profit websites.

The day-long Summit, held at the Binghamton University Innovative Technologies Complex, attracted over 150 participants. Experts from government, academia, and the private sector discussed the viability of various approaches to flood control, helping to shape future efforts to devise realistic and effective NYRCR plans in the region.

Topics of discussion included:

- What's Coming: Changing Weather Patterns and Regional Floodplain Management;
- What Can Be Done: Local and Regional Mitigation Techniques;
- Learning From Each Other – Communities Taking Action;



The Regional Resiliency Summit was well attended.

- An Overview of State Programs; and
- Presentation of NYRCR Conceptual Plans for Tioga, Broome and Sidney.

After the presentations, summit participants were invited to attend an interactive Open House with presenters, panelists, and State agencies. Each of the communities in Broome and Tioga counties and the Village of Sidney sponsored a table to share the Conceptual Plan, priority projects, and other information on the NYRCR program. Open house display booths included:

- County Soil & Water Conservation Districts- Upper Susquehanna Coalition;
- Delaware County Planning Department;
- NYS Department of Environmental Conservation;
- NYS Environmental Facilities Corporation;
- National Weather Service;
- NYS Energy Research and Development Authority; and,
- Each of the communities in Broome and Tioga counties and the Village of Sidney sponsored a table to share the Conceptual Plan, priority projects, and other information on the NYRCR program.

The Committee hosted their third public engagement event on February 12, 2014, at the Hubbard Auditorium, located in the Tioga County Office Building, from 6:00 – 8:00 pm. The event was publicized in print and electronic media (Owego PennySaver, WBNG Binghamton), on the County website, and with flyers posted in the windows of local businesses and organizations. The event included a brief presentation about where the Committee was in the NYRCR planning process and identified reconstruction strategies and projects for implementation. After the presentation, the floor was opened up to the public for discussion.

A fourth public meeting is scheduled to be held before May 12, 2014 to present the final NYRCR Tioga Plan. There, a discussion on implementation of projects and benefits of the plan will take place.

Additional Public Outreach

In addition to attendance at public meetings, residents, public and private agencies, community organizations, and local businesses were encouraged to attend Planning Committee meetings and provide feedback to the Committee regarding the draft document via social media (NYRCR website and Facebook page).

Several Committee members kept the public updated about the NYRCR Plan via their local websites, and one member, the Mayor of the Village of Owego, kept residents up to date via his column in the local Owego PennySaver.

To learn more about the specific impact that Tropical Storm Lee had on local businesses and housing organizations in the Tioga Community, representatives from the Consultant Team met with members of the Historic Owego Marketplace, local restaurateurs, and Tioga Opportunities, Inc.



Tioga's Regional Resiliency Summit Open House display.

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D. Community Asset Inventory

Table 5.3 Assets and Risk Assessment

| Asset Information | | | | | | Landscape Attributes | | | | | | | Risk Assessment (100-year event) | | | | Risk Assessment (500-year event) | | | |
|---|-----------|-------------|--|--|-----------------|-------------------------------------|--|--|--------------------------------|--|---|---------------------------------------|----------------------------------|----------------|---------------------|------------|----------------------------------|----------------|---------------------|------------|
| Asset | Risk Area | Asset Class | Asset Subcategory | Critical Facility | Community Value | Defensive flood protection measures | Asset elevation below base flood elevation | Freeboard elevation less than two feet above BFE | Asset near point of confluence | Asset near stormwater system discharge | Asset within floodway fringe and without adequate vegetated buffers | Landscape Attribute Score (Yes= +0.5) | Hazard Score | Exposure Score | Vulnerability Score | Risk Score | Hazard Score | Exposure Score | Vulnerability Score | Risk Score |
| Allyn Road Neighborhood | Extreme | C | Single Family Residence | No, Locally Significant: County Haz Mit Plan | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 4 | 3 | 36 | 4 | 4 | 3 | 48 |
| Apalachin Family Care | High | B | Healthcare Facilities | Yes, FEMA | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 3 | 3 | 27 | 4 | 3 | 3 | 36 |
| Apalachin Fire Department Station | Moderate | B | Emergency Operations / Response | Yes, FEMA | High | 0.5 | 0 | 0 | 0 | 0 | 0.5 | 1 | 3 | 1.5 | 3 | 13.5 | 4 | 1.5 | 3 | 18 |
| Campbell Farm | High | E | Agricultural Areas | No, Locally Significant: Committee | High | 0.5 | 0.5 | 0 | 0 | 0 | 0.5 | 1.5 | 3 | 2.5 | 3 | 22.5 | 4 | 2.5 | 3 | 30 |
| Catatonk Creek Road / Glenmary Drive Neighborhood | High | C | Single Family Residence | No, Locally Significant: County Haz Mit Plan | High | 0.5 | 0.5 | 0.5 | 0.5 | 0 | 0.5 | 2.5 | 3 | 3.5 | 3 | 31.5 | 4 | 3.5 | 3 | 42 |
| Chemung Canal Trust Bank | High | A | Banks and financial services | No, Locally Significant: Committee | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 3 | 3 | 27 | 4 | 3 | 3 | 36 |
| Community Care Network | N/A | B | Government and Administrative Services | Yes, FEMA | High | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | N/A | 3 | 0 | 4 | N/A | 3 | 0 |
| Creamery | Moderate | A | Large Business | No, Locally Significant: Committee | High | 0 | 0 | 0 | 0 | 0 | 0.5 | 0.5 | 3 | 1 | 3 | 9 | 4 | 1 | 3 | 12 |
| Dandy Mini Mart | Moderate | A | Small Business | No, Locally Significant: Committee | High | 0.5 | 0 | 0 | 0 | 0 | 0.5 | 1 | 3 | 1.5 | 3 | 13.5 | 4 | 1.5 | 3 | 18 |
| DOT Highway Garage | N/A | B | Public Works Facilities | Yes, FEMA | High | 0.5 | 0 | 0 | 0 | 0 | 0.5 | 1 | 3 | N/A | 3 | 0 | 4 | N/A | 3 | 0 |
| Dubois Road Neighborhood | N/A | C | Single Family Residence | No, Locally Significant: County Haz Mit Plan | High | 0.5 | 0 | 0 | 0.5 | 0 | 0.5 | 1.5 | 3 | N/A | 3 | 0 | 4 | N/A | 3 | 0 |
| East River Road Neighborhood | High | C | Single-Family Residence | No, Locally Significant: County Haz Mit Plan | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 3 | 3 | 27 | 4 | 3 | 3 | 36 |
| Engelbert Farm | High | E | Agricultural Areas | No, Locally Significant: Committee | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 3 | 3 | 27 | 4 | 3 | 3 | 36 |
| ExpressMart / Monro Muffler Brake & Service | High | A | Small Business | No, Locally Significant: Committee | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 3 | 3 | 27 | 4 | 3 | 3 | 36 |
| Franziska Racker Center | High | F | Disabled | Yes, FEMA | High | 0.5 | 0.5 | 0 | 0 | 0 | 0.5 | 1.5 | 3 | 2.5 | 3 | 22.5 | 4 | 2.5 | 3 | 30 |
| Front Street Historic Homes | High | C | Single Family Residence | No, Locally Significant: Conceptual Plan | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 3 | 3 | 27 | 4 | 3 | 3 | 36 |
| Guthrie Health Care | N/A | B | Healthcare Facilities | Yes, FEMA | High | 0.5 | 0 | 0 | 0 | 0 | 0.5 | 1 | 3 | N/A | 3 | 0 | 4 | N/A | 3 | 0 |
| Halsey Valley Road / Maple Avenue Neighborhood | High | C | Single Family Residence | No, Locally Significant: County Haz Mit Plan | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 3 | 3 | 27 | 4 | 3 | 3 | 36 |
| Hiawatha Road Neighborhood | Extreme | C | Single Family Residence | No, Locally Significant: County Haz Mit Plan | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 4 | 3 | 36 | 4 | 4 | 3 | 48 |
| Hickories Park | Extreme | E | Parks and Recreation | No, Locally Significant: County Haz Mit Plan | High | 0.5 | 0.5 | 0.5 | 0.5 | 0 | 0.5 | 2.5 | 3 | 4.5 | 3 | 40.5 | 4 | 4.5 | 3 | 54 |
| Hickory Estates Apartments | High | C | Multi-Family Residence | No, Locally Significant: Committee | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 3 | 3 | 27 | 4 | 3 | 3 | 36 |

Table 5.3 Assets and Risk Assessment

| Asset Information | | | | | | Landscape Attributes | | | | | | | Risk Assessment (100-year event) | | | | Risk Assessment (500-year event) | | | |
|---|-----------|-------------|---|--|-----------------|-------------------------------------|--|--|--------------------------------|--|---|---------------------------------------|----------------------------------|----------------|---------------------|------------|----------------------------------|----------------|---------------------|------------|
| Asset | Risk Area | Asset Class | Asset Subcategory | Critical Facility | Community Value | Defensive flood protection measures | Asset elevation below base flood elevation | Freeboard elevation less than two feet above BFE | Asset near point of confluence | Asset near stormwater system discharge | Asset within floodway fringe and without adequate vegetated buffers | Landscape Attribute Score (Yes= +0.5) | Hazard Score | Exposure Score | Vulnerability Score | Risk Score | Hazard Score | Exposure Score | Vulnerability Score | Risk Score |
| Kirby Park | High | E | Parks and Recreation | No, Locally Significant: County Haz Mit Plan | High | 0.5 | 0.5 | 0.5 | 0.5 | 0 | 0.5 | 2.5 | 3 | 3.5 | 3 | 31.5 | 4 | 3.5 | 3 | 42 |
| Larrabee's Tire Services | N/A | A | Small Business | No, Locally Significant: Committee | High | 0.5 | 0 | 0 | 0 | 0 | 0.5 | 1 | 3 | N/A | 3 | 0 | 4 | N/A | 3 | 0 |
| Lloyd Farm | High | E | Agricultural Areas | No, Locally Significant: Committee | High | 0.5 | 0.5 | 0 | 0 | 0 | 0.5 | 1.5 | 3 | 2.5 | 3 | 22.5 | 4 | 2.5 | 3 | 30 |
| Lockheed Martin | High | A | Employment Hub | No, Locally Significant: Committee | High | 0.5 | 0.5 | 0 | 0 | 0 | 0.5 | 1.5 | 3 | 2.5 | 3 | 22.5 | 4 | 2.5 | 3 | 30 |
| Lopke Gravel Mining | High | A | Industrial, Warehousing and Manufacturing | No, Locally Significant: Committee | High | 0.5 | 0.5 | 0 | 0 | 0 | 0.5 | 1.5 | 3 | 2.5 | 3 | 22.5 | 4 | 2.5 | 3 | 30 |
| Lourdes Family Clinic | High | B | Healthcare Facilities | Yes, FEMA | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 3 | 3 | 27 | 4 | 3 | 3 | 36 |
| Lourdes Hospital | Moderate | B | Primary / Regional Hospitals | Yes, FEMA | High | 0.5 | 0.5 | 0 | 0 | 0 | 0.5 | 1.5 | 3 | 2 | 3 | 18 | 4 | 2 | 3 | 24 |
| Marshland Road Neighborhood | High | C | Single Family Residence | No, Locally Significant: County Haz Mit Plan | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 3 | 3 | 27 | 4 | 3 | 3 | 36 |
| Martin Farm | High | E | Agricultural Areas | No, Locally Significant: Committee | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 3 | 3 | 27 | 4 | 3 | 3 | 36 |
| McFall Road / Wayside Lane Neighborhood | Extreme | C | Single Family Residence | No, Locally Significant: Committee | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 4 | 3 | 36 | 4 | 4 | 3 | 48 |
| Nichols American Legion | Moderate | E | Cultural or Religious Establishments | No, Locally Significant: Committee | High | 0 | 0 | 0 | 0 | 0 | 0.5 | 0.5 | 3 | 1 | 3 | 9 | 4 | 1 | 3 | 12 |
| Nichols Baptist Church | N/A | E | Cultural or Religious Establishments | No, Locally Significant: Committee | High | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | N/A | 3 | 0 | 4 | N/A | 3 | 0 |
| Nichols Downtown Center | Moderate | A | Downtown Center | No, Locally Significant: Committee | High | 0 | 0 | 0 | 0 | 0 | 0.5 | 0.5 | 3 | 1 | 3 | 9 | 4 | 1 | 3 | 12 |
| Nichols Elementary School | N/A | B | Schools | Yes, FEMA | High | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | N/A | 3 | 0 | 4 | N/A | 3 | 0 |
| Nichols Fire Department | Moderate | B | Emergency Operations / Response | Yes, FEMA | High | 0 | 0 | 0 | 0 | 0 | 0.5 | 0.5 | 3 | 1 | 3 | 9 | 4 | 1 | 3 | 12 |
| Nichols Masonic Lodge | Moderate | E | Cultural or Religious Establishments | No, Locally Significant: Committee | High | 0 | 0 | 0 | 0 | 0 | 0.5 | 0.5 | 3 | 1 | 3 | 9 | 4 | 1 | 3 | 12 |
| Nichols Presbyterian Church | Moderate | E | Cultural or Religious Establishments | No, Locally Significant: Committee | High | 0 | 0 | 0 | 0 | 0 | 0.5 | 0.5 | 3 | 1 | 3 | 9 | 4 | 1 | 3 | 12 |
| Nichols United Methodist Church | Moderate | E | Cultural or Religious Establishments | No, Locally Significant: Committee | High | 0 | 0 | 0 | 0 | 0 | 0.5 | 0.5 | 3 | 1 | 3 | 9 | 4 | 1 | 3 | 12 |
| Nichols Town Hall | Moderate | B | Government and Administrative Services | Yes, FEMA | High | 0 | 0 | 0 | 0 | 0 | 0.5 | 0.5 | 3 | 1 | 3 | 9 | 4 | 1 | 3 | 12 |
| NYSEG Substation (Nichols) | High | D | Power Supply | Yes, FEMA | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 3 | 3 | 27 | 4 | 3 | 3 | 36 |
| NYSEG Substation (Owego - Main St) | Extreme | D | Power Supply | Yes, FEMA | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 4 | 3 | 36 | 4 | 4 | 3 | 48 |
| NYSEG Substation (Owego - St Rt 38) | N/A | D | Power Supply | Yes, FEMA | High | 0.5 | 0 | 0 | 0 | 0 | 0 | 0.5 | 3 | N/A | 3 | 0 | 4 | N/A | 3 | 0 |

Table 5.3 Assets and Risk Assessment

| Asset Information | | | | | | Landscape Attributes | | | | | | | Risk Assessment (100-year event) | | | | Risk Assessment (500-year event) | | | |
|---|-----------|-------------|---------------------------------|--|-----------------|-------------------------------------|--|--|--------------------------------|--|---|---------------------------------------|----------------------------------|----------------|---------------------|------------|----------------------------------|----------------|---------------------|------------|
| Asset | Risk Area | Asset Class | Asset Subcategory | Critical Facility | Community Value | Defensive flood protection measures | Asset elevation below base flood elevation | Freeboard elevation less than two feet above BFE | Asset near point of confluence | Asset near stormwater system discharge | Asset within floodway fringe and without adequate vegetated buffers | Landscape Attribute Score (Yes= +0.5) | Hazard Score | Exposure Score | Vulnerability Score | Risk Score | Hazard Score | Exposure Score | Vulnerability Score | Risk Score |
| NYSEG Substation (Owego-Taylor Rd) | N/A | D | Power Supply | Yes, FEMA | High | 0.5 | 0 | 0 | 0 | 0 | 0.5 | 1 | 3 | N/A | 3 | 0 | 4 | N/A | 3 | 0 |
| Owego Downtown Center (Business) | High | A | Downtown Center | No, Locally Significant: Committee | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 3 | 3 | 27 | 4 | 3 | 3 | 36 |
| Owego Downtown Center (Housing) | High | C | Single Family Residence | No, Locally Significant: Committee | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 3 | 3 | 27 | 4 | 3 | 3 | 36 |
| Owego Elementary School | Extreme | B | Schools | Yes, FEMA | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 4 | 3 | 36 | 4 | 4 | 3 | 48 |
| Owego Flats Neighborhood | Extreme | C | Single Family Residence | No, Locally Significant: Committee | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 4 | 3 | 36 | 4 | 4 | 3 | 48 |
| Owego Free Academy | Extreme | B | Schools | Yes, FEMA | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 4 | 3 | 36 | 4 | 4 | 3 | 48 |
| Owego Super Mart (Valero) | N/A | A | Small Business | No, Locally Significant: Committee | High | 0.5 | 0 | 0 | 0 | 0 | 0 | 0.5 | 3 | N/A | 3 | 0 | 4 | N/A | 3 | 0 |
| Owego-Apalachin Middle School | Extreme | B | Schools | Yes, FEMA | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 4 | 3 | 36 | 4 | 4 | 3 | 48 |
| PROPOSED Infill Development | High | A | Small Business | No, LSF: Conceptual Plan | High | 0.5 | 0.5 | 0 | 0 | 0 | 0.5 | 1.5 | 3 | 2.5 | 3 | 22.5 | 4 | 2.5 | 3 | 30 |
| Radio WEBO | Moderate | D | Telecommunications | No, Locally Significant: County Haz Mit Plan | High | 0.5 | 0 | 0 | 0 | 0 | 0.5 | 1 | 3 | 1.5 | 3 | 13.5 | 4 | 1.5 | 3 | 18 |
| Ransom Park | High | E | Parks and Recreation | No, Locally Significant: County Haz Mit Plan | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 3 | 3 | 27 | 4 | 3 | 3 | 36 |
| Riverview Manor Health Care Center | High | F | Elderly | Yes, FEMA | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 3 | 3 | 27 | 4 | 3 | 3 | 36 |
| Route 96 Quikway Gas Station | High | A | Small Business | No, Locally Significant: Committee | High | 0.5 | 0 | 0 | 0 | 0 | 0.5 | 1 | 3 | 2 | 3 | 18 | 4 | 2 | 3 | 24 |
| Sanmina-Sci Corp. | N/A | A | Employment Hub | No, Locally Significant: Committee | High | 0.5 | 0 | 0 | 0 | 0 | 0.5 | 1 | 3 | N/A | 3 | 0 | 4 | N/A | 3 | 0 |
| Schoolhouse Apartments | Moderate | F | Elderly | Yes, FEMA | High | 0 | 0 | 0 | 0 | 0 | 0.5 | 0.5 | 3 | 1 | 3 | 9 | 4 | 1 | 3 | 12 |
| Seeley's Auto Body | N/A | A | Small Business | No, Locally Significant: Committee | High | 0.5 | 0 | 0 | 0 | 0 | 0 | 0.5 | 3 | N/A | 3 | 0 | 4 | N/A | 3 | 0 |
| South Main Street Neighborhood | Moderate | C | Single Family Residence | No, Locally Significant: County Haz Mit Plan | High | 0 | 0 | 0 | 0 | 0 | 0.5 | 0.5 | 3 | 1 | 3 | 9 | 4 | 1 | 3 | 12 |
| St. Patrick School | High | B | Schools | Yes, FEMA | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 3 | 3 | 27 | 4 | 3 | 3 | 36 |
| St. Rt. 434 E=MT3 Site | N/A | A | Large Business | No, LSF: Conceptual Plan | High | 0.5 | 0 | 0 | 0 | 0 | 0 | 0.5 | 3 | N/A | 3 | 0 | 4 | N/A | 3 | 0 |
| State Route 17C Tioga Center Neighborhood | High | C | Single Family Residence | No, Locally Significant: County Haz Mit Plan | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 3 | 3 | 27 | 4 | 3 | 3 | 36 |
| Sunnyside Road Neighborhood | High | C | Singe-Family Residence | No, Locally Significant: County Haz Mit Plan | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 3 | 3 | 27 | 4 | 3 | 3 | 36 |
| The Homestead | N/A | F | Elderly | Yes, FEMA | High | 0.5 | 0 | 0 | 0 | 0 | 0 | 0.5 | 3 | N/A | 3 | 0 | 4 | N/A | 3 | 0 |
| Tioga Center Fire Department | N/A | B | Emergency Operations / Response | Yes, FEMA | High | 0.5 | 0 | 0 | 0 | 0 | 0.5 | 1 | 3 | N/A | 3 | 0 | 4 | N/A | 3 | 0 |
| Tioga Country Club | Moderate | A | Tourism Destinations | No, Locally Significant: Committee | High | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0.5 | 3 | 4.5 | 4 | 0.5 | 3 | 6 |

Table 5.3 Assets and Risk Assessment

| Asset Information | | | | | | Landscape Attributes | | | | | | | Risk Assessment (100-year event) | | | | Risk Assessment (500-year event) | | | |
|--|-----------|-------------|--|--|-----------------|-------------------------------------|--|--|--------------------------------|--|---|---------------------------------------|----------------------------------|----------------|---------------------|------------|----------------------------------|----------------|---------------------|------------|
| Asset | Risk Area | Asset Class | Asset Subcategory | Critical Facility | Community Value | Defensive flood protection measures | Asset elevation below base flood elevation | Freeboard elevation less than two feet above BFE | Asset near point of confluence | Asset near stormwater system discharge | Asset within floodway fringe and without adequate vegetated buffers | Landscape Attribute Score (Yes= +0.5) | Hazard Score | Exposure Score | Vulnerability Score | Risk Score | Hazard Score | Exposure Score | Vulnerability Score | Risk Score |
| Tioga County Clerk | Moderate | B | Government and Administrative Services | No, Locally Significant: County Haz Mit Plan | High | 0.5 | 0 | 0 | 0 | 0 | 0.5 | 1 | 3 | 1.5 | 3 | 13.5 | 4 | 1.5 | 3 | 18 |
| Tioga County Court Annex | Moderate | B | Government and Administrative Services | No, Locally Significant: County Haz Mit Plan | High | 0.5 | 0 | 0 | 0 | 0 | 0.5 | 1 | 3 | 1.5 | 3 | 13.5 | 4 | 1.5 | 3 | 18 |
| Tioga County Historic Courthouse | Moderate | E | Historic Landmarks and Facilities | No, Locally Significant: County Haz Mit Plan | High | 0.5 | 0 | 0 | 0 | 0 | 0.5 | 1 | 3 | 1.5 | 3 | 13.5 | 4 | 1.5 | 3 | 18 |
| Tioga County Office Building | High | B | Government and Administrative Services | Yes, FEMA | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 3 | 3 | 27 | 4 | 3 | 3 | 36 |
| Tioga County Public Works | Extreme | B | Public Works Facility | Yes, FEMA | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 4 | 3 | 36 | 4 | 4 | 3 | 48 |
| Tioga Downs Casino | High | A | Tourism Destinations | No, Locally Significant: County Haz Mit Plan | High | 0.5 | 0.5 | 0 | 0 | 0 | 0.5 | 1.5 | 3 | 2.5 | 3 | 22.5 | 4 | 2.5 | 3 | 30 |
| Tioga Opportunities, Inc. | High | B | Government and Administrative Services | Yes, FEMA | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 3 | 3 | 27 | 4 | 3 | 3 | 36 |
| Tioga State Bank (St Rt 17C) | High | A | Banks and financial services | No, Locally Significant: Committee | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 3 | 3 | 27 | 4 | 3 | 3 | 36 |
| Tioga Town Hall | Moderate | B | Government and Administrative Services | Yes, FEMA | High | 0.5 | 0 | 0 | 0 | 0 | 0.5 | 1 | 3 | 1.5 | 3 | 13.5 | 4 | 1.5 | 3 | 18 |
| Tireland USA | N/A | A | Small Business | No, Locally Significant: Committee | High | 0.5 | 0 | 0 | 0 | 0 | 0 | 0.5 | 3 | N/A | 3 | 0 | 4 | N/A | 3 | 0 |
| Tops Plaza | High | A | Small Business | No, Locally Significant: Committee | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 3 | 3 | 27 | 4 | 3 | 3 | 36 |
| Town of Nichols Highway Garage / Water Well #1 | High | D | Transportation & Water Supply | Yes, FEMA | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 3 | 3 | 27 | 4 | 3 | 3 | 36 |
| Town of Nichols Wastewater Plant / Water Well #2 | Extreme | D | Wastewater & Water Supply | Yes, FEMA | High | 0.5 | 0.5 | 0.5 | 0.5 | 0 | 0.5 | 2.5 | 3 | 4.5 | 3 | 40.5 | 4 | 4.5 | 3 | 54 |
| Town of Owego Highway Dept | Extreme | B | Public Works Facilities | Yes, FEMA | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 4 | 3 | 36 | 4 | 4 | 3 | 48 |
| Town of Owego Offices/ Court/State Police Barracks | N/A | B | Government and Administrative Services | No, Locally Significant: County Haz Mit Plan | High | 0.5 | 0 | 0 | 0 | 0 | 0 | 0.5 | 3 | N/A | 3 | 0 | 4 | N/A | 3 | 0 |
| Town of Owego Wastewater Plant (Broadway) | Extreme | D | Wastewater | Yes, FEMA | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 4 | 3 | 36 | 4 | 4 | 3 | 48 |
| Town of Owego Wastewater Plant (Main St) | Extreme | D | Wastewater | Yes, FEMA | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 4 | 3 | 36 | 4 | 4 | 3 | 48 |
| Treadway Inn Complex | High | A | Large Business | No, Locally Significant: Committee | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 3 | 3 | 27 | 4 | 3 | 3 | 36 |
| United Water Pumphouse / Water Well #2 | Moderate | D | Water Supply | No, Locally Significant: Committee | High | 0 | 0 | 0 | 0 | 0 | 0.5 | 0.5 | 3 | 1 | 3 | 9 | 4 | 1 | 3 | 12 |
| Verizon Office (Nichols) | Moderate | D | Telecommunications | Yes, FEMA | High | 0 | 0 | 0 | 0 | 0 | 0.5 | 0.5 | 3 | 1 | 3 | 9 | 4 | 1 | 3 | 12 |

Table 5.3 Assets and Risk Assessment

| Asset Information | | | | | | Landscape Attributes | | | | | | | Risk Assessment (100-year event) | | | | Risk Assessment (500-year event) | | | |
|---------------------------------------|-----------|-------------|--|--|-----------------|-------------------------------------|--|--|--------------------------------|--|---|---------------------------------------|----------------------------------|----------------|---------------------|------------|----------------------------------|----------------|---------------------|------------|
| Asset | Risk Area | Asset Class | Asset Subcategory | Critical Facility | Community Value | Defensive flood protection measures | Asset elevation below base flood elevation | Freeboard elevation less than two feet above BFE | Asset near point of confluence | Asset near stormwater system discharge | Asset within floodway fringe and without adequate vegetated buffers | Landscape Attribute Score (Yes= +0.5) | Hazard Score | Exposure Score | Vulnerability Score | Risk Score | Hazard Score | Exposure Score | Vulnerability Score | Risk Score |
| Verizon Office (Owego) | High | D | Telecommunications | Yes, FEMA | High | 0.5 | 0 | 0 | 0 | 0 | 0 | 0.5 | 3 | 1.5 | 3 | 13.5 | 4 | 1.5 | 3 | 18 |
| Village of Owego Clerk | Moderate | B | Government and Administrative Services | No, Locally Significant: County Haz Mit Plan | High | 0.5 | 0 | 0 | 0 | 0 | 0.5 | 1 | 3 | 1.5 | 3 | 13.5 | 4 | 1.5 | 3 | 18 |
| Village of Owego DPW | High | B | Public Works Facilities | Yes, FEMA | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 3 | 3 | 27 | 4 | 3 | 3 | 36 |
| Village of Owego EMS | High | B | Emergency Operations / Response | Yes, FEMA | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 3 | 3 | 27 | 4 | 3 | 3 | 36 |
| Village of Owego Fire Dept. Sta 1 & 2 | High | B | Emergency Operations / Response | Yes, FEMA | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 3 | 3 | 27 | 4 | 3 | 3 | 36 |
| Village of Owego Fire Dept. Sta 3 | Moderate | B | Emergency Operations / Response | Yes, FEMA | High | 0.5 | 0 | 0 | 0 | 0 | 0.5 | 1 | 3 | 1.5 | 3 | 13.5 | 4 | 1.5 | 3 | 18 |
| Village of Owego Police Dept. | High | B | Emergency Operations / Response | Yes, FEMA | High | 0.5 | 0 | 0 | 0 | 0 | 0.5 | 1 | 3 | 2 | 3 | 18 | 4 | 2 | 3 | 24 |
| Village of Owego Wastewater Plant | High | D | Wastewater | Yes, FEMA | High | 0.5 | 0.5 | 0.5 | 0.5 | 0 | 0.5 | 2.5 | 3 | 3.5 | 3 | 31.5 | 4 | 3.5 | 3 | 42 |
| Water Well #1 | Extreme | D | Water Supply | No, Locally Significant: Committee | High | 0.5 | 0.5 | 0.5 | 0.5 | 0 | 0.5 | 2.5 | 3 | 4.5 | 3 | 40.5 | 4 | 4.5 | 3 | 54 |
| West River Road Neighborhood | High | C | Single Family Residence | No, Locally Significant: County Haz Mit Plan | High | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.5 | 2 | 3 | 3 | 3 | 27 | 4 | 3 | 3 | 36 |

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E. End Notes

¹ VanDeMark, Edward. Overview of Tioga County Local Government. Web. October 2013. <http://www.tiogacountyny.com/Local-Government-Overview/>

² County profile information for this section derived from Tioga County. Web. October 2013. <http://www.tiogacountyny.com/County-Profile/county-profile.html>

³ Data for this section derived from Wikipedia, the free encyclopedia, 2013. Web. October 2013. http://en.wikipedia.org/wiki/Susquehanna_River

⁴ Information for this section derived from Tioga County. Web. October 2013. <http://www.tiogacountyny.com/towns-villages/nichols.html>

⁵ Demographic data for this section is derived from the U.S. Census Bureau, 2010. Web. September 2013. <http://www.census.gov/2010census/data/>

⁶ Information for this section was derived from the Elan Planning, Design and Landscape Architecture, PLLC. Town of Nichols, New York Long-Term Community Recovery Strategy, September 2013. p.13.

⁷ Information for this section derived from Tioga County. Web. July 2013. <http://www.tiogacountyny.com/towns-villages/nichols-village-of.html>

⁸ Elan Planning, Design and Landscape Architecture, PLLC. Town of Nichols, New York Long-Term Community Recovery Strategy, September 2013. p.18.

⁹ Buckhurst, Fish, and Jacquemart, Inc. Town of Owego Comprehensive Plan (1997)

¹⁰ Information for this section derived from Tioga County. Web. October 2013. <http://www.tiogacountyny.com/towns-villages/owego.html>

¹¹ Information used for this section derived from WNFB Radio's website. Web. April 2014. <http://wnbf.com/camping-to-return-to-owegos-hickories-park/>

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¹⁴ Demographic data for this section is derived from the U.S. Census Bureau, 2010. Web. September 2013. <http://www.tiogacountyny.com/towns-villages/owego-village-of.html>

¹⁵ Elan Planning, Design and Landscape Architecture, PLLC. Village of Owego, New York Long-Term Community Recovery Strategy, September 2013. p.13.

¹⁶ Elan Planning, Design and Landscape Architecture, PLLC. Village of Owego, New York Long-Term Community Recovery Strategy, September 2013. p.18.

¹⁷ Elan Planning, Design and Landscape Architecture, PLLC. Village of Owego, New York Long-Term Community Recovery Strategy, September 2013. p.19.

¹⁸ Information for this section derived from Tioga County. Web. July 2013. <http://www.tiogacountyny.com/towns-villages/tioga.html>

¹⁹ Demographic data for this section is derived from the U.S. Census Bureau, 2010. Web. September 2013. <http://www.census.gov/2010census/data/>

²⁰ Elan Planning, Design and Landscape Architecture, PLLC. Town of Tioga, New York Long-Term Community Recovery Strategy, September 2013. p. 13.

²¹ Elan Planning, Design and Landscape Architecture, PLLC. Town of Tioga, New York Long-Term Community Recovery Strategy, September 2013. p. 18.

²² Elan Planning, Design and Landscape Architecture, PLLC. Town of Tioga, New York Long-Term Community Recovery Strategy, September 2013. p. 19.

²² Elan Planning, Design and Landscape Architecture, PLLC. Town of Tioga, New York Long-Term Community Recovery Strategy, September 2013. p. 20.

²⁴ Ibid.

²⁵ Tioga County Emergency Management. Tioga County Tropical Storm Lee Flood Response. May 2012.

²⁶ Tioga County Emergency Management. Tioga County Tropical Storm Lee Flood Response. May 2012. p. 16.

²⁷ Ibid.

²⁸ Elan Planning, Design and Landscape Architecture, PLLC. Town of Tioga, New York Long-Term Community Recovery Strategy, September 2013. p. 3.

²⁹ Ibid.

³⁰ Tetra Tech EM, Inc, Tioga County Multi-Jurisdictional Hazard Mitigation Plan Update, August 2012

³¹ Southern Tier Regional Economic Development Council: 2011-2016, Progress Report, September 2012. p. 5.

³² Demographic data for this section is derived from the U.S. Census Bureau, 2010. Web. September 2013. <http://www.census.gov/2010census/data/>

³³ U.S. Department of Commerce Economics and Statistics Administration Office of the Chief Economist. Economic Impact of Hurricane Sandy Potential Economic Activity Potentially Lost and Gained in New Jersey and New York, September 2013.

³⁴ Ibid.

³⁵ Ibid.

³⁶ Web. April 2013. www.floodsmart.gov

³⁷ U.S. Department of Commerce Economics and Statistics Administration Office of the Chief Economist. Economic Impact of Hurricane Sandy Potential Economic Activity Potentially Lost and Gained in New Jersey and New York, September 2013.

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³⁹ Ibid.

⁴⁰ Ibid.

⁴¹ Ibid.

⁴² Ibid.

⁴³ Ibid.

⁴⁴ Web. March 2013. <http://fuzehub.com/manufacturing-industry-news/empire-state-development-announces-innovation-hot-spot-awardees/>

⁴⁵ Ibid.

⁴⁶ Ibid.

F. Glossary

| | |
|-----------|--|
| BF E | Base Flood Elevation |
| Committee | NYRCR Planning Committee |
| DART | Disaster Assistance Response Team |
| DEC | Department of Environmental Conservation |
| DOT | New York State Department of Transportation |
| DPW | Department of Public Works |
| E&G | Electric and Gas |
| EOC | Emergency Operations Center |
| FEMA | Federal Emergency Management Agency |
| LT CR | Long Term Community Recovery |
| NFIP | National Flood Insurance Program |
| NYRCR | NY Rising Community Reconstruction |
| NYS | New York State |
| REAP | Tioga County Rural Economic Area Partnership |
| RSF | Recovery Support Functions |
| SEQRA | State Environmental Quality Review Act |
| USACE | U.S. Army Corps of Engineers |