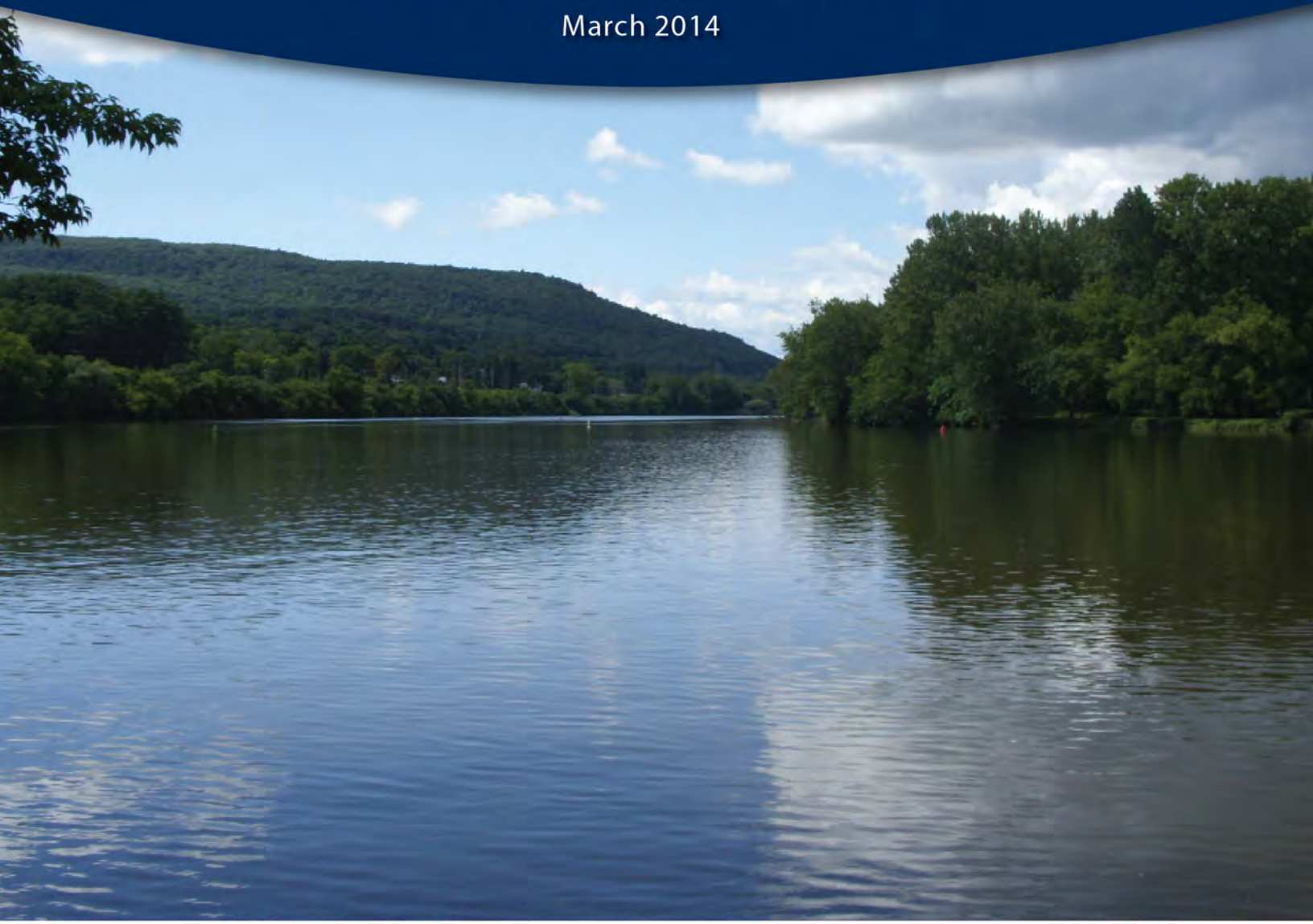
NY Rising Community Reconstruction Plan for the

CITY OF SCHENECTADY AND TOWN OF ROTTERDAM

Prepared for the
NY Rising Community Reconstruction Program

March 2014



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Foreword

Introduction

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

To meet these pressing needs, Governor Andrew M. Cuomo led the charge to develop an innovative, community-driven planning program on a scale unprecedented and with resources unparalleled. The NY Rising Community Reconstruction (NYRCR) Program 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 grounded in rigorous analysis and informed by the latest innovative solutions.

One hundred and two storm-affected localities across the State were originally designated to participate in the NYRCR Program. The State has allocated each locality between $3 million and $25 million to implement eligible projects identified in the NYRCR Plan. The funding for these projects is provided through the U.S. Department of Housing and Urban Development (HUD) Community Development Block Grant – Disaster Recovery (CDBG-DR) program.[1]

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

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

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

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

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

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.

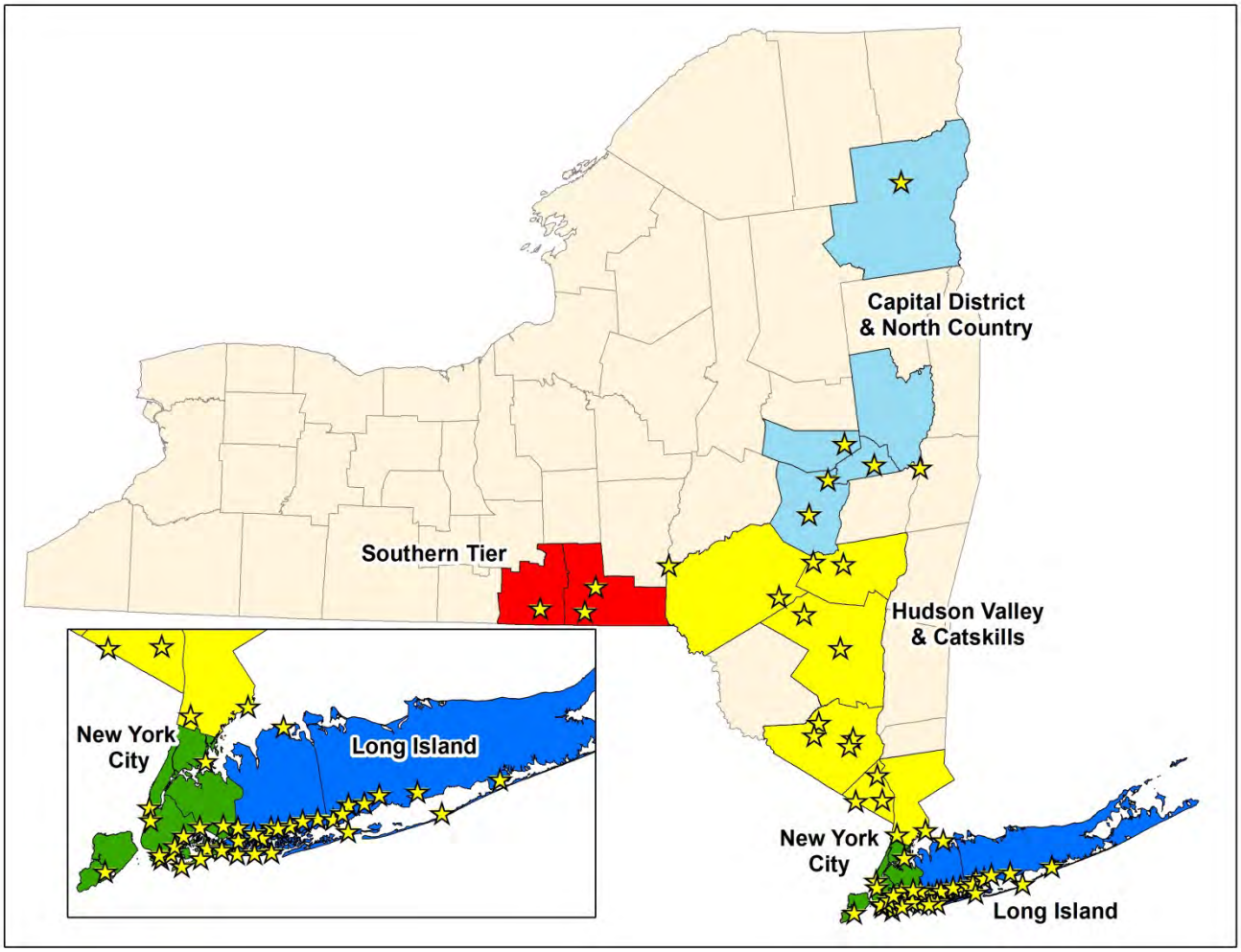
The NYRCR Schenectady – Rotterdam Community is eligible for up to $6.0 million in CDBG-DR implementation funds.[2]

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 organizations, when determining which projects and actions are best positioned for implementation.

[2] The following localities' allocations comprise the NYRCR Community's total allocation: City of Schenectady - $3.0 million; Town of Rotterdam - $3.0 million.

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.



www.stormrecovery.ny.gov/nyrcr

NYRCR Communities[3]

3 Note: map includes those NYRCR Communities funded through the CDBG-DR program, including the NYRCR Communities announced in January 2014.

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Flooded homes in Schenectady
Credit: All Over Albany

Executive Summary

The New York Rising Community Reconstruction (NYRCR) Program was established by Governor Andrew M. Cuomo to provide additional rebuilding and revitalization assistance to communities damaged by Superstorm Sandy, Hurricane Irene, and Tropical Storm Lee.

The NYRCR Program provided a unique opportunity for community members in the City of Schenectady (Schenectady) and the Town of Rotterdam (Rotterdam) to come together and engage in thoughtful discussion about their future. In the two years since Hurricane Irene and Tropical Storm Lee, they have done their best to rebuild, but have not fully recovered. Under this Program, Schenectady and Rotterdam each qualify for awards of up to $3 million to fund reconstruction and resiliency projects.

NYRCR Planning Committee

Overview

Schenectady and Rotterdam are located on the south bank of the Mohawk River in Schenectady County. The Plan addresses three distinctly different parts of Schenectady: mixed use neighborhoods, including the Stockade; Schenectady's downtown central business district; and the existing and former industrial waterfront. The portion of Rotterdam included in the study area is predominantly residential and includes the Hamlets of Pattersonville and Rotterdam Junction, and the waterfront floodplain in between them. The hamlets are distinct communities that lie far west of the more densely settled Rotterdam town center.

Storm Damage

Schenectady and Rotterdam were hard hit by Hurricane Irene and Tropical Storm Lee. Floodwaters poured into streets, homes, and buildings throughout Schenectady. The level of the Mohawk River rose as high as 28 feet above flood stage in the Stockade and East Front Street neighborhoods. Residents in these neighborhoods, who had experienced numerous previous floods, had never seen their homes (some of which are over 200 years old) come under as much water. The damage was so significant that some residents were unable to return to their homes for six to nine months.

The hamlet of Rotterdam Junction was the hardest hit community in Schenectady County. Water overflowed into the abandoned and debris-laden Old Erie Canal by Leggerio Lane, flowed southeast through the canal, overflowed the Hudson-Mohawk Hike Bike Trail, and flooded Rotterdam Junction. As a result, 62 homes were inundated: 57 were flooded to the first floor and 5 were flooded up to the second floor. Residents who had not evacuated found themselves trapped because State Route 5S was flooded on Monday morning and the Route 103 Bridge was closed on Sunday night. This effectively turned Rotterdam Junction into an island surrounded by debris-laden flood waters, making it extremely dangerous to attempt to leave.

Photo credit: Jose Rijo

Flooded home in Rotterdam Junction

Photo credit: The Daily Gazette

Flooded homes on Ingersoll Avenue, Schenectady.

Critical Issues

The aftermath of these unforgettable, catastrophic events guided the NYRCR Planning Committee when they were tasked to define critical flood-related issues in both communities. Some of these issues include:

- Existing local and regional plans predate the storms and do not address flood-related emergency preparedness, evacuation planning, and flood mitigation.
- Residential property is still at risk of flooding: Over 50 homes in the Historic Stockade and East Front Street neighborhood are located in the 100-year floodplain and the majority of Rotterdam Junction residents live in the 500-year floodplain.
- The communities struggle with abandoned homes as a result of Irene and Lee: seven in Schenectady and 14 in Rotterdam.
- Culverts and storm drains throughout Schenectady and Rotterdam are undersized and in need of repair, which compromises their ability to handle large storm events.
- The communities' water and sewer systems, which were damaged during Irene and Lee, continue to be vulnerable to flood damage.
- Emergency responders were able to meet the community's needs during Irene and Lee, but often had to make due with imperfect facilities – upgrades are needed.

NYRCR Public Engagement Event

Community-Driven Process

Through the NYRCR process, the communities of Rotterdam and Schenectady are preparing to act now to minimize future impacts from flooding. This includes developing resilient infrastructure (water supply, electric supply, wastewater, and road systems), protecting homes and businesses from floodwater, and providing resources for first responders and emergency shelters to house people who are displaced by disaster.

The Planning Committee, comprised of a group of civic leaders, held five formal and numerous informal meetings as they sought develop and implement a shared vision for the community. This vision was informed by public input collected during three public meetings held during the planning process.

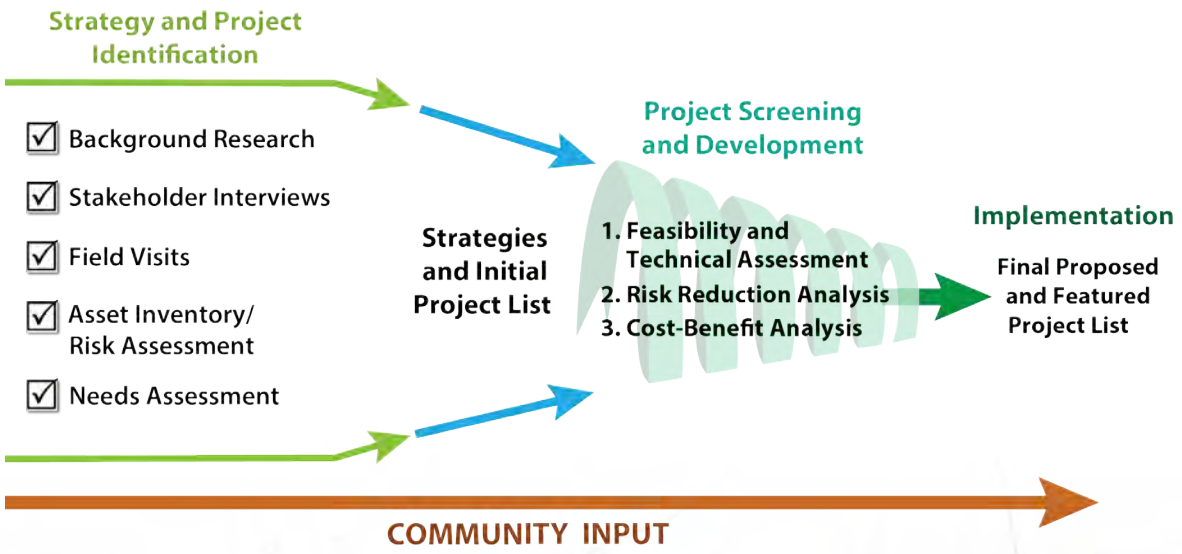
Community Vision

The City of Schenectady and the Town of Rotterdam will be resilient; they will anticipate flood risks, limit impacts on property and infrastructure when flooding is unavoidable, and respond efficiently and recover quickly, in a manner that protects traditional community neighborhoods, quality of life, and takes advantage of waterfront opportunities.

A Blueprint for Implementation

The Planning Committee developed strategies and projects based on public input and a comprehensive asset inventory, risk assessment, and needs assessment process. The Planning Committee identified 60 critical assets of community value and assessed the flood risk to each asset. The importance of assets and the public support for projects was determined at public meetings and workshops.

The figure below outlines the process taken by the Planning Committee to develop resiliency strategies and projects for Schenectady and Rotterdam.



Project Screening and Development

The project development and evaluation process resulted in identifying projects that fall under three categories: Proposed, Featured, and Additional Resiliency Recommendations.

- Proposed projects are projects proposed for funding through a NYRCR Community's allocation of CDBG-DR funding.
- Featured projects are projects and actions that the Planning Committee has identified as important resiliency recommendations and has analyzed in depth, but has not 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 projects below are grouped by strategy. Projects are all categorized as "Proposed" except for those marked "Featured." Projects are not ranked or listed in any particular order.

- Strategy: Strengthen capacity of emergency and support services to respond during a major storm event and manage resources throughout recovery.
  - Rotterdam Junction Firehouse Upgrades
  - Schenectady High School Emergency Shelter Project
  - Evacuation Plan for Rotterdam Junction
  - Senior Citizens Center/Schenectady County Emergency Shelter

- Strategy: Complete long-term community recovery planning, watershed management planning, hazard mitigation planning, and other related planning efforts to build flood resilience.
  - East Front Street Combined Sewer System Study
  - Mitigation Measures to Reduce Flooding in the Stockade and East Front Street Neighborhoods

- Strategy: Incorporate green infrastructure and other stormwater management practices into private and public development and infrastructure projects.
  - Liberty Park Expansion and Streetscape Improvements

- Strategy: Establish health and social service buildings outside the flood zones as shelters during major storm events.
  - Senior Citizens Center/Schenectady County Emergency Shelter
  - Schenectady High School Emergency Shelter Project

- Strategy: Reduce flood risk to vulnerable neighborhoods located in the floodplain.
  - Mitigation Measures to Reduce Flooding in the Stockade and East Front Street Neighborhoods
  - Demolish Seven Flood Damaged Homes Located in the 100-Year Flood Plain

Photo credit: Schenectady County

American Red Cross provides medical care for Rotterdam Junction residents

Photo credit: The Daily Gazette

Evacuations during Irene/Lee

Photo Credit: Elinore Schumacher

Home repairs after the storms.

- Strategy: Protect wellheads and other drinking water infrastructure from flooding to ensure uninterrupted supply of clean, safe drinking water.
  - Flood Protection of Rotterdam Water District #5 Wells
  - Flood Protection of Schenectady City Well Heads
  - Install an Automatic Transfer Switch at the Rotterdam District #3 Well Head Facility

- Strategy: Improve septic and wastewater infrastructure to reduce flood damage and risk of pollution.
  - North Ferry Street Pump Station Relocation Project
  - City of Schenectady Wastewater Treatment Plant- Flood Control

Photo Credit: Jim Kalohn, Schenectady County Planner

Historic Flooding of the North Ferry Street Pump Station

- Strategy: Improve and maintain culverts and other drainage systems that contribute to flood impacts.
  - Mohawk-Hudson Bike-Hike Trail and Culvert Improvements
  - Replace Lock Street Stormwater Pumps with Gravity Storm Sewer Line
  - Schenectady County Community College Flood Abatement (Featured)
  - East Front Street Combined Sewer System Study

Photo Credit: Times Union

Schenectady County Community College Irene/Lee flooding

- Strategy: Ensure that critical facilities continue to operate during major storm events through redundant backup systems (e.g., generators, pumps, and connecting supply waterlines).
  - Install Generator at City Hall
  - Install an Automatic Transfer Switch at the Rotterdam District #3 Well Head Facility

- Strategy: Increase opportunities for recreation and tourism through efforts that include improving river access, regional biking and hiking trail development, and new activities and events.
  - Liberty Park Expansion and Streetscape Improvements

The projects and actions included in the Schenectady/Rotterdam NYRCR plan will help the communities achieve recovery from the devastation of Irene and Lee and make them more resilient in the face of future flood events.

A NASA satellite map of Hurricane Irene approaching New York State.
Source: http://en.wikipedia.org/wiki/File:Hurricane_irene_082711_0150_est.jpg

I. Community overview

Section I sets the stage for the Schenectady and Rotterdam's NYRCR Plan. It includes:

- **A description of Schenectady and Rotterdam (the geographic scope)**
- **A description of storm damage and the recovery process**
- **A discussion of critical issues facing the community**
- **The community vision**
- **A discussion of the relationship of the NYRCR Plan to other regional plans and initiatives**

On August 24, 2011 emergency management officials across New York State began to prepare for the approach of Hurricane Irene. Governor Cuomo pro-actively declared a State Disaster Emergency. Hurricane Irene arrived in the Mohawk Valley on August 28. Just a week later, Tropical Storm Lee brought nearly a foot of rain to the Valley. Extreme rain caused the Mohawk River to crest at levels above the 100-year floodplain in a matter of hours, flooding communities throughout the region. The impacts of the storms were devastating, warranting a Federal Major Disaster Declaration on August 31, 2011 for New York State and the counties impacted.[1]

"This is not a routine flood situation. This is an extraordinary event," Schenectady Fire Chief Michael Della Rocco told the Associated Press. "This is going to be a long-term event. It is going to build and it will be extraordinary."
—Kevin Deutsch, Daily News, Monday August 29, 2011.

The City of Schenectady (Schenectady) and Town of Rotterdam (Rotterdam) also referred to as the Community, are located on the south bank of the Mohawk River in Schenectady County. Floodwaters from Hurricane Irene and Tropical Storm Lee impacted daily life throughout the Community—homes, businesses and some infrastructure were flooded, residents were evacuated, and bridges were temporarily closed. The impact of the storms immediately brought residents, volunteers, non-profits, and government agencies together to begin recovery efforts. These recovery efforts have continued for the past two and half years, with volunteers and government entities developing partnerships and plans to not only recover, but to create long-term solutions to mitigate flooding.

Shawn Taylor, Chief of the Rotterdam Junction Volunteer Fire Department, made the tough call of ordering an evacuation "as soon as we started seeing water come in." This decision helped save the lives of more than 300 people. He told The Daily Gazette Reporter Michael Lamendola "If we did not evacuate town, there would have been a loss of life. The water was above the second floor in the first houses we worked on," Taylor said. Floodwaters flashed into the hamlet within minutes of cresting the Mohawk River west of the hamlet - the evacuation plan assumes at least an hour's warning for approaching floodwaters.
—The Daily Gazette, September 7, 2011

This New York Rising Community Reconstruction (NYRCR) Plan describes how Schenectady and Rotterdam are preparing to build back better than before and improve resilience to storms, while protecting critical assets, vulnerable populations, economic tax base, and the significant historic heritage they record as part of the living history of New York State.

A. Geographic scope of the NYRCR plan

Schenectady and Rotterdam were established along the Mohawk River because of easy access to water and trade routes, which allowed them to become centers of industry. Schenectady continues to be an influential center of urban life, culture, and commerce in the Capital Region of New York State, while neighboring Rotterdam is a desirable suburban community in which to live, raise a family, and work. Because Schenectady and Rotterdam have historically been oriented toward the Mohawk River, many of their critical natural, economic, recreational, historic, and residential assets are located in the flood-prone portions of the Community.

Schenectady, settled in 1661, is one of the largest cities in the Capital Region with an estimated population of 65,921, according to the 2012 U.S. Census American Community Survey.[3]

At the time of settlement, Schenectady was part of the Dutch colony of New Netherland. It was established as a city in 1798. Access to the Hudson and Mohawk Rivers, combined with major rail and roadway networks that complimented riverine trade routes, led to a flourishing of industry.[4] The presence of Edison Electric Company (known as General Electric or GE today), and the American Locomotive Company (ALCO) gave Schenectady its nickname "The City that Lights and Hauls the World."

Schenectady Demographics (2012 Est.)	
Population:	65,921
Median age:	34.5
% Population aged 65+:	12.2%
Number of households:	31,668
Average household size:	2.35
Families below poverty level:	18.1%
Median household income:	$38,485
Housing Units:	31,668
Dominant Housing Type:	Single-family

Source: U.S. Census American Community Survey[2]

"The 300-year old Historic Stockade district is an eclectic downtown neighborhood, a village inside of one of America's oldest cities. Bankers, house painters, executives, clerks, school teachers, artists, and scientists rub shoulders and work together to create one of the most unique and interesting places to live in the United States. Living in the oldest residential neighborhood in the US, with more than 40 pre-Revolutionary War houses, elegant and ancient churches, and what has been called the most beautiful riverside park in America, give residents a common purpose to preserve one of America's treasures."

—Stockade Association

Today, the largest employers in the City are General Electric and the Golub Corporation, Ellis Hospital, Schenectady County, Schenectady City School District, MVP Health Plan, and Union College.

The City's downtown, some of which is in the 100-year floodplain, is the center for municipal activity and is home to City, County, and State government offices; an entertainment and arts district (including Proctor's Theatre); two institutions of higher education, Union College and Schenectady County Community College (SCCC); and the Stockade, East Front Street, and other residential neighborhoods.

Schenectady contains a number of historic districts, including the Stockade. The Stockade bears the distinction of being the first NYS-designated Historic District, designated in 1962, and is listed on both the State and National Registers of Historic Places. The Stockade district's name refers to "the wooden stockades that enclosed the central settlement for the first 120 years."[5,6] Its status as an Historic District has helped preserve this unique collection of 17th- and 18th-century buildings, which includes churches, old factories, public buildings, a YMCA and YWCA, a brew pub, and apartment houses.

Northeast of the Stockade is the East Front Street neighborhood, made up of residential streets with small apartment buildings and one- and two-family houses. Several businesses serving the neighborhood operate along Front Street and Mohawk Avenue; they include taverns, a beverage wholesaler, and an antique store.

Similar to Schenectady, Rotterdam was settled by the Dutch in 1661 and was formally established as a Town in 1820. Rotterdam experienced a development boom following the construction of the Erie Canal and the railroad in the 1820s. The hamlets of South Schenectady, Pattersonville, and Rotterdam Junction were established as a result of these developments.[8]

Rotterdam Junction Demographics (2008-2012 Est.- CT 326.02)	
Population:	3,672
Median age:	43.9
% Population aged 65+:	19.4
Number of households:	1,649
Average household size:	2.23
Families below poverty level:	5.3%
Median household income:	$56,926
Housing Units:	1,850
Dominant Housing Type:	Single-family

Source: US Census Bureau, 2008-2012 American Community Survey 5-year Estimates for Census Tract 326.02[7]

Rotterdam's proximity to Schenectady and easy commuting distance to the City of Albany make it a desirable place to live. In 2012 Rotterdam had an estimated population of 29,054. The Town contains a mix of residential neighborhoods, retail, service corridors, and industry as well open spaces and agriculture.[9]

FEMA Flood Hazard Mapping

"FEMA maintains and updates data through Flood Insurance Rate Maps (FIRMs) and risk assessments. FIRMs include statistical information such as data for river flow, storm tides, hydrologic/hydraulic analyses, and rainfall and topographic surveys. FEMA uses the best available technical data to create the flood hazard maps that outline your community's different flood risk areas."

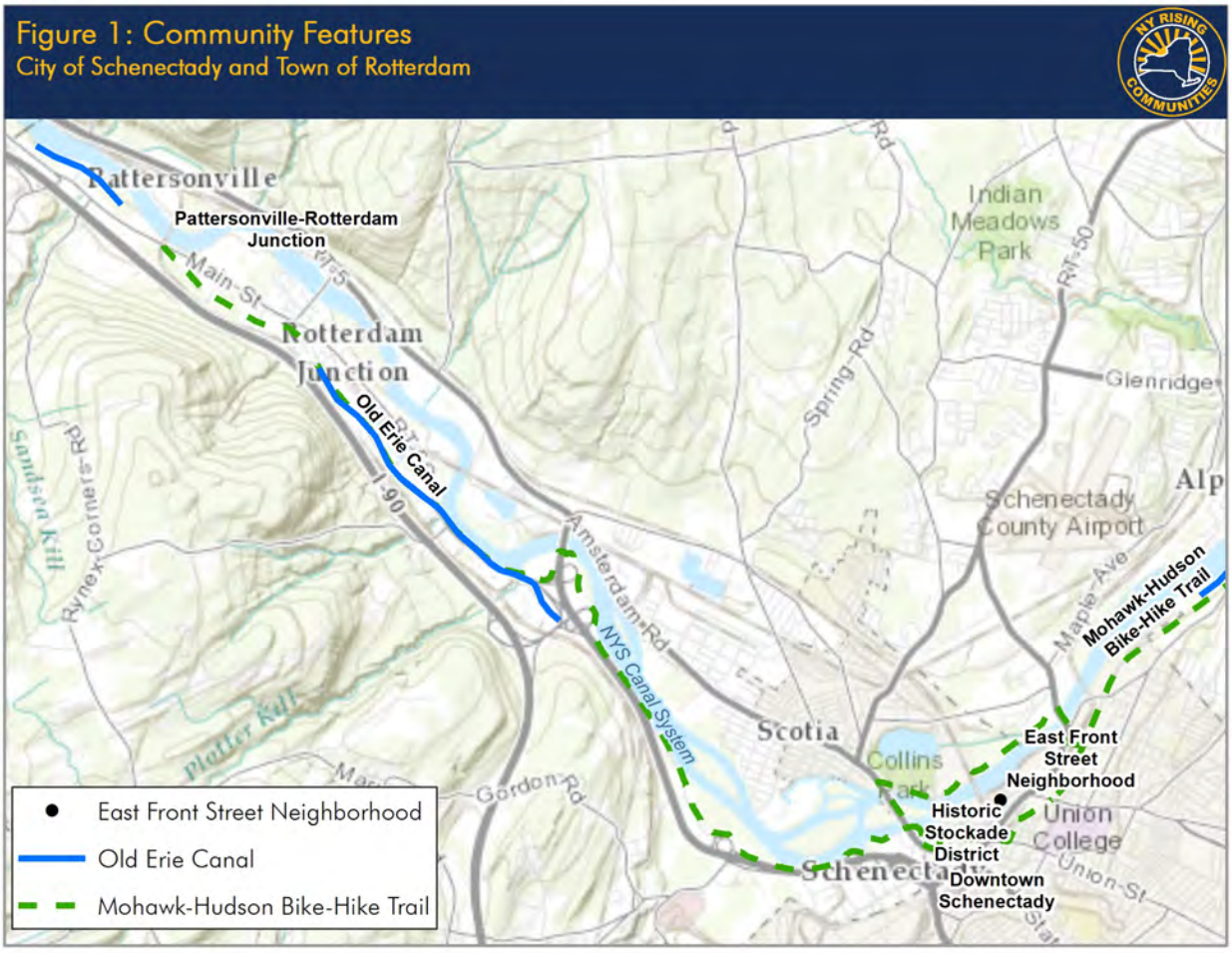
Source: Federal Emergency Management Agency (FEMA). www.fema.gov

According to the 2008-2012 U.S. Census American Community Survey[10], the population of the census tract that includes Rotterdam Junction is 3,672. Rotterdam Junction stretches along the Mohawk River and contains a wide range of land uses, including older single, two- and multi-family homes generally built before 1940; a newer, 100-lot residential subdivision west of Bridge Street and a condominium project on the east side of Bridge Street. Figure 1 identifies the Community features de-

scribed above.

The geographic scope or Study Area for the Schenectady and Rotterdam NYRCR Plan, depicted in Figure 2, includes areas that are vulnerable to flooding and areas where reconstruction efforts and investment can be encouraged to improve flood resiliency. The Study Area focuses on parts of the Community subject to recurring flooding. The water bodies that contribute to flooding include the Mohawk River along with several of its tributaries, including the Plotter Kill, the Moccasin Kill, and the Poentic Kill, and the Old Erie Canal. The Mohawk River carries barge traffic as part of the New York State Canal System. The portion of the New York State Canal System that runs through the study area is called the Erie Canal. The Old Erie Canal, which flows parallel to the Mohawk River, flows through the Hamlets of Pattersonville and Rotterdam Junction, and provides an unregulated storm conveyance to the Mohawk River.

The Study Area, which recognizes these water bodies as the primary sources of flooding, was defined to include the 500-year floodplain as defined by Federal Emergency Management Agency (FEMA) mapping completed in 2013, as well as an additional buffer zone.[11]



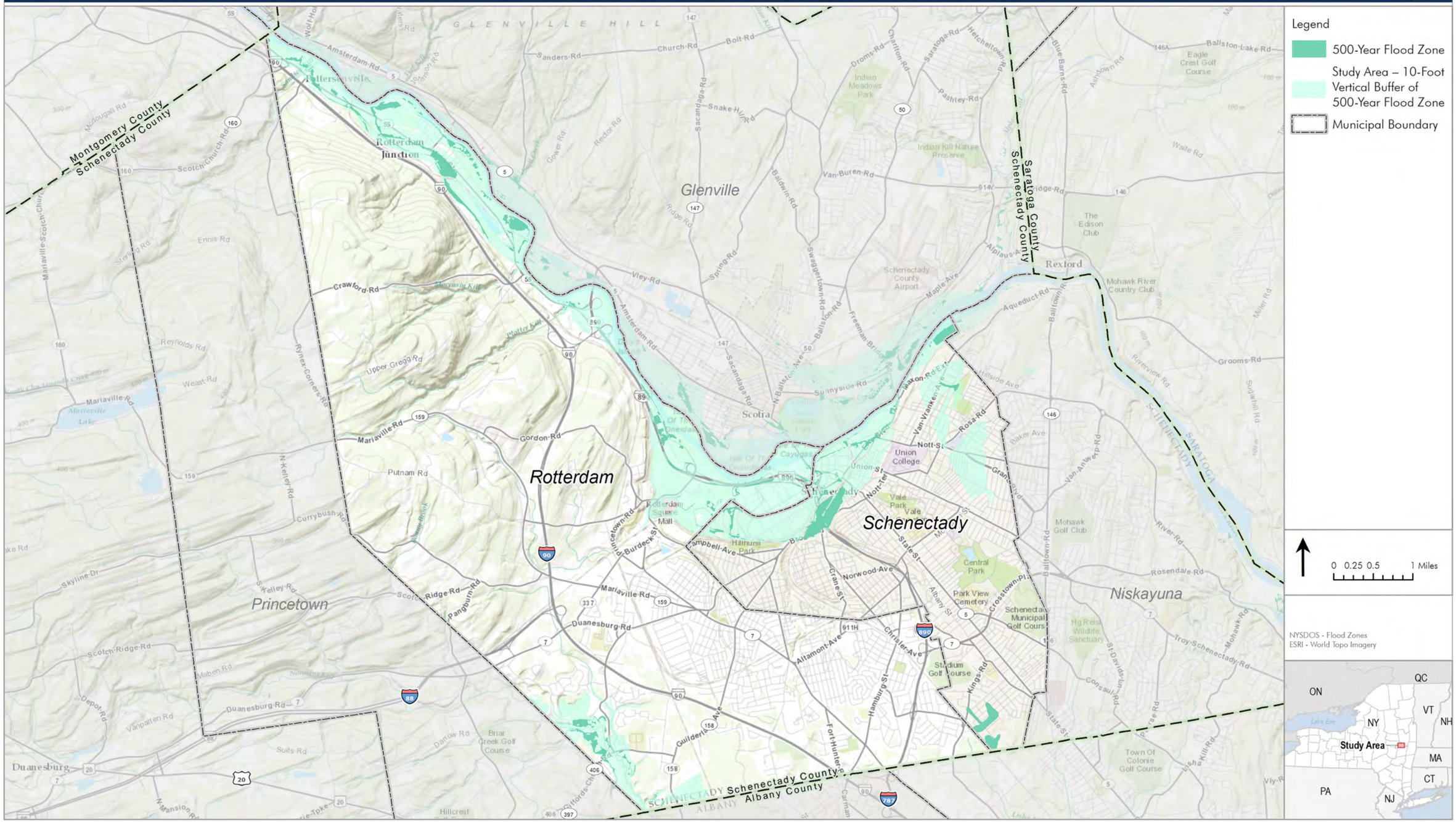
Three distinctly different parts of Schenectady are contained within the Study Area: mixed use neighborhoods, including the Stockade; Schenectady's downtown central business district; and the existing and former industrial waterfront. The portion of Rotterdam included in the Study Area is primarily residential, containing the Hamlets of Pattersonville and Rotterdam Junction and the waterfront floodplain in between them.

Photo credit: Jim Kalohn, Schenectady County Planner

Historic Stockade Waterfront, Schenectady

Rotterdam Junction

Figure 2: Geographic Scope
City of Schenectady and Town of Rotterdam



B. Description of storm damage

The waterways that are such a valuable resource to Schenectady and Rotterdam are a mixed blessing; flooding is not an uncommon occurrence in the Community. Hurricane Irene and Tropical Storm Lee led to particularly dramatic flooding of the Mohawk and its tributaries, causing destruction throughout Schenectady and Rotterdam.

Floods are among the most frequent and costly natural disasters. Conditions that cause floods include heavy or steady rain for several hours or days that saturate the ground. Flash floods occur suddenly due to rapidly rising water along a stream or low-lying area.

http://www.redcross.org/prepare/disaster/flood

City of Schenectady

In anticipation of the arrival of Hurricane Irene, Schenectady police evacuated residents living in flood-prone areas of Schenectady. At the same time, personnel from the Schenectady Water Department rushed to the City Well Field and built an emergency flood wall to prevent floodwaters from inundating this critical asset.

The Mohawk River rose to over 26 feet, which is more than double the average elevation (approximately 12 feet) typical of August and September.[12] This caused water to pour into streets, homes, and buildings throughout Schenectady. Flooding reached its peak early Monday morning, the day after the storm hit.

On September 4, a week after Hurricane Irene, Tropical Storm Lee caused flooding in the Stockade and the East Front Street neighborhoods. Residents living in these neighborhoods, who had experienced previous floods, had never seen their homes (some of which are over 200 years old) inundated with so much water. Electricity was out for almost a week and telephone service was limited. The City, along with residents, spent months cleaning the mud off the streets.

Photo credit: The Daily Gazette

Flooded homes on Ingersoll Avenue, Schenectady

Floodwaters were deepest in the Stockade, flooding homes and ripping up backyard fences along the lower portion of Ingersoll Avenue, North Street, North Ferry Street, Governor's Lane, and Washington Avenue. These streets descend towards Riverside Park, located along the edge of the Mohawk River. Homes in the Stockade were inundated to a depth of two to four feet on the first floor and up to the ceilings in basements. Riverside Park was entirely submerged by flood waters.

Peak flooding within the East Front Street neighborhood occurred north of Front Street. Areas bordering the neighborhood were also flooded. As described by the U.S. Geological Survey[13], water flooded the former ALCO plant on the Erie Boulevard extension, Edison Avenue and Van Guysling Avenue, and Broadway between Edison Avenue, Lower Broadway, and River Street. A few businesses on Van Guysling Avenue including a roofing company, the Board of Elections, and other commercial facilities and businesses were flooded with approximately six inches of water on the first floor. The National Grid substation located on River Street also flooded, with flood waters coming within three to six inches of inflicting serious damage.

Photo Credit: Elinore Schumacher

Schenectady after the storms

The sewer bordering the East Front Street neighborhood on the west side of the intersection of Nott Street and East Front Street typically overflows during short-duration, high-volume storms and ice jams. A significant amount of water came up through the manhole during Hurricane Irene and Tropical Storm Lee. Overland flooding and sewer overflows inundated the first floor of approximately 30 homes with up to one to three feet of contaminated water, which remained for roughly 36 hours.

City drinking water and wastewater facilities nearly flooded during the storms. The North and South Ferry Street Pump Stations, critical components of the city's sewer system, were severely impacted by floodwaters. The control and electrical systems were inundated and the control panels did not operate for almost 24 hours due to power failure. Fortunately, residents residing near the stations were not impacted by the shutdown of these facilities due to the short amount of time that they were inoperable. This was not the first time the North Ferry Street Pump Station flooded. Major storm and ice jamming events caused floodwaters to inundate the pump station in 1913, 1914, 1936, 1955, 1996, and 2006.

Photo credit: Times Union

Schenectady County Community College and a portion of downtown after Hurricane Irene/Tropical Storm Lee

Downtown areas also flooded. Much of the area bounded by State Street, Washington Avenue, and Erie Boulevard in downtown Schenectady lies within the 100 year flood plain, and flooded up to two feet during the storms. Two of the three buildings standing in the area of the proposed expansion site of Liberty Park/Gateway Plaza were impacted by floodwater, and a total of seventeen out of 54 buildings in the larger area were impacted by floodwaters.

Just west of Liberty Park/Gateway Plaza, on the other side of Washington Avenue, Schenectady County Community College sustained an estimated $1 million worth of flood damage from the storms. Flood waters inundated the community college parking lot, the copy and mailroom on the first floor of Elston Hall (approximately three feet deep), and the basement of Begley Hall. The SCCC was closed for approximately one week. During this time, there was no electricity.

Town of Rotterdam

Rotterdam Junction was the hardest hit community in Schenectady County.[14] Water from the Mohawk River overflowed into the abandoned and debris-laden Old Erie Canal by Leggiero Lane, flowed southeast through the canal, overflowed the Mohawk-Hudson Bike-Hike Trail, and flooded Rotterdam Junction.

Photo Credit: Times Union

Rotterdam Junction

Conditions in Rotterdam Junction were grave. Residents were left without power or natural gas, with many residing in flooded homes, sheltered by neighbors, or evacuated to the emergency shelter at Shalmont High School. Sixty-two homes were inundated; 57 were flooded on the first floor; and 5 were flooded up to the second floor. Flood waters reached 4- to 12-feet high on Scrafford Lane, Isabella Street, Lock Street, Iroquois Street, Erie Street, and Main Street. Volunteer fire department rescue boats evacuated 408 residents from their homes in Rotterdam Junction alone.

Floodwaters remained in the hamlet for up to six days following Hurricane Irene. Residents who had not evacuated found themselves trapped because Route 5S was flooded on Monday morning and the Route 103 Bridge was closed Sunday night. These were the only two escape routes from the hamlet. This effectively turned Rotterdam Junction into an island surrounded by debris-laden flood waters, making it extremely dangerous to attempt to leave.

The flood waters in Rotterdam Junction did not recede when the river levels subsided, because the hamlet was effectively a bowl with no outlet; homes remained inundated for another week, until water was pumped out of low-lying areas. The resulting financial losses impacted homeowners as well as businesses. Some homeowners decided not to rebuild as they did not want to go through another flood, including families that had been in the same home for several generations.

Photo Credit: The Daily Gazette

Evacuating Rotterdam Junction residents after the storms

Despite taking on several inches of water, the Rotterdam Junction Firehouse served as the center of emergency operations for Rotterdam residents during Hurricane Irene and Tropical Storm Lee. The firehouse was open from August 29, 2011 to September 21, 2011 between the hours of 5:30 a.m. and 11:00 p.m. It became a collection and distribution point for supplies, including clothing, pots/pans, meals, and cleaning products. The American Red Cross provided on-site medical care.

To help provide for the safety and well-being of residents, numerous governmental entities, non-profits, small businesses, and volunteers came together. The Rotterdam Junction Volunteer Fire Department, Schenectady County legislators, Schenectady County Departments of Public Health, Social Services, Information Technology, and Public Works, the Town of Rotterdam, and the City of Schenectady all supported the response and recovery. Residents teamed up with local and county fire departments, rescue and EMS, Red Cross and other charities to help their friends and neighbors.

> *Recovery is built on hope. It is the idea that something good can come out of tragedy. Recovery does not assume that things will just "get back to normal," but recognizes that a "new normal" must be discovered and built.*
>
> ***—Looking Back: Lessons Learned, Flood Recovery Coalition***

The New York State Canal System infrastructure was also damaged during the storms. The Lock 9 Bridge in Rotterdam was battered by debris from the raging floodwaters. The bridge structure was so badly shaken that the New York State Department of Transportation (NYS DOT) and the Canal Corporation closed the bridge to traffic on Sunday and Monday during Hurricane Irene. On Monday morning, when it became clear that the residents of Rotterdam Junction were cut off by flood waters east and west of Rotterdam Junction, the County Sheriff supervised the evacuation of residents, allowing one vehicle to cross the bridge at a time. After waters subsided, the bridge was reopened but high water prevented the immediate removal of debris. Floodwater from Tropical Storm Lee days later was blocked by this debris,

diverting water around the lock. The increase in flow washed away the bridge approaches on the north side as well as a National Grid gas supply line serving Rotterdam and Schenectady. The Lock E-9 tender's building was also washed away during Tropical Storm Lee. At Lock E-8, Tropical Storm Lee flood waters eroded the riverbank on the north side of the lock and ripped away approximately 1,200 feet of shore line. The Canal Corporation later tore down the lock tender's building to avoid future flood damage.

Flood Recovery Efforts

As the Hurricane Irene floodwaters receded, hundreds of home and business owners were faced with the need to rebuild and/or renovate. While FEMA funded a portion of the recovery efforts, some families and businesses were not able to cover the full costs of recovery.

"We are meeting with each homeowner on a case-by-case basis to help develop an individualized reconstruction plan with the homeowner. This allows the Coalition to identify how to best utilize the funds each homeowner has available (i.e., FEMA, flood insurance, savings) while identifying what gaps there will be. The Coalition is attempting to work with the homeowner to use their financial resources (i.e., FEMA, flood insurance, savings) most effectively, and then identify how to best utilize the resources we have available to fill the gaps (i.e., finances, materials, volunteers, and/or contractors). Through this partnership with the homeowner, we are also able to identify other needs (counseling, food, safety, clothing, etc.)."

- FRC, January 2012 (Looking Back: Lessons Learned, Flood Recovery Coalition)

The Flood Recovery Coalition of Schenectady County and its partners (American Red Cross, Better Neighborhoods, Mohawk Opportunities, Northeast Parent and Child Society, Parsons Child and Family Center, Samaritan Counseling Center, and the New York State Chapter of the National Association of Social Workers) came together to respond to the impacts of the flooding on residents. From late September into late October 2011, the coalition canvassed flood-affected communities throughout the County, including Schenectady and Rotterdam, and developed written assessments of the structural damage and immediate needs for each family. Rebuilding and repair work on 72 homes throughout Schenectady County began in December 2011 and was completed in January 2013, 13 months later.[15]

Coalition efforts leveraged the much-needed skillsets of partner organizations including the Schenectady Foundation, Habitat for Humanity, City Mission, Catholic Charities, and many more to help reconstruct the lives of those affected by the storms. Today, at least eight homes affected by Hurricane Irene and Tropical Storm Lee are still in need of repair in Schenectady and six in Rotterdam Junction.

While residential recovery was underway, a parallel effort took place to restore critical infrastructure. The North and South Ferry Street Pump Stations were back in operation in less than 24 hours. National Grid set up an alternative natural gas supply to replace lost service after Tropical Storm Lee destroyed the Lock 9 Bridge approach. The Canal Corporation began work on damaged canal infrastructure shortly after the storms. Currently, the Canal Corporation is renovating the lock buildings and replacing the gates to allow the gates to be lifted more quickly and under higher flow conditions and to avoid the ac-

cumulation of debris on the lock structures. The Canal Corporation plans to install flood gages above and below locks along the Mohawk River to develop a flood warning system to assist communities in developing their flood response plans.

Photo Credit: Jim Kalohn, Schenectady County Planner

Lock 8 Irene and Lee Flood Lines

Photo Credit: Jim Kalohn, Schenectady County Planner

Lock 8 Elevated above the 100-year Flood Zone following Irene/Lee

Hurricane Irene and Tropical Storm Lee presented a shared challenge that brought the communities together. For instance, Rotterdam and Schenectady organized their own remembrance ceremonies on August 28, 2012, one year after the storms. Over 700 people attended the one-year anniversary event held by the County, "Schenectady County Remembers." The Flood Recovery Coalition developed a documentary based on the storms "Wake of Irene: Heart of the Storm." This documentary includes stories from local residents, volunteers, and leaders. The Red Cross has conducted several trainings and seminars on Disaster Preparedness since the storms and a flood disaster resource guide was specifically created for Schenectady County residents.[16]

Natural Disaster Recovery Framework

In line with the National Disaster Recovery Framework, this NYRCR Plan considers the needs, risks, opportunities, and strategies related to the following six recovery support functions (RSFs), established by President Barak Obama in 2011:

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

C. Critical issues

The aftermath of this unforgettable, catastrophic event guided the Planning Committee as they sought to define critical flood-related issues in the Community. This section summarizes these critical issues according to the FEMA National Disaster Recovery Framework (NDRF). The NDRF, organized into six FEMA Recovery Support Functions, provides communities impacted by a disaster a structure to follow to determine the appropriate mitigation efforts that restore, redevelop, and revitalize the health, social, economic, and natural and cultural resources components of the affected community.

Community Planning and Capacity Building

NYRCR Planning Committee Meeting

At the local and neighborhood level, both Rotterdam and Schenectady have completed many revitalization and development plans and studies that are related to community planning, transportation, economic development and neighborhood revitalization and recreation, of which some include flood recovery. However, much of the planning predates Hurricane Irene and Tropical Storm Lee, with the exception of the Rotterdam Junction Long-Term Community Recovery Plan. Rotterdam received a grant from New York State Department of State (NYS DOS) to develop a community strategy for long-term community recovery and revitalization based on lessons learned from Hurricane Irene. The Long-Term Community Recovery Plan has informed some of the project development conducted as part of this NYRCR Plan.

Intergovernmental emergency response to flood events was hampered by loss of power, inundation of transportation infrastructure (Mohawk River bridge crossings, flooded roadways), and lack of adequate resources for sheltering. Additionally, there were no emergency response plans available to the Community. Existing local government plans do not address flood-related emergency preparedness, evacuation planning, and flood mitigation.

Economic Development

Schenectady's economy was traditionally based on manufacturing. However, in recent years the economy has been changing. While GE, whose facility extends into both Schenectady and Rotterdam, has retained its administrative core in Schenectady as well as its steam turbine and battery manufacturing

plants, it does not employ the number of people it did years ago. ALCO, which was once a significant employer in Schenectady, slowly declined and eventually closed its doors in the late 1960s.[17] Schenectady's population has declined by one-third due to the loss of employment opportunities over the last 60 years.[18] In recent years, Schenectady's downtown has experienced resurgence through public and private investment, and its economy is diversifying, but the economy is still vulnerable.

Rotterdam Junction is predominantly residential but contains a mix of small retail and service establishments as well as some industrial uses; specifically the GE plant and the SI Group, a chemical manufacturer located in Lower Rotterdam Junction. There are limited opportunities for employment and most residents work outside the hamlet.[19] A number of factors hold back initiatives to rebuild or encourage new economic development outside the floodplain. According to the Rotterdam Junction *Brownfield Opportunity Area (BOA) Nomination Study (2013,)*[20] the presence of a protected wellhead and lack of a public sewer system are constraints on future development.

As indicated in Table 1 below, Schenectady residents have household incomes well below the County and State averages, and many of these households are single income/nonfamily households. Schenectady's per capita income is closer to the County and State average but still well below it while Rotterdam Junction's per capita income is slightly higher.[21] Schenectady's significant percentage of low- and moderate-income residents limits the City's ability to absorb losses and enhance resilience to hazards. [22] Additionally, many of the residents in Rotterdam Junction have incomes similar to Schenectady County.[23] However, according to survey results presented in the *NYS Homes and Community Renewal Application: Community Development Block Grant 2012 for Rotterdam Junction*, households damaged by flooding from Hurricane Irene and Tropical Storm Lee have incomes 80% or less of area median incomes defined by HUD. These results represent 37 of the 62 surveys returned at the time the application was completed. Thirty-two of the 37 surveys are LMI households.[24]

Table 1 Household Income and Poverty Rate Comparison, 2012 Estimate

Municipality	Median Household Income	Per Capita Income	Families Below Poverty Level	Individuals Below Poverty
City of Schenectady	$38,485	$20,422	18.1%	22.5%
Rotterdam Junction (CT 326.02)*	$56,926	$34,018	5.3%	6.2%
Schenectady County	$56,445	$28,326	8.3%	12.0%
New York State	$57,683	$32,104	11.4%	14.9%

Source: US Census Bureau, 2008-2012 American Community Survey 5-year Estimates for Census Tract 326.02. The income figures are in 2012 inflation-adjusted dollars.

*This Census Tract includes data outside of the Study Area but does not include Rotterdam as a whole. The only available data for the Pattersonville-Rotterdam Junction CDP is from 2000.

Health and Social Services

During Hurricane Irene and Tropical Storm Lee it was clear that flooding in Rotterdam Junction can make it more difficult for residents to access services due to roads and bridges closing. During Hurricane Irene, hundreds of Rotterdam Junction residents had to be evacuated by fire department boat or one at a time across the Lock 9 Bridge. Those that did not leave depended on services provided by the Rotterdam Junction Fire Department, which was able to maintain operations and provide essential services to the hamlet, but its capacity was taxed.

Rotterdam's relatively large senior population underscores the need for localized services during emergency situations. Oftentimes, senior residents have limited mobility and/or medical needs that can make evacuation difficult. Fortunately, the tight-knit community of long-term residents was able to help those who needed special care during this time of crisis.

Similarly, people living in poverty often rely on localized services during emergencies. Twenty-two percent of individuals in Schenectady are below the poverty line.

Housing: Flood Vulnerable Neighborhoods and their Residents

Substantial portions of several neighborhoods within Schenectady and Rotterdam are at risk of flooding due to their location within the 100-year floodplain. Over 50 homes in the Stockade and East Front Street neighborhood are located in the 100-year floodplain. Seven Schenectady homes were abandoned after Hurricane Irene and Tropical Storm Lee.

The majority of Rotterdam Junction residents live in the 500-year floodplain. Mohawk River floodwaters devastated this community leaving 14 abandoned homes.

Photo Credit: Elinore Schumacher

A resident repairs her home after Hurricane Irene and Tropical Storm Lee

Schenectady's NYRCR Plan Study Area neighborhoods have aging housing stock that is costly and difficult to repair following flood damage. Nearly two-thirds of structures in the East Front Street neighborhood and 81% of the Stockade/downtown were built earlier than 1940. Homes in Rotterdam Junction that were damaged are generally older, although town-wide only 16% of Rotterdam's housing was built before 1940.

The Stockade's status as an Historic District listed on both the State and National Registers of Historic Places creates challenges for mitigating flood damage. The high cost of elevating structures out of the floodplain and the desire to maintain these historic and cultural assets have placed the neighborhood in a difficult position. As discussed previously, many property owners do not have the resources to relocate

or flood-proof their buildings. Yet this neighborhood as a whole is a significant historic resource, and the potential loss of over 60 historic homes would adversely impact its historic character.

Infrastructure

Drainage Systems

Parts of the existing stormwater management infrastructure in both communities are insufficiently sized to handle large storm events, which can result in overflows and backups. Additionally, some of the culverts in and around the Old Erie Canal are clogged with debris. When floodwaters are not able to recede due to clogged and/or undersized stormwater conveyance systems, flood damage becomes much worse than it would otherwise be. For example, many culverts in the drainage area in and around the Old Erie Canal in Rotterdam Junction caused severe localized drainage problems during Hurricane Irene and Tropical Storm Lee. Flood waters remained in areas of the Junction for a week after the water in the Mohawk River receded.

Photo Credit: The Daily Gazette

Homeowner in Rotterdam Junction

Water

The primary drinking water sources for Schenectady and Rotterdam are located in the floodplain and nearly flooded during the storms. Most of Rotterdam, but not Rotterdam Junction, is served by the Rotterdam well fields, located on the north side of Rice Road abutting the Mohawk River, just inside the 500-year floodplain. This well field needs flood protection to prevent failure due to major storms. The Schenectady well fields are close to Rotterdam's well fields south of Rice Road in the 100-year floodplain, abutting I-890. Schenectady's public water system serves the entire city and portions of the surrounding Towns of Rotterdam and Niskayuna. This drinking water facility needs a back-up generator to function in the event of a power outage.

Sewer

Rotterdam properties located in the vicinity of the western County line and the SI Group plant are served by septic systems. Homes and businesses located between Lower Rotterdam Junction and the SCCC are on septic systems. The septic systems located in the wellhead protection areas represent a potential source of contamination to the Schenectady and Rotterdam wells and are nonconforming uses under the Inter-municipal Watershed Rules and Regulations.

Schenectady's wastewater treatment plant (WWTP), completed in 1973, is located along the Mohawk River in the 500-year floodplain, close to the Town of Niskayuna's border. This plant, which has aging infrastructure, serves the entire City except for a few homes located in the Woodlawn neighborhood. This plant nearly flooded during the storms due to its location along the Mohawk River. Flooding could have caused a significant impact to the Community if raw sewage were carried into the Mohawk River and surrounding area.[25]

The sewer collection system throughout the City is also compromised because the piping is old and not large enough to handle the amount of storm water infiltration and inflow. The pipes also require frequent repairs. As a result, Schenectady's sewer system overflows during high volume storms. Overflows have caused some effluent to bypass the WWTP and drain into the Mohawk River, impacting water quality.[26] For example, at the bottom of the hill, where the interceptors bring the collected wastewater to the treatment plant, there have been occasions when sewage has backed up through the manholes in the vicinity of Nott Street and Front Street (between downtown and the Northside neighborhood).

Natural and Cultural Resources

Many of the parks in both communities are located in flood-prone areas and have historically flooded over the years. In particular, Riverside Park, which was fortunately able to recover, is still used today by visitors and residents.

The Canal locks along the Mohawk River that are part of the Erie Canalway Heritage Corridor are vulnerable to high volume storms and were significantly damaged during Hurricane Irene and Tropical Storm Lee.

NYRCR Public Engagement Event

D. Community vision

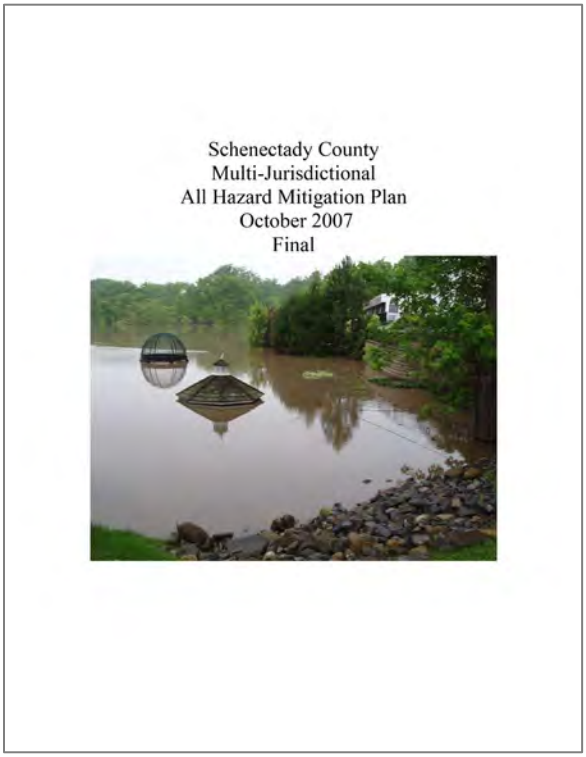
Through a series of facilitated discussions and Public Engagement Events, the Planning Committee developed a community vision that serves as the foundation of this plan. The Planning Committee has used this vision to guide the development of strategies and projects throughout the NYRCR Planning process.

The City of Schenectady and the Town of Rotterdam will be resilient: they will anticipate flood risks, limit impacts on property and infrastructure when flooding is unavoidable, and respond efficiently and recover quickly, in a manner that protects traditional community neighborhoods, quality of life, and takes advantage of waterfront opportunities.

E. Relationship to regional plans

This NYRCR Plan shares many goals with the various regional plans that have been developed over the past few years in Schenectady County and the Mohawk Valley Region. Some of these common goals include: improving infrastructure to support economic development, enhancing quality of life, and improving flood resiliency; enhancing recreational and tourism amenities for residents and visitors; and continuing revitalization of historic "downtowns" whether they are hamlets or cities.

This NYRCR Plan directly advances several goals of the recently updated *Capital Region Economic Development Council (CREDC) Strategic Plan: Progress Report (September 2013)*. The CREDC is one of 10 regional councils in New York State that were created to develop long-term strategic plans for economic growth in their respective regions. The Council is comprised of local experts and stakeholders from business, academia, local government, and non-governmental organizations. The CREDC developed an initial Strategic Plan, which is updated annually. This NYRCR Plan directly advances the following goals of the CREDC:

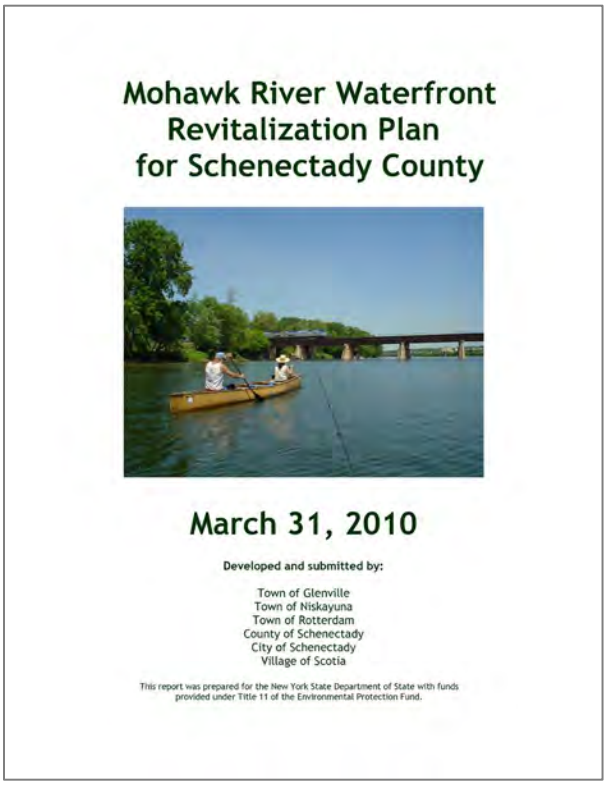

Schenectady County
Multi-Jurisdictional
All Hazard Mitigation Plan
October 2007
Final

- "Fostering success in leveraging and collaboration among academic, not-for-profit, government, and commercial organizations to support entities that combine goals, efforts and resources for the greater good of our communities.
- Investing in infrastructure to support the growth of our economy in both new and retained jobs, building a super highway to carry the Tech Valley forwards as a leader in technology and innovation to increase capacity of water supply and management laying the groundwork for business and capital progress.
- Bringing cities to life by focusing on development within the urban core, restoring, rebuilding and revitalizing streets and community by investing in capital projects for the Region to:
    - Advance the reconstruction of marquee historic properties that will cascade economic benefits to the surrounding community (such as Schenectady's ALCO site); and
    - Revitalize the streetscapes of our cities with a focus on turning blight to betterment for the people who live, work and visit.

- Highlighting the importance of sustaining and optimizing our surroundings, protecting the environment and natural resources while connecting citizens to the beauty of the Region with access and opportunities for activities to enjoy the splendor of our landscapes including sports and leisure on land and water, promoting healthy lifestyles and appreciation for the abundant trails, parks and waterways."[27]

Additionally, the CREDC Opportunity Agenda specifically addresses critical needs for Schenectady, including increased "viable housing in safe, secure, pleasant, clean neighborhoods."[28] This NYRCR Plan addresses the need for housing and neighborhood stability through improved infrastructure and enhanced flood resilience of the housing stock.

The Schenectady and Rotterdam NY Rising Community Reconstruction Plan also shares the goals for addressing priorities in the *Capital Region Sustainability Plan (2012)*, a regional sustainability plan developed as part of Governor Cuomo's Cleaner, Greener Communities Program. Administered by the New York State Energy Research and Development Authority (NYSERDA), the Sustainability Plan addresses resiliency to climate change through the reduction of carbon emissions, reducing energy consumption, and better utilization of renewable sources of energy. This NYRCR Plan advances the following Sustainability Plan Goals:


Mohawk River Waterfront Revitalization Plan for Schenectady County

March 31, 2010

Developed and submitted by:

Town of Glenville
Town of Niskayuna
Town of Rotterdam
County of Schenectady
City of Schenectady
Village of Scotia

This report was prepared for the New York State Department of State with funds provided under Title 11 of the Environmental Protection Fund.

- "Local government policies and programs that integrate climate change mitigation and adaptation;
- A multi-modal system that includes expanded transit opportunities, well-developed bicycle and pedestrian infrastructure; and
- The creation of vibrant urban centers to reduce development pressure on rural areas."[29]

The Schenectady and Rotterdam NYRCR Plan fulfills recommendations made in the *Schenectady County Multi-Jurisdictional All Hazard Mitigation Plan (2007)* (presently being updated), prepared by Schenectady County in response to the Disaster Mitigation Act of 2000 to improve the disaster planning process for the County. The plan identified hazards that were of concern, profiled and prioritized the potential impacts of these hazards, estimated property inventory at risk and potential losses associated with these hazards, developed mitigation strategies and goals that address the hazards that impact the area, and developed mitigation plan maintenance procedures to be executed from the New York State Emer-

gency Management Office (SEMO) and FEMA. The 2008 Plan cites flooding, both event flooding and seasonal, as a hazard in Rotterdam Junction and Schenectady. Several recommendations for flood mitigation were identified as well as actions to improve the flood warning system and first response. This NYRCR Plan acknowledges some continued deficiencies in these areas and includes projects that mitigate both issues and challenges.

Finally, this NYRCR Plan further advances several county-level waterfront and recreation plans, including the *Mohawk River Waterfront Revitalization Plan for Schenectady County (2010)* and the *Schenectady County Mohawk River Blueway Trail Plan (2008).* These planning efforts were collaborative efforts of the Schenectady County communities along the Mohawk River in partnership with the NYS DOS Local Waterfront Revitalization Program. The plan includes the City of Schenectady; the Village of Scotia; and the Towns of Glenville, Niskayuna, and Rotterdam and was developed to assess the current state of the County's water resources and to guide future development of its waterfront areas. The NYRCR Plan advances the goals of these Waterfront Revitalization Plans by proposing projects that will enhance recreation and tourism in the region for both residents and visitors. For example, the NYRCR Plan includes a project that will provide a drainage channel during high rain events that will double as a bike/hike-tunnel under the Pan Am railroad tracks in Rotterdam Junction. This project would seamlessly reconnect segments of the very popular Mohawk-Hudson Bike-Hike Trail.

Schenectady after the storms
Source: Times Union

II. Assessment of risk and needs

Section II includes a comprehensive overview of community assets, risks, and broader community needs. This includes a description of the process undertaken to identify and inventory assets of community value and its results. These assets were then analyzed to determine the risk of damage or disruption to each asset due to flooding. The risk assessment results are also presented in Section II.

Finally, Section II includes an analysis and discussion of community needs and opportunities.

The results of the asset inventory, risk assessment, and needs and opportunities assessment informed the development of strategies and the identification of projects to implement the NYRCR Plan.

A. Description of community assets and assessment of risk

i. Description of community assets

Over the course of several months the Planning Committee worked to identify and inventory the Community's assets through the process outlined below. The assets were then ranked according to their relative vulnerability and community importance in order to inform the development and prioritization of projects to protect vulnerable assets. A complete asset inventory is provided in Section V.D, Community Asset Inventory.

The **Asset Inventory** provides a complete description of assets that, if damaged or lost during flooding or storm events, would compromise any essential social, economic, or environmental function or critical facility.

a. Asset inventory, data collection, and classification

As part of data collection, the Consultant Team conducted a review of local, State and Federal databases.[30] Data were also collected through a public outreach process that included interviews with community members and State and local agency employees, solicitations for public input during the course of public outreach events, and through Planning Committee consultation. Finally, windshield surveys were used to systematically collect asset-specific data and verify that geo-referencing was accurate.

Community assets were classified according to the six FEMA recovery support functions[31] presented in Table 2.

A subset of assets was defined as "Critical Facilities" in accordance with FEMA.[32] "Critical Facilities" include:

- Structures or facilities that produce, use, or store highly volatile, flammable, explosive, toxic and/or water-reactive materials.
- Hospitals, nursing homes, and housing likely to have occupants who may not be sufficiently mobile to avoid injury or death during a flood.
- Police stations, fire stations, vehicle and equipment storage facilities, and emergency operations centers that are needed for flood response activities before, during and after a flood.
- Public and private utility facilities that are vital to maintaining or restoring normal services to flooded areas before, during and after a flood.

If an asset did not meet FEMA's requirements but was still considered significant by the Planning Committee then it was classified as a "Significant Facility" rather than a "Critical Facility."

Table 2 Types of Assets

Asset Class	Asset Example
Community Planning and Capacity Building	Not applicable
Economic	Office buildings, business and industrial parks, manufacturing, warehouses, storage facilities, grocery stores, restaurants, banks, lodging, storefronts, downtown center, seasonal/tourism destinations
Health and Social Services	Schools, health care, day care, elder care, emergency operations, government and administrative services, media and communications, police, fire and rescue
Housing	Single-family and multi-family dwellings, supportive housing/group homes, senior housing and affordable housing
Infrastructure Systems	State Canal System facilities, pedestrian, bicycle and vehicular ways, transit, bridges, airports, rail, ports, ferries, gas stations, water supply, stormwater, wastewater, solid waste and recycling
Natural and Cultural Resources	Natural habitats, wetlands and marshes, recreation facilities, parks, public access, open spaces, agricultural areas, religious establishments, libraries, museums, historic landmarks, performing arts venues
Vulnerable Populations[1]	Assets predominantly providing housing and services for people with disabilities, low and very-low income populations, the elderly, young children, homeless and people at risk of becoming homeless

[1] Vulnerable Populations are not one of the FEMA RSFs. There is a strong possibility that some assets within the five classes may also serve Vulnerable Populations. As a result the asset inventory was reformatted so that Vulnerable Populations are identified in a separate row, in addition to their identification in the five asset classes.

Risk Area

Assets were categorized into four different risk areas based on location:

- **Extreme risk areas** are areas that are known to have repetitive flooding issues. Extreme risk areas were delineated based on interviews with members of the community and the Planning Committee.
- **High risk areas** are areas within the 100-year flood plain.
- **Moderate risk areas** are areas within the 500-year flood plain.
- **Residual risk areas** are areas located outside of the 100-/500-year flood plain.

Community Value

A community value of **High, Medium, or Low** was assigned to each asset. Community values were assigned by the Planning Committee, based on best judgment and knowledge of the region. The community value represents the outcome or magnitude of damage to the community if an asset was flooded. If an asset valued as **High** was flooded then the outcome would be critical or catastrophic to the communi-

ty. For example, the Schenectady Wastewater Treatment Plant was ranked as **High** for community value because if it floods, raw sewage would flow into the Mohawk River and flood areas of the City, potentially transmitting diseases to humans through direct contact with contaminated potable and non-potable water.

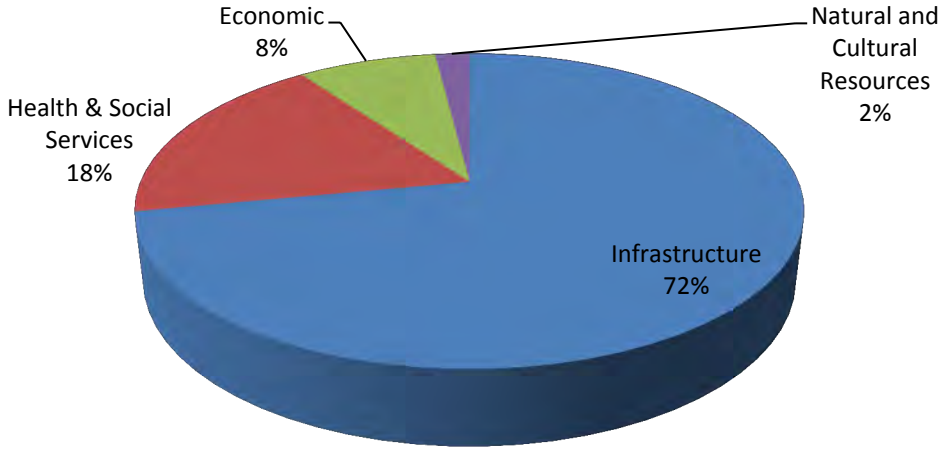
If an asset valued as **Medium** was flooded then the outcome for the community would be marginal. For example, a temporarily closed bridge in Schenectady will not have a significant impact on the community; traffic will be diverted or stalled for a few hours.

Finally if an asset valued as **Low** flooded then the outcome for the community would be negligible. None of the assets were valued as **Low** by the Committee members.

b. Overview of community assets

The majority (72%) of assets in the Study Area fall into the infrastructure class (Figure 3) followed by health and social services (18%).

Figure 3 Asset Categories



Two of the assets identified by the Planning Committee are located outside the Study Area in the Town of Glenville—Lock 9 Barge Canal Park and the Town of Glenville Sewage Lift Station. The Lock 9 Barge Canal Park, categorized by the Planning Committee as of Medium value, is located in a High risk area because it is located along the Mohawk River. This asset is included in the analysis because it is part of the canal infrastructure and was severely flooded during Hurricane Irene and Tropical Storm Lee. The Town of Glenville Sewage Lift Station is located outside of the 100- and 500-year flood plain. The Planning Committee assigned a **High** community value to this asset because it pumps sewage to the Schenectady Wastewater Treatment Plant through a suspended pipe along Freemans Bridge.

Economic Assets

The Planning Committee identified seven economic assets in Schenectady and Rotterdam. These include Nott Street Industrial Park, SI Group, and the GE plant, all of which are located in High risk areas; Niagara Mohawk Remediation Site and Golub Headquarters, located in Moderate risk areas; and the Rotterdam Corporate Park and Golub Distribution Center, located in Low risk areas. Damage to these assets would primarily disrupt business but would not necessarily affect the health or safety of the community.

Health and Social Services Assets

Health and social services assets identified in Schenectady and Rotterdam include elder care, schools, and fire stations. The Pine Grove fire station, a High community value asset, is located an Extreme risk area and has a history of flooding.

Although the Rotterdam Junction firehouse is located outside of the flood plain, it was inundated with several inches of water during Hurricane Irene.

The Schenectady High School and the Rotterdam Senior Center are located outside of the flood plain and have been identified as potential emergency shelters for Rotterdam, Schenectady, and the County.

The Planning Committee and members of the public consider the Rotterdam Junction Firehouse, Schenectady High School, and Senior Citizens Center as important projects for enhancing flood disaster mitigation, preparedness, and response and recovery efforts in both a local and regional capacity. Impairment or loss of critical fire and rescue facilities would place the lives of community members affected by flooding in jeopardy.

Housing

The Stockade and East Front Street neighborhood are located in an Extreme risk area and therefore are a High value to the community.

Although Rotterdam Junction is located in a Moderate risk area, it is also considered of High value to the community. The primary focus for Rotterdam Junction is to improve drainage through and along the Old Erie Canal to reduce the amount of flooding from future storms.

Infrastructure Assets

Infrastructure assets identified in Schenectady and Rotterdam include water, waste water and sanitary sewer facilities, bridges and associated intersections, and electric utilities. Because most of the assets are infrastructure facilities, this section is sub-divided into risk categories.

High Risk Areas

Approximately 50% of the infrastructure assets are located in High risk areas (i.e., the 100-year flood plain). Four of these assets, the North Ferry Street Sanitary Sewer Pump Station, Lock 9 Bridge, Lock E-9 dam, Lock 9 barge, and the Lock E-8 dam, are located in Extreme risk areas and were assigned a High community value by the Planning Committee due to the major impact these assets would have on the community if they were to fail.

Additional assets located in High risk areas with a High community value include bridges in both Schenectady and Rotterdam that, if damaged, could potentially disrupt traffic patterns for an extended period of time; water and wastewater facilities; and private companies, including National Grid.[33]

Two of the community's three drinking water facilities—the Schenectady well head facility and Rotterdam District #5 well head facility, are located in a High and Moderate risk area, respectively. The Rotterdam District #3 well head facility is located outside of the 100-/500- year floodplain.

Loss or impairment of these facilities would eliminate the availability of public water for drinking, cooking, washing, and the flushing of toilets. This would represent an immediate public health risk.

Moderate Risk Areas

Forty percent of the infrastructure assets fall within the 500-year flood plain. The majority of these assets are bridges, followed by water and waste water facilities; remediation sites; and a section of Route 5S between Karl Street and Old Crawford Road in Rotterdam.[34]

The Schenectady Wastewater Treatment Plant (WWTP), a critical facility adjacent to the Mohawk River, was assigned a High community value by the Planning Committee. Flood damage to this critical asset would disrupt community recovery from and could result in significant environmental and public health impacts.

Residual Risk Areas

The remaining 10% of the infrastructure assets fall outside of the 100-/500-year flood plain—the Town of Glenville Sewage Lift Station, which pumps across the river to the City WWTP, the Rotterdam District #3 well head facility (described above), and Freemans Bridge, located on Maxon Road. This bridge flooded on the northern approach of the Glenville side.

Natural and Cultural Resources Assets

The Planning Committee identified four natural and cultural resources assets. Schenectady contains the oldest historic neighborhood in the region, the Stockade. The Stockade is located in a High risk area. The buildings on Mabee Farm, a historic site in Rotterdam Junction, are in the Low risk area, but much of the property is in the Moderate risk category along the Mohawk River.

Planning Committee members believe Gateway Plaza/Liberty Park in Schenectady to be of High community value. Most of the area – bounded by State Street, Washington Avenue, and Erie Boulevard – is in the 100-year flood plain. The City plans to expand Liberty Park, enhancing downtown pedestrian connectivity and open space. The new park would be a focal point for the community college and would drive redevelopment opportunities of other privately owned property that experience repetitive flooding. Redevelopment would include elevation of the new buildings to provide relief from flooding with parking beneath each building.

There are no NYS DEC-identified wetlands located within the Schenectady Study Area. However, a few NYS DEC-identified wetlands border the Mohawk River across from Schenectady in the Town of Glenville and Village of Scotia. One large NYS DEC wetland falls on either side of Old River Road in Rotterdam. These wetlands contribute to flood control by slowing the speed of flood waters, distributing, and infiltrating the water slowly over the floodplain. The wetlands are valuable to Rotterdam because they help to reduce the amount of surface water runoff from pavements and buildings.

ii. Assessment of risks to assets

a. Objective of the risk assessment

Risk is the probability that an asset will be damaged or destroyed during a major storm event. The Committee assessed the risk to assets to:

- Understand those assets and geographic areas within the community that are most at risk of storm damage; and
- Inform the selection and prioritization of projects for which the community benefit would be greatest.

b. Approach to the risk assessment

The NYRCR Risk Assessment Tool, developed by NYS DOS, was used to evaluate the risk to community assets identified in the asset inventory. The Risk Assessment Tool used three primary factors – hazard, exposure and vulnerability – to calculate the relative risk (the Risk Score) to each asset in the event of a 100-year storm (1% annual chance).

*The **Risk Area** and **Risk Score** categories use similar terminology:*

- ***Risk Area Categories** include Extreme, High, Moderate, and Residual*
- ***Risk Score Categories** include Severe, High, Moderate and Residual*

The detailed methods used to conduct the risk assessment are described in Section V.E.

c. Risk assessment results

The Risk Score helps to identify the assets within the community that may be at an increased potential for storm damage. In addition to the Risk Scores – described below and presented in Figure 4 – the following factors should be considered when evaluating risks and developing a community risk management strategy. The additional factors include:

- The asset's contribution to life safety;
- If the asset is a critical facility;
- The community value of the asset;
- The environmental services provided the economic contribution of the asset;
- What alternatives are available; and
- The capacity of the asset to adapt.

The Risk Scores were classified according to the categories in Table 3.

Table 3 Risk Score Categories and Definitions

Risk Score Category	Definition
Severe	The asset is in a dangerous situation. Both exposure and vulnerability are high for the asset and should be reduced, if possible. Relocation may be a priority for these assets.
High	Conditions exist that could lead to significant negative outcomes from a storm, with the likely loss of service of an asset for an extended period of time. For many assets this may be unacceptable. If a high risk score is the result of a high vulnerability, actions, such as elevating or flood-proofing the asset, to help avoid a long-term loss of function. If a high risk score is the result of a high vulnerability, actions such as elevating or flood-proofing the asset to help avoid a long-term loss of function should be taken. If the high risk score is the result of a high exposure, many local landscape attributes that would help protect an asset against storm damages are not present. This would necessitate actions to restore landscape attributes. If the overall risk score is higher than 24, exposure and/or vulnerability are higher than may be acceptable. A score greater than 24 may necessitate relocation in the future if other possible adaptation or management actions are not effective in protecting against flood damage.
Moderate	Conditions related to this asset pose moderate to serious consequences, but assets may have lower vulnerability or exposure scores. A combination of measures should be used to reduce exposure and/or vulnerability.
Residual	Floods would pose minor or infrequent consequences. However, risk is never completely eliminated. Some residual risk still remains even after management measures have been implemented. It should be noted if an asset receives a residual risk score but is considered a critical facility, even this small amount of risk may not be acceptable. If this is the case, management actions should be undertaken to eliminate risks.

When considered in conjunction with the features described above, the Risk Scores produced by the Risk Assessment Tool are a vital component of the project prioritization process. The Planning Committee was able to more objectively evaluate and prioritize projects that would best protect the assets deemed most valuable to the community as well as those projects that would contribute to long-term economic growth.

Table 4 groups the assets under each community to summarize the Risk Score. Maps showing each asset and its corresponding Risk Score are presented in Figure 4. The most vulnerable assets within Schenectady and Rotterdam are houses, some of which have been abandoned since the storms.

Table 4 Summary of Risk Scores

Risk Score (100-year flood event)	Schenectady Assets (#)	Rotterdam Assets (#)	Critical Assets (#)	Total # of Assets
Severe	-	-	-	-
High	3	1	4	4
Moderate	11	9	9	20
Residual	10	25	18	35

Assets with High Risk Scores

The NYRCR risk analysis tool indicates that none of the assets are considered to be at Severe risk and only four were calculated to be at High risk. Each of the four assets is located in Extreme risk areas. These assets include:

- **Pine Grove Fire Station.** The fire station is located two miles southwest of Rotterdam along the Normans Kill in the 100-year flood plain.
- **Stockade Historic District.** A portion of the Stockade is located in an Extreme risk area that borders the Mohawk River. This historic neighborhood is connected to the East Front Street neighborhood.
- **Nott Street Industrial Park.** This industrial park is located along the Mohawk Rover and is undergoing development and remediation with alternate funding sources.
- **Lock E-9 Dam at Rotterdam Junction.**

Assets with Moderate Risk Scores

- Twenty assets received Moderate Risk Scores. Eleven of these assets are located in Schenectady and include bridges, wastewater facilities, private utility companies, the SCCC and Liberty Park. The remaining nine assets, in Rotterdam, include bridges, roads, canal infrastructure, the former DEC Mine-Bonded Concrete site and the drinking water well field that serves Schenectady.

- All but five of these assets are located in the 100-year floodplain. These five assets are located in the 500-year flood plain and include the Schenectady WWTP, roads, Rotterdam Square Impoundment Dam, and bridges. Since their vulnerability score is Low, these assets received a Moderate risk score due to their location in the floodplain.

Assets with Residual Risk Scores

- Thirty- five assets were calculated as being at residual risk. Fourteen of these assets are bridges located in both Schenectady and Rotterdam. These bridges were included in the analysis because they are located in the 100- and 500-year flood plain.
- In addition to bridges, assets at residual risk in Schenectady include the Schenectady High School, remediation sites, businesses, and roads. Additional assets in Rotterdam include two of the Rotterdam firehouses, District 1 and 4, Golub Distribution Center, Rotterdam Corporate Park, Rotterdam Senior Center, Mabee Farm, five Sanitary Lift Stations, BOCES building (former Woestina High School), Rotterdam Drinking Wells District #3 and District #5, and SI Group. All but the Rotterdam Drinking Well District #5 facility and Schenectady International are located outside the 100- and 500-year flood plain.

Figure 4: Assessment of Risk to Assets
City of Schenectady and Town of Rotterdam
Overview

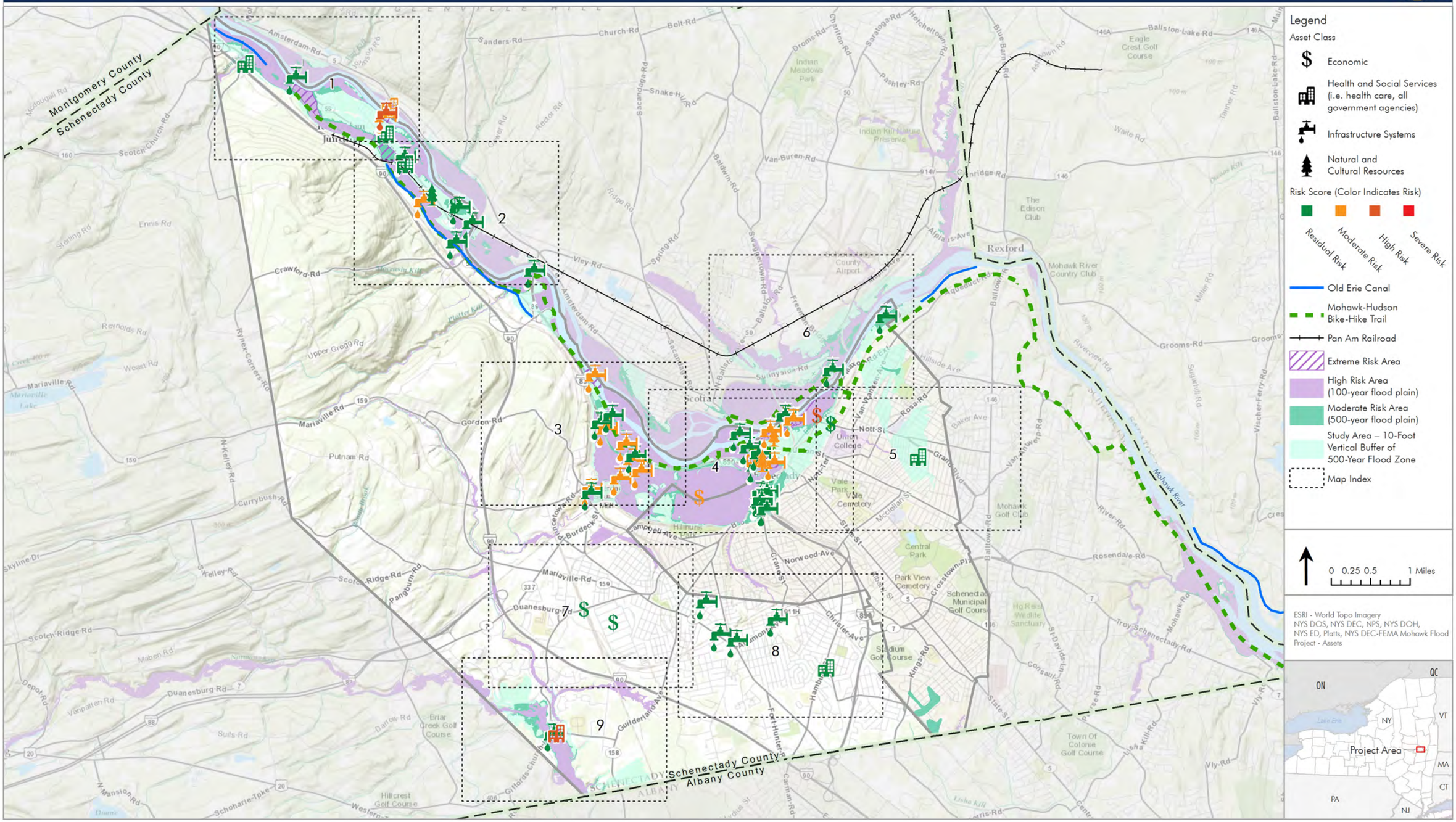


Figure 4: Assessment of Risk to Assets

City of Schenectady and Town of Rotterdam

Frame 1 of 9

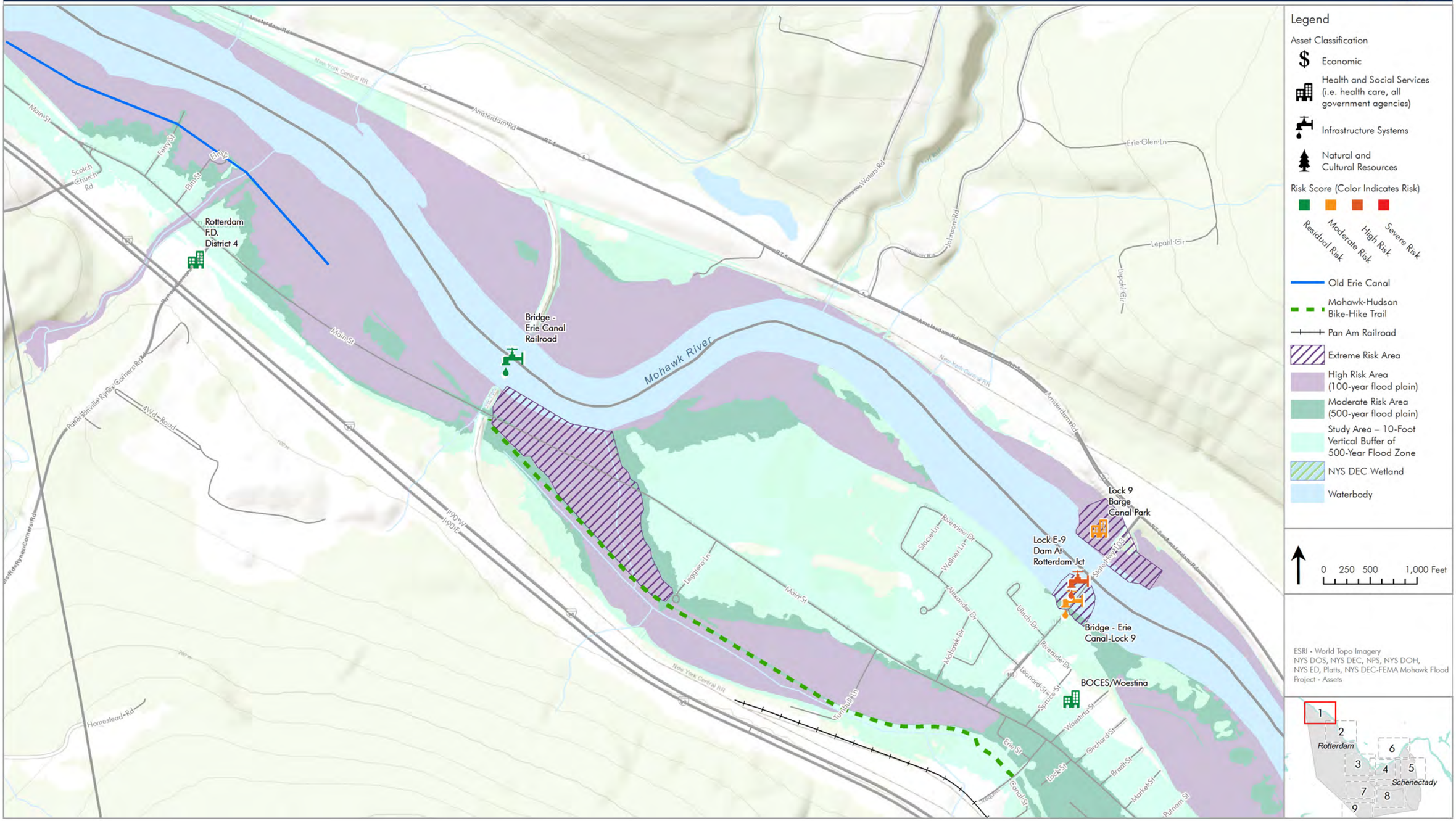


Figure 4: Assessment of Risk to Assets
City of Schenectady and Town of Rotterdam
Frame 2 of 9

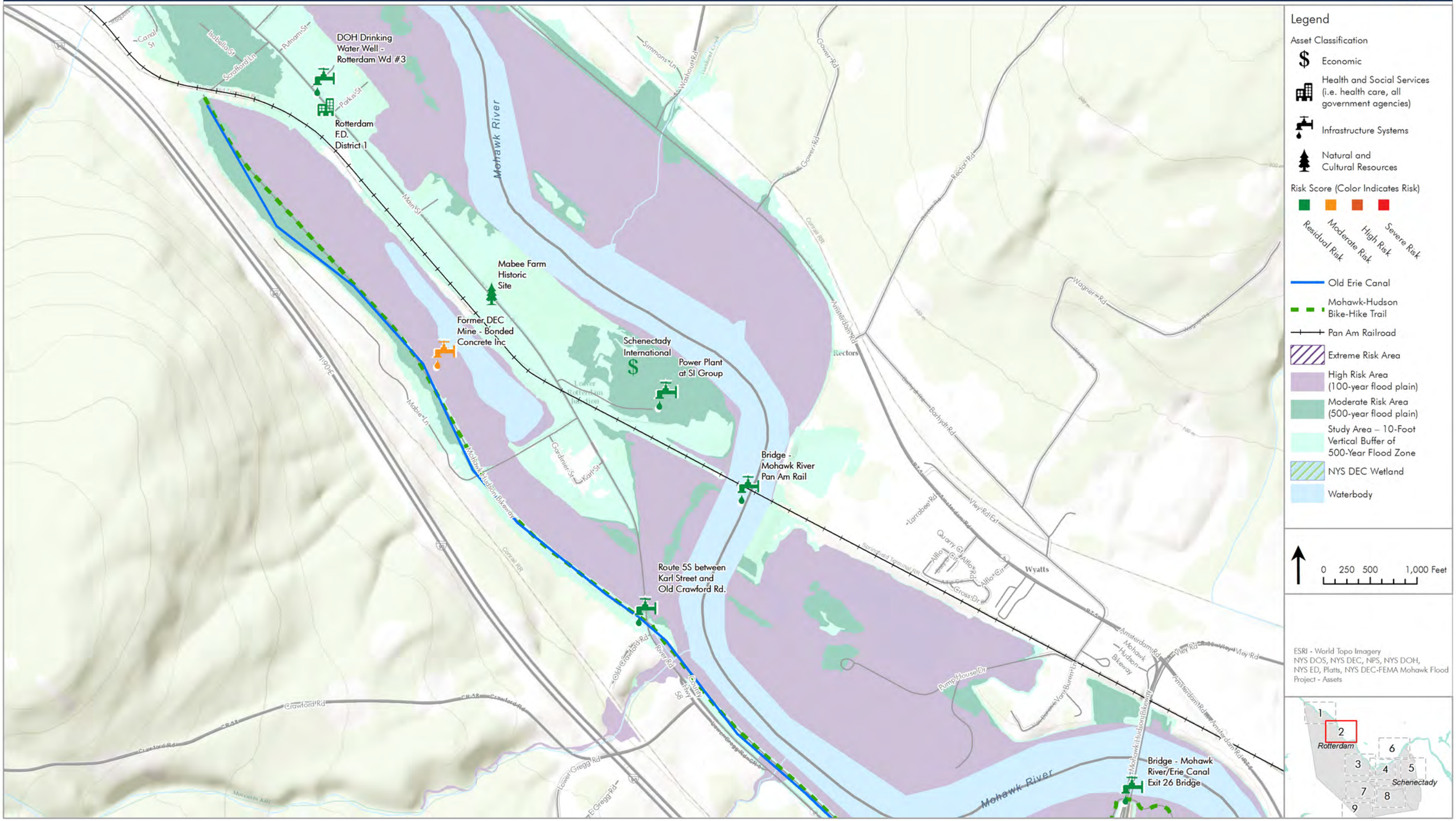


Figure 4: Assessment of Risk to Assets

City of Schenectady and Town of Rotterdam

Frame 3 of 9

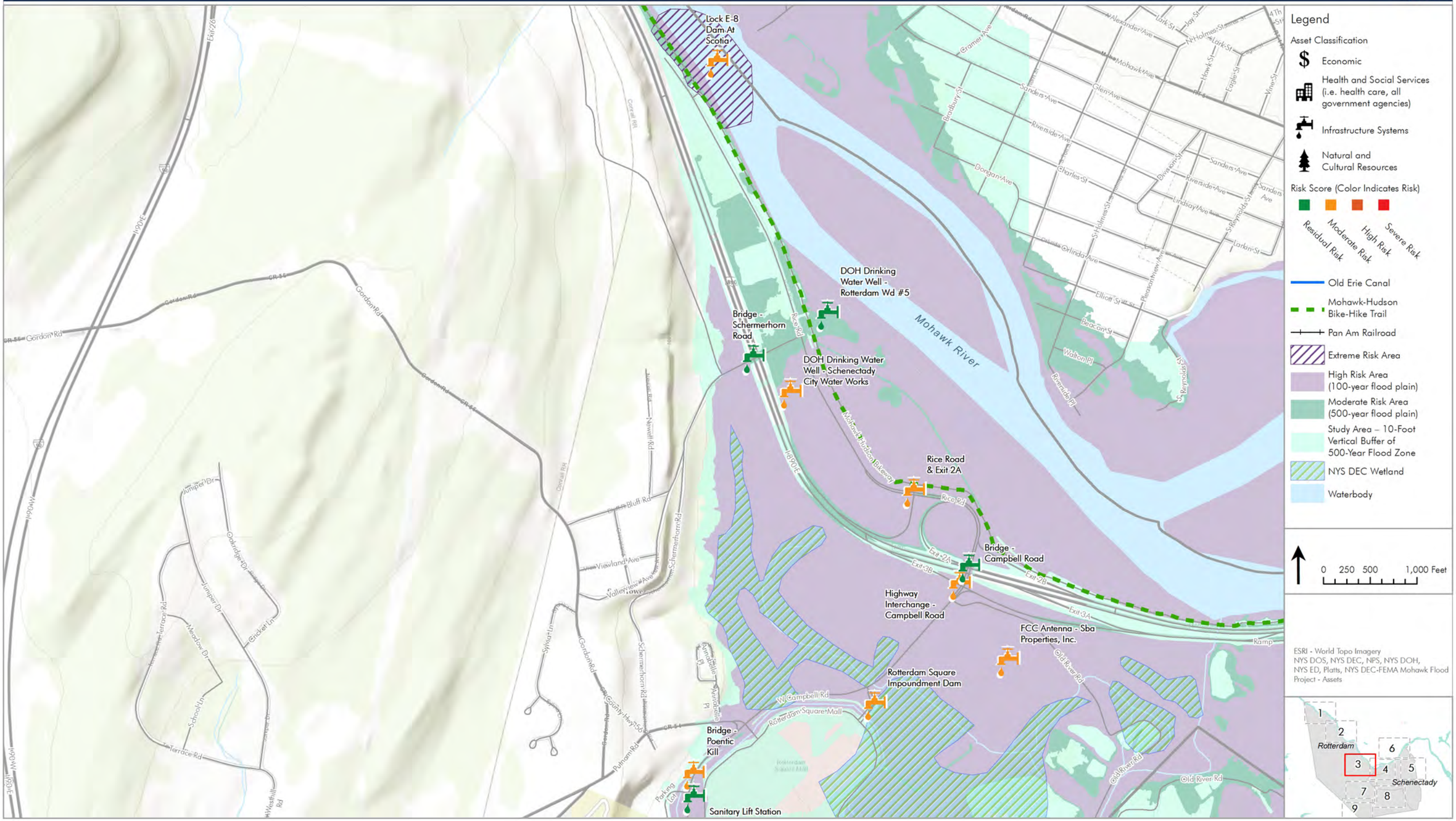


Figure 4: Assessment of Risk to Assets
City of Schenectady and Town of Rotterdam
Frame 4 of 9

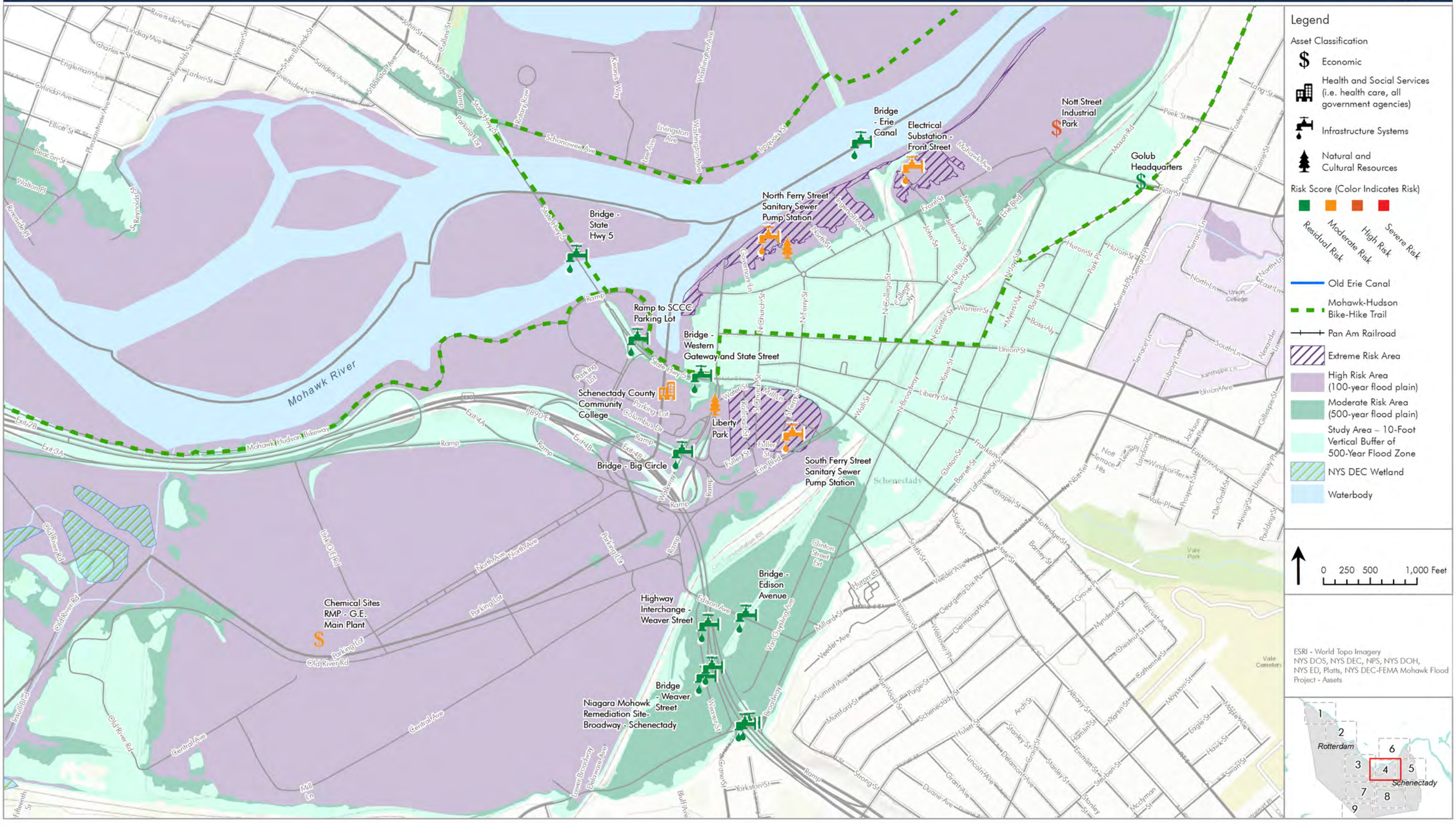


Figure 4: Assessment of Risk to Assets
City of Schenectady and Town of Rotterdam
Frame 5 of 9

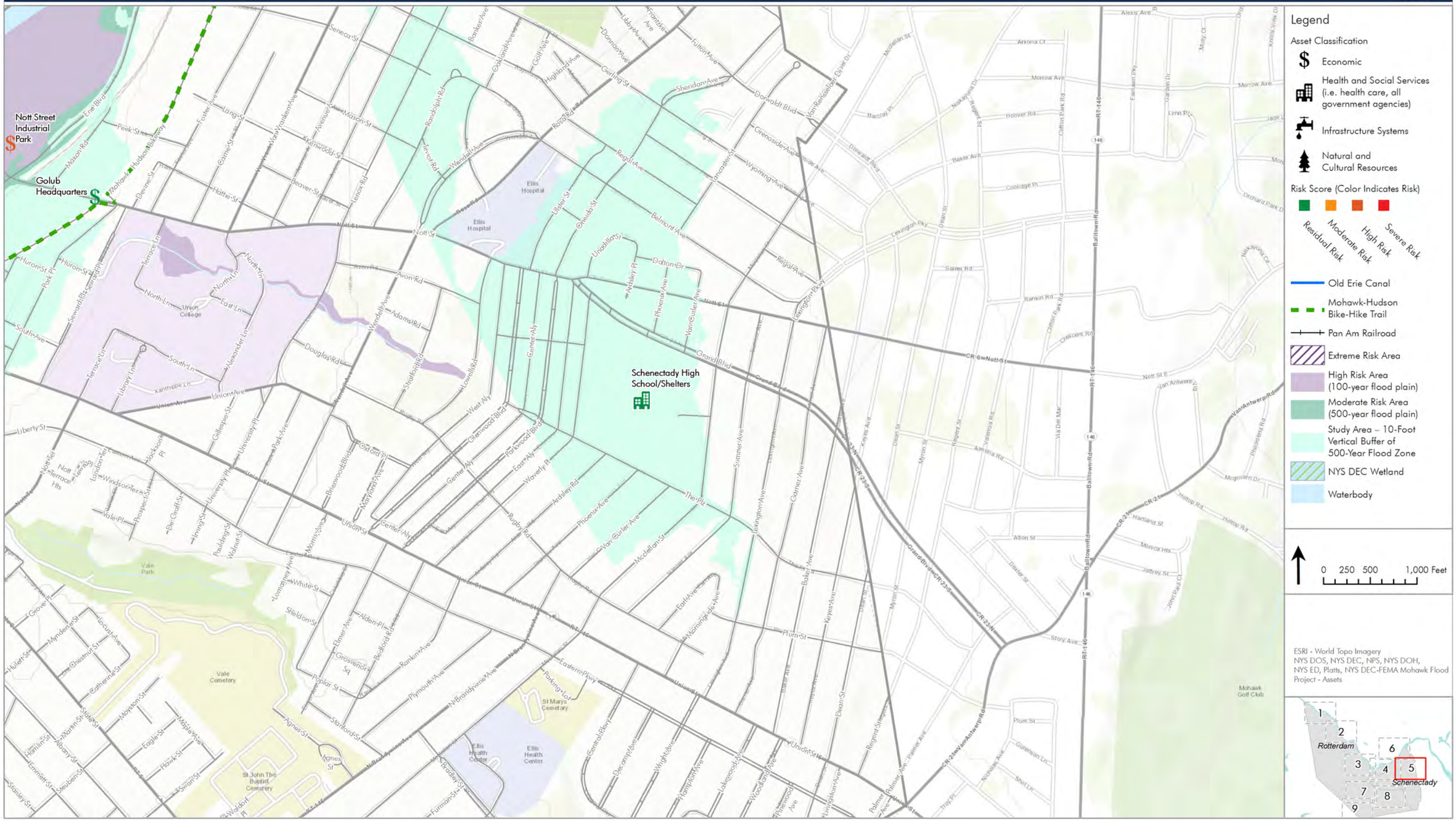


Figure 4: Assessment of Risk to Assets

City of Schenectady and Town of Rotterdam

Frame 6 of 9

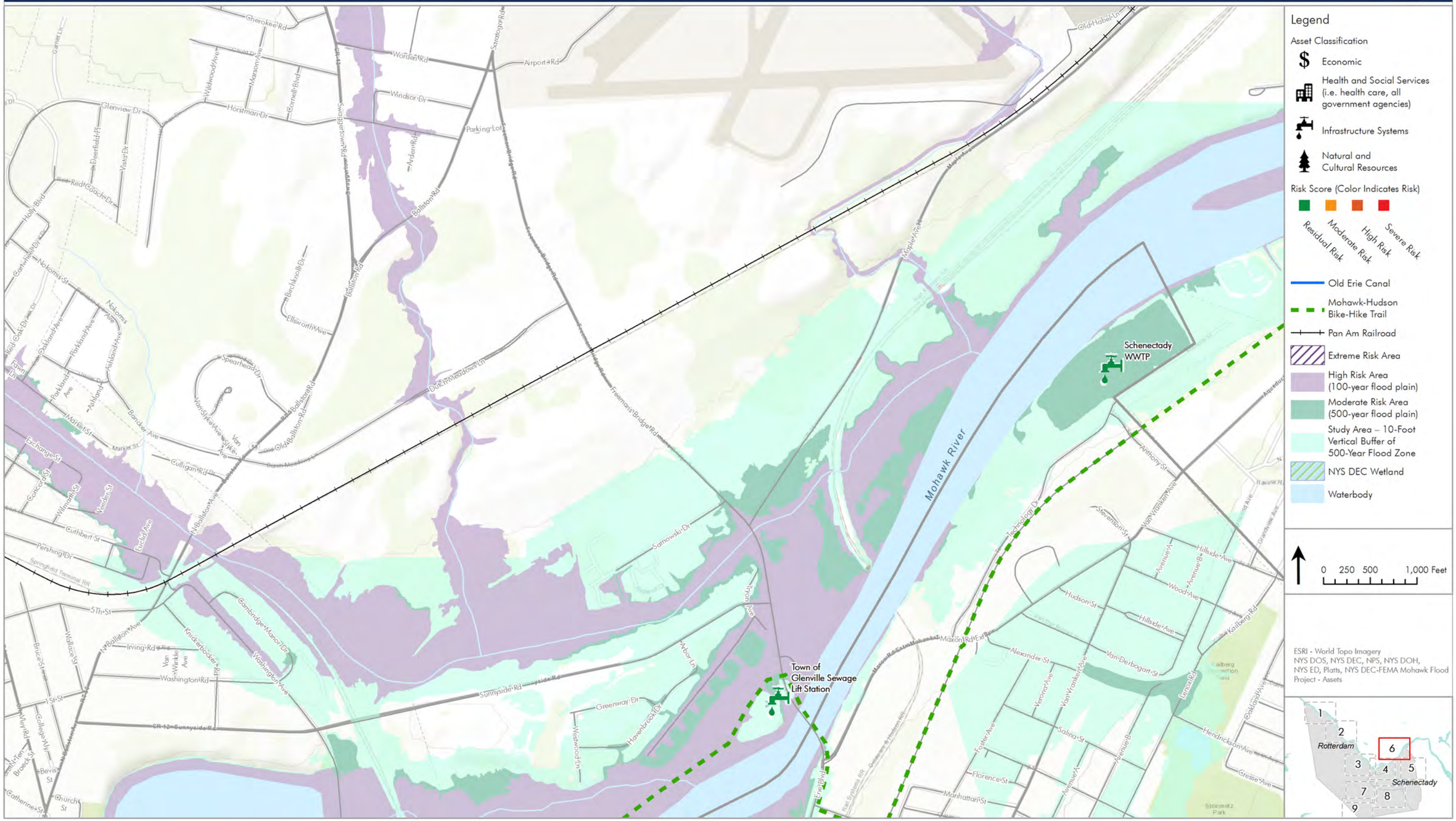


Figure 4: Assessment of Risk to Assets

City of Schenectady and Town of Rotterdam

Frame 7 of 9

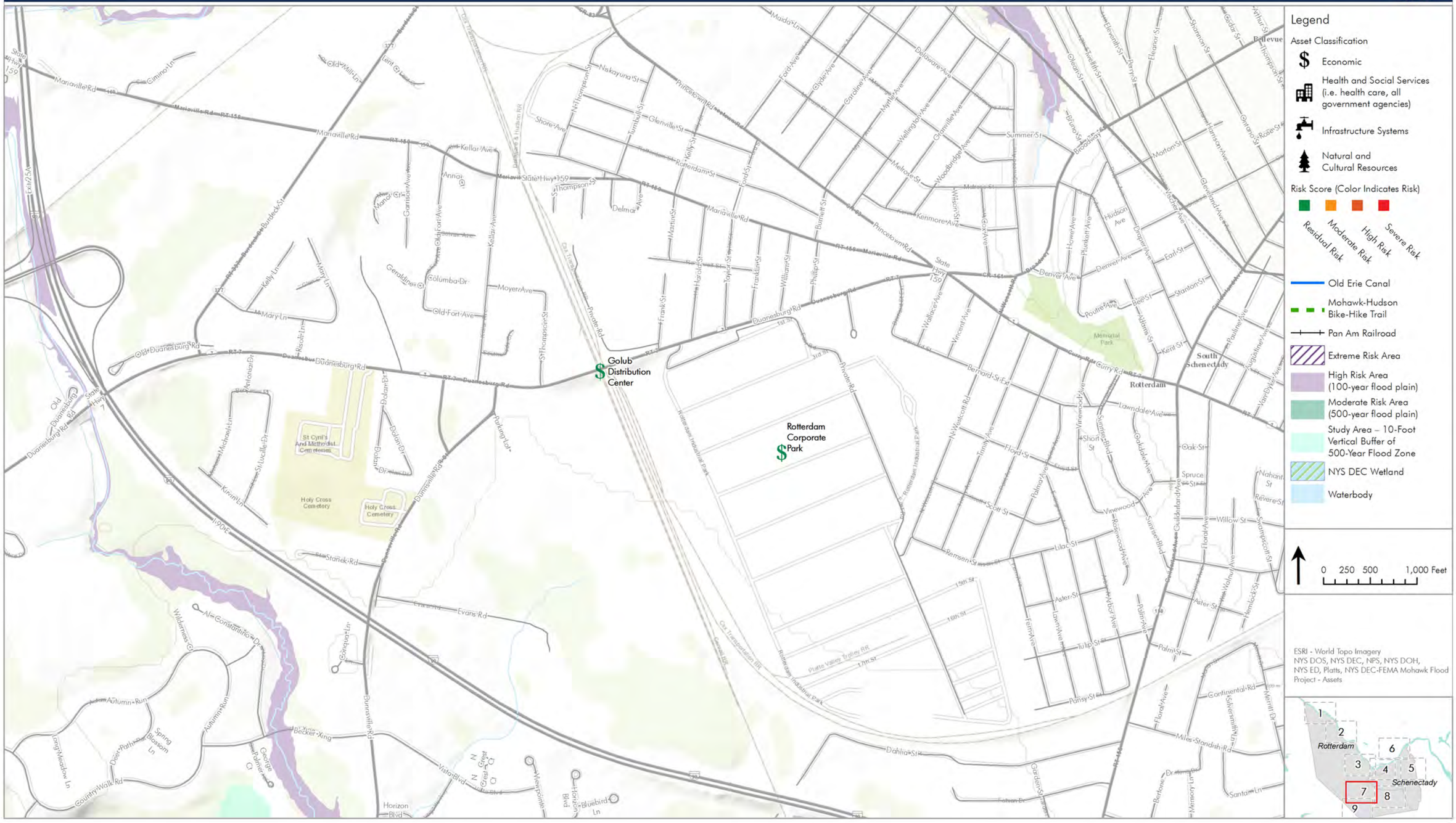


Figure 4: Assessment of Risk to Assets

City of Schenectady and Town of Rotterdam

Frame 8 of 9

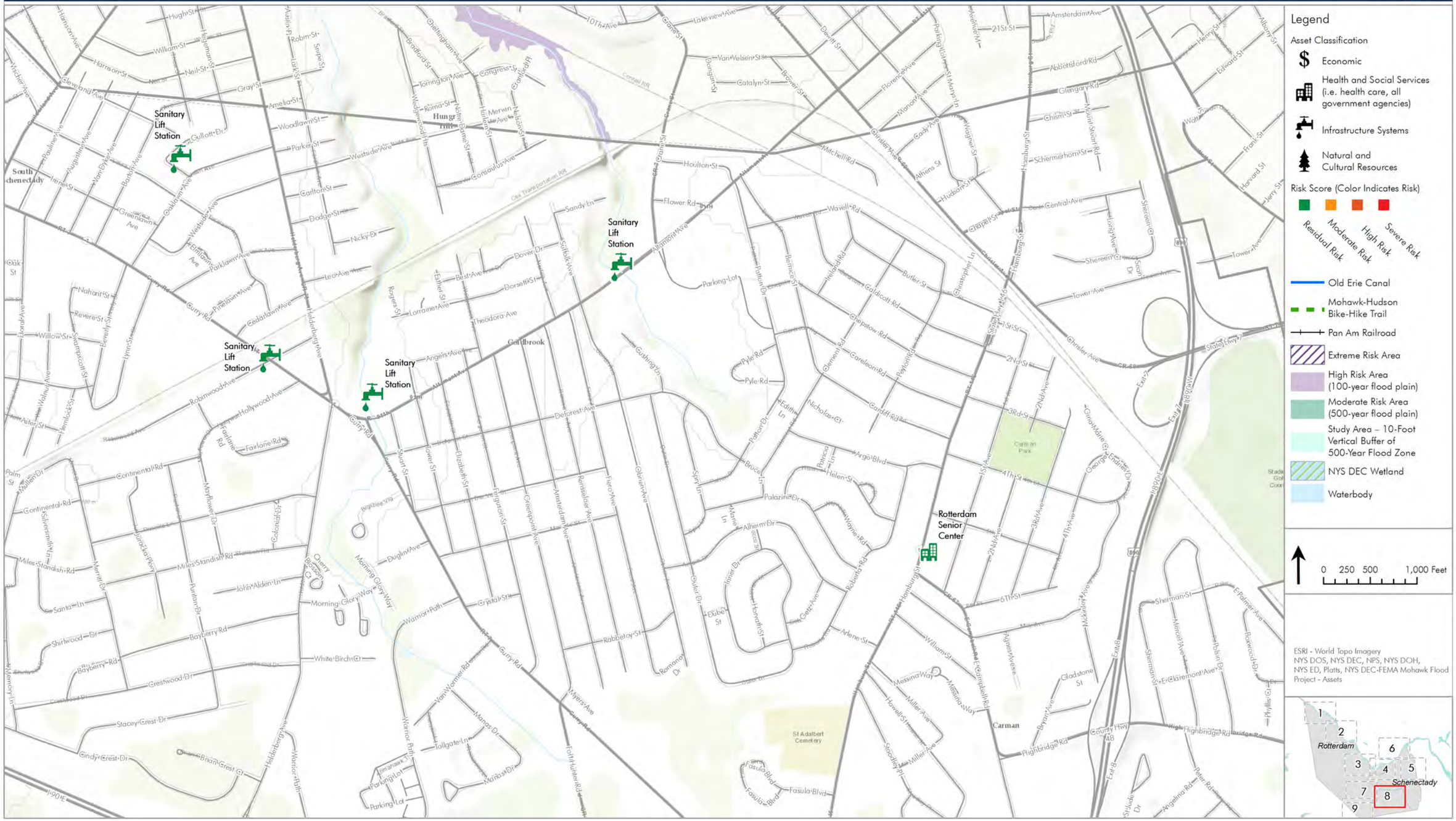
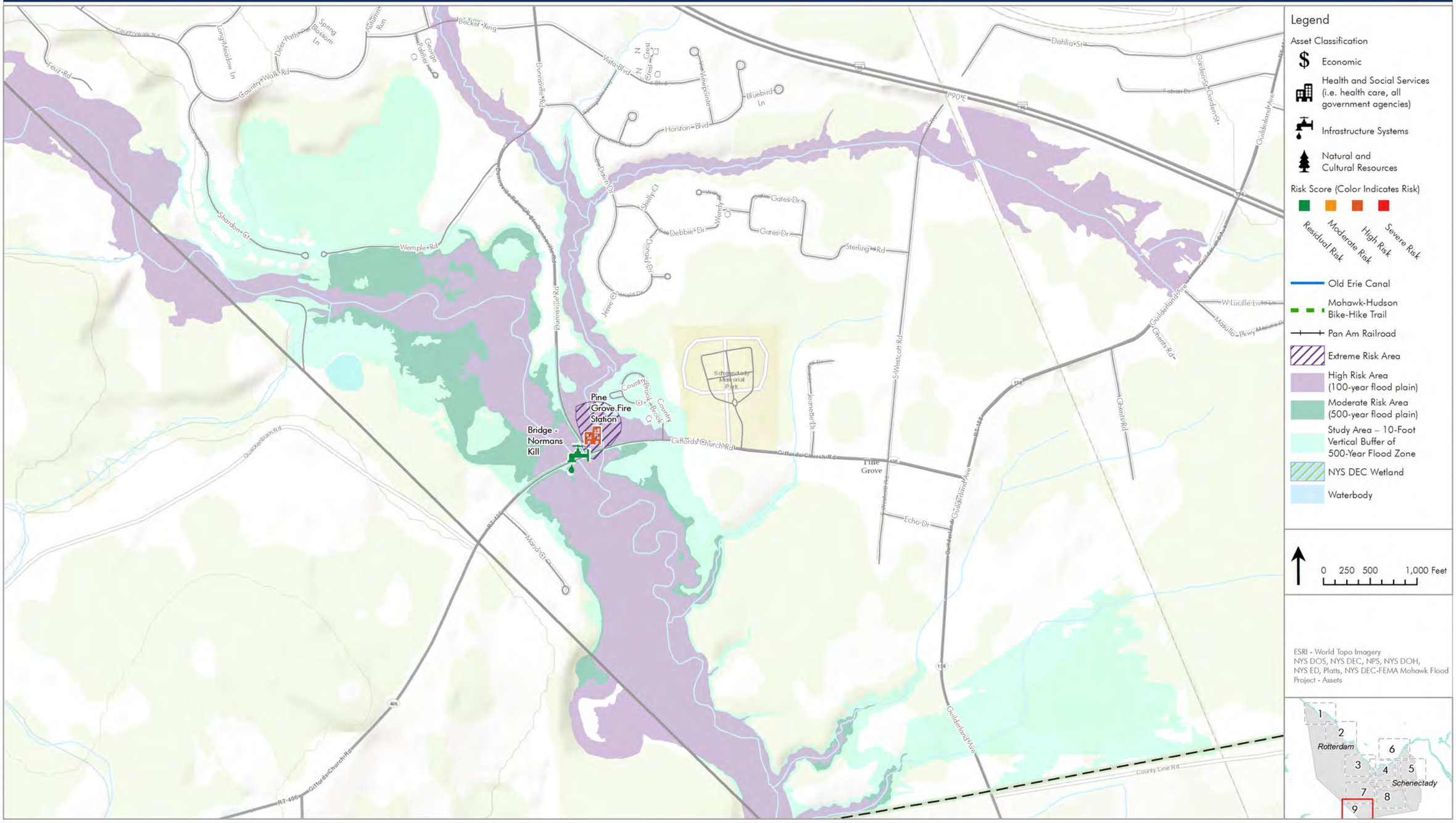


Figure 4: Assessment of Risk to Assets
City of Schenectady and Town of Rotterdam
Frame 9 of 9



B. Assessment of needs and opportunities

Community needs and opportunities to support recovery and resilience were assessed by the Planning Committee. Strategies that address the needs and opportunities are presented in Section III, Reconstruction and resiliency strategies.

i. Community planning and capacity building

At the local and neighborhood level, both Rotterdam and Schenectady have completed many plans and studies in support of community planning, transportation, economic development and neighborhood revitalization and recreation, of which some include flood recovery. However, much of the planning predates Hurricane Irene and Tropical Storm Lee. These local and regional plans continue to be relevant, but more in-depth consideration of flood impacts, community services, and future development plans in the Study Area is needed, particularly at the local level.

Schenectady has met with success recently in its efforts to promote economic development. Revitalization of the downtown area has started, commencing with a renovation and expansion of Proctor's Theatre and assistance from the Metroplex Development Authority, a Schenectady County economic development authority. The City has significant economic development capacity, including a Department of Development that oversees planning and development activity, administers development in the Empire Zone, a portion of which is the Study Area, and staffs the Schenectady Local Development Corporation.

Through coordinated efforts among Rotterdam Junction, Schenectady County, and NYS DOS, Rotterdam has developed a Long-Term Community Recovery Plan that includes strategies and projects for long-term community recovery and revitalization. This plan supports Rotterdam's capacity to undertake development projects, primarily infrastructure-related projects.

Emergency preparedness

Schenectady County's website (www.schenectadycounty.com) provides information to residents about how they can prepare themselves for future flood events. The website includes the Schenectady County Flood Brochure to inform residents about flood preparedness. There also is a Voluntary Evacuation Registry for seniors and residents with special needs and other information on preparing for an emergency. Input from the Rotterdam Junction flood recovery effort indicated that the capacity of emergency services was severely taxed during the flood. Additional generators and electrical upgrades, emergency equipment, and trailers are needed at fire houses and shelters. Further, the lack of a robust evacuation plan or evacuation route system, combined with a need for better communication between different levels of government regarding road and bridge closures, may have contributed to the number of residents who were stranded in Rotterdam Junction when bridges were damaged and roads washed out.

Needs and Opportunities

Emergency shelters and supplies need to be located close to the assets and populations that are at risk in the event that roads and bridges are impassable. Communications depend upon backup generators and other equipment.

- Emergency shelters and emergency supplies need to be created and stocked so that populations can be served during an emergency.
- Communications equipment, emergency power, and transportation via airboat would provide an important layer of safety and security.

Regulatory actions

Both Schenectady and Rotterdam have instituted regulatory reforms to protect lives and property in the event of flooding. Both communities follow the Uniform Fire Prevention and Building Code. These codes assure that construction and major renovations are conducted according to industry standards. Zoning is present in Rotterdam and Schenectady, and periodic updates have designated waterfront areas that restrict new development in the flood zones. Updates to the zoning code have designated the Stockade neighborhood as an historic district, assured wellhead protection in both communities, planned for re-development of brownfield areas, and set a vision of downtown redevelopment in Schenectady that protects assets while encouraging economic growth.

Needs and Opportunities

The following needs and opportunities address the community's ability to implement storm recovery activities and to plan how to mitigate the effects of future storms.

- Long-range plans such as Comprehensive Plans need to be updated to address land management in flood prone areas and planning efforts for recovery and resiliency.
- Existing building codes, design guidelines, zoning laws and other land management regulations need review and revision to reflect new building code recommendations and best practices for development in flood-prone areas. This would support long-range planning in Schenectady and Rotterdam. Flood protection laws and protection of riparian zones would help to focus long-range planning efforts on recovery and resiliency.
- Rotterdam needs to establish and disseminate an evacuation plan that includes multiple evacuation routes to prevent residents from being stranded during storm events. These plans should be included in the updated Schenectady County Comprehensive Emergency Management Plan (CEMP).
- Schenectady and Rotterdam need sufficient emergency services to adequately serve the community during a disaster. Potential shelter locations require building and electrical upgrades with back-up generators, additional emergency equipment, supplies and trailers.

ii. Economic Development

While Schenectady and Rotterdam Junction have distinct economies, both are vulnerable in the face of extreme flooding. Existing businesses in Schenectady and Rotterdam need to be protected from flood damage in order to maintain a strong economic base. Some businesses flooded during the storms but were able to recover from inventory and sales losses and other property damage.

Needs and Opportunities

- Residents of the Schenectady need more opportunities for jobs paying a living wage so that they can more easily recover from losses.
- As an important institution of higher education and a large employer, Schenectady County Community College needs infrastructure improvements to mitigate impacts from future flooding.
- Flood-prone areas in Schenectady previously identified as key opportunities for development, such as the East Front Street neighborhood and the ALCO site, need site and infrastructure improvements, to mitigate flooding potential.

iii. Health and social services

After a disaster, one of the more immediate considerations is whether public health, health care facilities, and essential social service needs have been restored. This is especially critical for vulnerable populations, such as the elderly, physically or mentally disabled, and non-English speakers.

Needs and Opportunities

- Vulnerable populations dependent on social services require additional support in the post-disaster period. Special needs populations (infirm, mentally or physically disabled, and homeless) are disproportionately affected during disasters and may need additional services including transportation or first responder assistance to get out of harm's way.
- Emergency planning needs to be updated with evacuation routes to ensure vulnerable populations can be safely evacuated from their homes.
- Schenectady County needs to establish health and social service buildings outside the flood zones as emergency shelters to adequately serve those in need of food, shelter, and medical care.

The Center for Disease Control (CDC) states that many health departments throughout the United States use the following language to describe at-risk or vulnerable populations: "groups whose needs are not fully addressed by traditional service providers or who feel they cannot comfortably or safely access and use the standard resources offered in disaster preparedness, relief, and recovery. They include but are not limited to, those who are physically or mentally disabled (blind, deaf, hard-of-hearing, have cognitive disorders, or have mobility limitations). Also included in this group are those who are non-English (or not fluent) speakers, geographically or culturally isolated, medically or chemically dependent, homeless, frail elderly, and children."

iv. Housing

Hurricane Irene and Tropical Storm Lee caused extensive damage to homes in both Schenectady and Rotterdam Junction. As discussed previously, many property owners in these neighborhoods do not have the resources to relocate or flood-proof their buildings.

Many of the houses damaged in Rotterdam Junction were outside the 100-year flood zone or were older homes with no mortgages and therefore not required to carry flood insurance.

The Stockade and East Front Street neighborhoods frequently experience flooding during heavy rain events and ice jams. The Stockade's status as an Historic District listed on the State and National Register of Historic Places creates challenges for mitigating flood damage. The high cost of elevating structures out of the floodplain and the desire to maintain these historic and cultural assets have thwarted efforts in the past.

Needs and Opportunities

- Cost burdened renters and owners need comprehensive information about financial aid during recovery.
- Homeowners and renters need sufficient shelter options when housing becomes uninhabitable or too costly.
- Some existing housing in floodplain areas needs upgrades to protect against future flood impacts.
- Plans to reduce the vulnerability of historic housing stock to flooding need to be developed for the Stockade.

v. Infrastructure

During Hurricane Irene, the majority of flood damage in Rotterdam Junction was due to flood waters infiltrating the poorly drained Old Erie Canal system, which was abandoned decades ago. In addition, many culverts in the drainage area in and around the Old Erie Canal were blocked and caused severe localized flooding. As a result of this flooding, the only way out of the Junction was the Route 103 Bridge, which in turn was severely damaged, closed to traffic, and eventually washed away.

All primary water sources for Schenectady and Rotterdam are located in the NYRCR Plan Study Area and could be impacted by flood events. Schenectady's public water system serves the entire city as well as portions of the surrounding Towns of Rotterdam and Niskayuna.

Similar to older systems in other communities around the country, storm water infiltration and inflow remains a significant issue for Schenectady. The result of this infiltration and inflow problem is that the City's sewer system is occasionally overwhelmed during very large storms, causing some effluent to bypass the treatment plant and flow directly into the Mohawk River.

Needs and Opportunities

The following infrastructure needs and opportunities were identified by the Planning Committee based on impacts from the storms and potential impacts from future storms on existing critical infrastructure assets.

- Important wellheads in Rotterdam that serve Rotterdam, Schenectady and other surrounding communities could be better protected from flooding through berming.
- A sewer system for Rotterdam Junction would help address aquifer contamination potential from existing septic systems.
- Wellheads need to be outfitted with automatic transfer switches for generators for use during power outages.
- Culverts throughout Rotterdam Junction need to be resized where necessary and maintained properly to be able to accommodate large quantities of water during flooding situations.
- The Old Erie Canal needs to be cleared to maximize capacity and prevent overflows.
- Sewer treatment facilities in Schenectady need to be protected from flood impacts.
- Pump stations in the City need to be relocated or protected to prevent future flood impacts.

vi. Natural and cultural resources

Natural resources

The Mohawk River joins the Hudson River, creating a waterbody that provides inland travel from New York City to the Great Lakes. Today, the Mohawk River is used more for recreation than for transportation or cargo.

There are four NYS DEC-designated wetland areas in the Rotterdam portion of the Study Area. Two are located in the abandoned bed of the former Erie Canal; another is at the west end of the GE Plant south of Rotterdam Square Mall and is part of the 105-acre wetland into which the Poentic Kill flows. Wetlands regulated by the U.S. Army Corps of Engineers are located between the Rice Road exit ramp of I-890 and the Mohawk River. NYS DEC has identified this area as important wildlife habitat.

The following structures in the Study Area are individually listed on the NRHP:

- *H.S. Barney Building*
- *Central Fire Station*
- *Foster Building (Foster Hotel)*
- *Hotel Van Curler*
- *F.P. Proctor Theatre and Arcade*
- *Schenectady Armory*
- *Schenectady City Hall*
- *Mabee House*
- *Historic Lock 23*

Historic resources

Schenectady County as a whole has 91 historic sites.[35] The County has created several self-guided driving tours that can be customized based on personal interests. Rotterdam Junction is an area rich in history and is the location of several historic homes and properties as well as the Old Erie Canal. Mabee

House, which is part of the Mabee Farm, and Old Erie Canal Lock #23 are listed on the NRHP. Besides the Stockade, there are several structures listed on the State Register of Historic Places and the NRHP that are located in the Study Area. Some are in the 500-year floodplain or its buffer.

Recreation

The Mohawk-Hudson Bike-Hike Trail, the portion of the state-wide Canalway Trail that follows the Erie Canal from Buffalo to Albany runs through the NYRCR Plan Study Area from the railroad overpass in Pattersonville to SCCC, with a small portion on Route 5S that detours around railroad tracks and residences in Rotterdam Junction. This is the only major gap in the trail. The gap is caused by Guildford Rail's (Pan Am Railways) blocking the former crossing at Scrafford Lane. Trail users are detoured a half mile along busy Route 5S, while some users must cross while weaving through train cars.

Within the Rotterdam Junction section of the Study Area are three parks offering various amenities:

- Woestina Park, on Putnam Street has a basketball court, playground equipment, and is home to Rotterdam Little League.
- Kiwanis Park on Route 5S is on the Mohawk-Hudson Bike-Hike Trail and has a boat launch and picnic area.
- Erie Canal Lock 8 Park has a car top beach landing boat launch, picnic and fishing areas, and provides access to the Mohawk-Hudson Bike-Hike Trail.

Several small city parks exist in the Study Area, however, most of the City's large active park land is outside. Passive parks include Liberty Park and Veteran's Park, which are both located on State Street. Active parks include South Avenue Park, Front Street Park, and Riverside Park.

Photo Credit: Jim Kalohn, Schenectady County Planner

Mohawk River

Needs and Opportunities

To develop the appropriate strategies that address natural and cultural resources, the Planning Committee identified the following needs of the NYRCR Community.

- The gap in the Mohawk-Hudson Bike-Hike Trail in Rotterdam Junction is a significant opportunity that may be addressed by creating a multi-use tunnel (for both drainage and passage) under the railroad tracks.
- Recreational enhancements to Rotterdam Junction are needed for the long-term revitalization of the hamlet for both residents and tourists.

- Rotterdam Junction and Pattersonville west of Lock 9 need public access to the river.
- Plans to protect historically sensitive structures in the Stockade need to be developed and implemented.
- Many areas throughout the NYRCR Community need green infrastructure to retain and absorb stormwater at the surface to reduce the strain on storm sewer capacity. Green infrastructure prevents a large volume of stormwater from entering the piped storm sewer system, overflowing, and flooding surrounding areas.

Rotterdam Junction, NY
Source: Jose Rijo

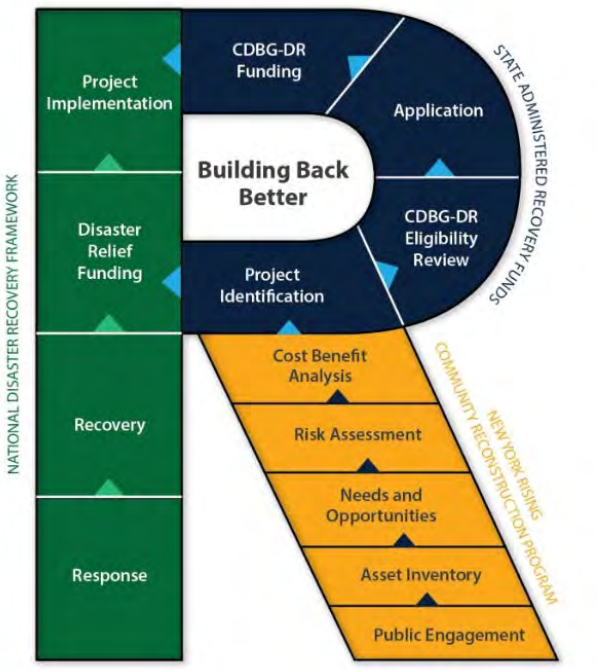
III. Reconstruction and resiliency strategies

Section III includes a description of the NYRCR Schenectady and Rotterdam Planning Committee's proposed reconstruction and resiliency strategies. Strategies are intended to help mitigate risk and address community needs. The proposed strategies are to:

- **Strengthen capacity of emergency and support services to respond during a major storm event and manage resources throughout recovery.**
- **Complete long-term community recovery planning, watershed management planning, hazard mitigation planning, and other related planning efforts to build flood resilience.**
- **Increase opportunities for recreation and tourism through efforts that include improving river access, regional biking and hiking trail development, and new activities and events.**
- **Incorporate green infrastructure and other stormwater management practices into private and public development and infrastructure projects.**
- **Establish health and social service buildings outside the flood zones as shelters during major storm events.**
- **Reduce flood risk to vulnerable neighborhoods located in the floodplain.**
- **Protect wellheads and other drinking water infrastructure from flooding to ensure uninterrupted supply of clean, safe drinking water.**
- **Improve septic and wastewater infrastructure to reduce flood damage and risk of pollution.**
- **Improve and maintain culverts and other drainage systems that contribute to flood impacts.**
- **Ensure that critical facilities continue to operate during major storm events through redundant backup systems (e.g., generators, pumps, and connecting supply waterlines).**

The NYRCR Schenectady and Rotterdam Planning Committee developed a list of strategies, which are summarized in the next section, through collaborative efforts, including:

- Planning Committee Meetings and Public Engagement Events;
- Local and regional stakeholder meetings;
- Review of other regional planning documents;
- Meetings with agencies;
- Development of the community asset inventory;
- Assessment of risk to assets;
- Identification of needs and opportunities; and
- Identification of the known areas of vulnerability, flooding and damage.



Development of reconstruction and resiliency strategies and projects

These strategies support reconstruction, increased resilience, and economic growth of the Schenectady and Rotterdam communities. They will be implemented through projects, programs, and actions to restore and protect NYRCR community assets.

Strategy: ***Strengthen capacity of emergency and support services to respond during a major storm event and manage resources throughout recovery.***

Photo Credit: The Daily Gazette

Irene/Lee evacuation in Rotterdam Junction

During Hurricane Irene and Tropical Storm Lee, local first responders lacked the capacity to adequately respond to flood-related emergencies (e.g., rescuing residents trapped in their homes) due to the limited amount of rescue and lifesaving equipment available and the absence of shelters. For example, the Rotterdam Junction Fire Department served as an emergency operations facility in addition to functioning as an active fire department. The fire department cleared out the four garage bays that ordinarily house fire equipment and turned them into offices hosting representatives of local, county and state government agencies as well as the American Red Cross and Salvation Army. These spaces were temporarily used to coordinate their emergency operation, and as collection and distribution points for community members to drop off or find clothing and cooking and cleaning supplies.

To develop this strategy, the Planning Committee worked with the Rotterdam Junction Fire Department, Schenectady High School, and Rotterdam Senior Center to determine what resources are needed to strengthen emergency response and recovery efforts in both communities. Meetings and discussions led to the development of several projects; including establishing an emergency shelter in both Schenectady and Rotterdam, strengthening the capacity for the Rotterdam Firehouse to respond during flood-related emergencies, establishing an evacuation plan for Rotterdam Junction, and an additional recommendation to conduct an emergency preparedness training program for Rotterdam Code enforcement. A specific list of needs was developed for each facility. Consensus determined that each facility is in need of a backup generator and associated electrical upgrades, pertinent building improvements and upgrades to accommodate evacuees and additional rescue and shelter resources. The Planning Committee believes these projects will help to advance emergency-related needs of the community. Additional Resiliency Recommendations can be found in Section V.

Table 5 Strategy: Strengthen capacity of emergency and support services to respond during a major storm event and manage resources throughout recovery.

Project Name	Short Project Description	Estimated Cost	Proposed or Featured Project	Regional Project (Y/N)
Rotterdam Junction Firehouse Upgrades	Enhance the Rotterdam Junction Firehouse facilities and grounds to strengthen disaster response including the installation of an emergency backup generator; expansion of the main hall; expansion of the septic system; purchase of a rescue air boat and trailer; expansion of the garage to the accommodate air boat and trailer; and other upgrades. The capacity of the firehouse was compromised during the storms due to the lack of space and supplies.	$1,403,000	Proposed	Yes
Schenectady High School Emergency Shelter Project	Establish Schenectady High School as an emergency shelter for residents in need of a shelter during major storm events. Install a backup emergency generator to ensure shelter services do not fail during storm-related events.	$360,000	Proposed	Yes
Evacuation Plan for Rotterdam Junction	Work with Schenectady County to refine and improve the existing emergency response and evacuation plan to address lessons learned during Hurricane Irene and Tropical Storm Lee. Provide adequate education about the plan to inform residents of proper protocols for future events.	$100,000	Proposed	Yes
Senior Citizens Center/Schenectady County Emergency Shelter	Establish a certified emergency shelter in Schenectady County at the Rotterdam Senior Citizens Center. This project requires building upgrades and the installation of an emergency backup generator and associated electrical switchgear.	$354,000	Proposed	Yes

Strategy: ***Complete long-term community recovery planning, watershed management planning, hazard mitigation planning, and other related planning efforts to build flood resilience.***

Significant community planning has occurred at the regional, local, and neighborhood level. Both communities have fairly comprehensive zoning regulations and wellhead protection standards. However, most of the plans and regulations predate Hurricane Irene and Tropical Storm Lee. For example, the *Schenectady County Multi-Jurisdictional All Hazard Mitigation Plan* was written in 2007, before the storms. Several recommendations for flood mitigation as well as actions to improve the flood warning and first response systems are identified in the plan. This plan is currently undergoing updates based on events that took place during the Irene and Lee storms.

To develop this strategy, the Planning Committee and planning team identified opportunities where planning and studies could benefit each community. This was accomplished through interviews with members of the public, reviews of existing local and regional plans, reviews of the asset inventory and risk assessment results, and discussions regarding community needs. The Planning Committee decided to prioritize an analysis and evaluation of the complex flooding issues surrounding the East Front Street neighborhood and Stockade. Additionally, it was recommended to consider updating the Town of Rotterdam Comprehensive Plan and the City of Schenectady Comprehensive Plan to include flood resiliency as a new objective and to study possible engineering adaptations to the Lock 7 Dam to minimize flooding in upstream communities. Additional Resiliency Recommendations that fall under this strategy can be found in Section V.

Table 6 Strategy: Complete long-term community recovery planning, watershed management planning, hazard mitigation planning, and other related planning efforts to build flood resilience.

Project Name	Short Project Description	Estimated Cost	Proposed or Featured Project	Regional Project (Y/N)
East Front Street Combined Sewer System Study	Conduct an engineering study to analyze the cause of the sanitary backups that occur during high rain events and Mohawk River flooding, and developing mitigation measures that reduce sewer overflow as well as the feasibility and costs of elevating structures.	$220,000	Proposed	No
Mitigation Measures to Reduce Flooding in the Stockade and East Front Street Neighborhoods	Provide assistance to homeowners in the Stockade and East Front Street neighborhood whose homes were inundated by floodwaters from Hurricane Irene and Tropical Storm Lee. Develop a series of plans that offer a menu of options to alleviate vulnerability to flooding.	$500,000	Proposed	No

Strategy: ***Increase opportunities for recreation and tourism through efforts that include improving river access, regional biking and hiking trail development, and new activities and events.***

The Planning Committee discussed the importance of enhancing tourism within and around Rotterdam Junction in order to help revitalize the local economy, and downtown and waterfront areas. This strategy is important because it addresses recreational enhancements that are essential for long-term revitalization of the hamlet.

Recreational opportunities exist in Rotterdam Junction due to its proximity to the Mohawk River, the Mohawk-Hudson Bike-Hike Trail and various open spaces that could be converted to parkland. According to the BOA Nomination Study, Rotterdam Junction has been limited in its waterfront development due to land ownership along the river banks. The only active recreational area along the Mohawk River is Woestina Park, a 5,500 square foot parcel with no direct riverfront access. The Mohawk-Hudson Bike-Hike Trail passes through Rotterdam Junction. A major gap in the trail deters trail users from accessing Rotterdam Junction. Instead, trail users must travel along Route 5S in order to re-enter the bike/hike trail. The former DEC-Bonded Concrete site provides passive open space for Rotterdam residents. The Town has discussed converting this area to an active community park. Additional Resiliency Recommendations that fall under this strategy can be found in Section V.

Table 7 Strategy: Increase opportunities for recreation and tourism through efforts that include improving river access, regional biking and hiking trail development, and new activities and events.

Project Name	Short Project Description	Estimated Cost	Proposed or Featured Project	Regional Project (Y/N)
Mohawk-Hudson Bike-Hike Trail and Culvert Improvements	Provide flood abatement and economic and recreational benefits for Rotterdam Junction by constructing a tunnel of sufficient diameter to serve as both a culvert and bike trail. Remove the sediment and debris from the Old Erie Canal channel. Replace the two culverts at the railroad crossing on Scrafford Lane.	Phase I: engineering/permitting $660,000 Phase II: construction $2.2 million (estimate)	Proposed	Yes
Liberty Park Expansion and Streetscape Improvements	This project supports a portion of the proposed *City of Schenectady Gateway Plaza Implementation Plan*, developed during the years of 2008 and 2012. It includes the acquisition and demolition of two buildings (the AAA buildings) that flooded during Hurricane Irene and Tropical Storm Lee. The vacant land created as a result of demolition would be converted to park space with perimeter street improvements, such as the incorporation of green infrastructure to increase permeable surface and smart landscaping.	$1,000,000	Proposed	Yes

Strategy: ***Incorporate green infrastructure and other stormwater management practices into private and public development and infrastructure projects.***

Schenectady is primarily an urban environment. It is covered with impervious surfaces that drain directly to the sewer system and local waterways. During Hurricane Irene and Tropical Storm Lee, the combined sewers received too much rain water and overflowed, discharging human wastewater and storm water into local waterways, streets and basements. In some low areas, floodwaters from the Mohawk and its tributaries inundated neighborhoods, parks, and plazas. In Rotterdam Junction, the poor condition of Main Street was exacerbated by the floodwaters from the storm.

To support this strategy, the Planning Committee developed project ideas that incorporate green infrastructure (e.g., permeable pavements, vegetated swales, green streets and walls, rain gardens/ bioretention systems) to manage storm water runoff from impervious surfaces. The Planning Committee also discussed incorporating green infrastructure into existing and proposed projects within Schenectady. The use of green infrastructure techniques would help to reduce flooding in the communities but would not solve the flooding issues entirely. Additional Resiliency Recommendations that address green infrastructure can be found in Section V.

The conceptual redesign plan for Liberty Park, developed by the City of Schenectady and Schenectady Metroplex Development Authority, includes green infrastructure design and will serve as an important flood retention area for future major storms. This park borders State Street and Washington Avenue, which separates the Park from the SCCC, both of which flooded during Hurricane Irene and Tropical Storm Lee.

Table 8 Strategy: Incorporate green infrastructure and other stormwater management practices into private and public development and infrastructure projects.

Project Name	Short Project Description	Estimated Cost	Proposed or Featured Project	Regional Project (Y/N)
Liberty Park Expansion and Streetscape Improvements	This project supports a portion of the proposed *City of Schenectady Gateway Plaza Implementation Plan*, developed during the years of 2008 and 2012. It includes the acquisition and demolition of two buildings (the AAA buildings) that flooded during Hurricane Irene and Tropical Storm Lee. The vacant land created as a result of demolition would be converted to park space with perimeter street improvements, such as the incorporation of green infrastructure to increase permeable surface and smart landscaping.	$1,000,000	Proposed	Yes

Strategy: ***Establish health and social service buildings outside the flood zones as shelters during major storm events.***

The Planning Committee identified the need to establish shelters that serve Schenectady and Rotterdam during emergencies. The primary project recommended under this strategy is the Senior Center/Schenectady County Emergency Shelter. The Center was approved by the American Red Cross as a facility with adequate staff, capacity and resources required to serve as an emergency shelter for the County. Together with the American Red Cross, staff at the center developed a list of resources and upgrades needed to transform the center into a certified emergency shelter.

Table 9 Strategy: Establish health and social service buildings outside the flood zones as shelters during major storm events.

Project Name	Short Project Description	Estimated Cost	Proposed or Featured Project	Regional Project (Y/N)
Senior Citizens Center/ Schenectady County Emergency Shelter	Establish the first certified emergency shelter in Schenectady County at the Rotterdam Senior Citizens Center. This project requires building upgrades and the installation of an emergency backup generator and associated electrical switchgear.	$354,200	Proposed	Yes
Schenectady High School Emergency Shelter Project	Establish Schenectady High School as an emergency shelter for residents in need of a shelter during major storm events. Install a backup emergency generator to ensure shelter services do not fail during storm-related events.	$360,000	Proposed	Yes

Strategy: ***Reduce flood risk to vulnerable neighborhoods located in the floodplain.***

Nearly 200 homes in Schenectady and Rotterdam suffered severe flood damage during Hurricane Irene and Tropical Storm Lee. Floodwaters reached up to 12 feet in some areas. While many of the homes have undergone repair, significant housing stock remains vulnerable to flood damage.

This strategy is primarily concerned with the vulnerable historic areas within Schenectady. The devastating impacts of Hurricane Irene and Tropical Storm Lee are of particular concern to the Stockade's residents, who place a high value on the district due to its historic and cultural character. Planning Committee members, some of whom live in the Stockade, the Consultant Team, and a local engineering company held meetings to discuss and develop mitigation measures to reduce storm impacts on the neighborhood while maintaining its historic character. Planning Committee Members and NYS DOS Planners also

attended a Stockade Association meeting to gather input from the residents. The Stockade Association is a volunteer-driven neighborhood association that was created in 1958 by a group of residents that strive to protect, preserve and improve the Stockade while maintaining its residential nature.

The complexities of preserving this neighborhood have stymied flood recovery efforts. Elevating historic homes out of the flood plain, for example, is difficult to accomplish in a manner that preserves the houses' historic appearance. The Planning Committee proposes to develop a series of plans that offer the community a menu of options to reduce vulnerability to flooding as the first step towards increasing neighborhood flood resiliency. These plans would consider the entire Stockade and East Front Street neighborhoods and would require engineering and, ultimately, construction in excess of the NYRCR resources. The Planning Committee also identified housing districts and individual properties that are located in repetitive flooding areas and that may be candidates for acquisition and demolition, elevation, or other resiliency measures, including repairs and flood proofing.

Additional Resiliency Recommendations that fall under this strategy can be found in Section V.

Table 10 Strategy: Reduce flood risk to vulnerable neighborhoods located in the floodplain.

Project Name	Short Project Description	Estimated Cost	Proposed or Featured Project	Regional Project (Y/N)
Mitigation Measures to Reduce Flooding in the Stockade and East Front Street Neighborhoods	Provide assistance to homeowners in the Stockade and East Front Street neighborhood whose homes were inundated by floodwaters from Hurricane Irene and Tropical Storm Lee. Develop a series of plans that offer a menu of options to alleviate vulnerability to flooding.	$500,000	Proposed	No
Demolish Seven Flood Damaged Homes Located in the 100-Year Flood Plain	The City has taken title to four vacated properties, and proposes to take title of the remaining three abandoned properties located in the Stockade District. The City will donate the purchased properties to the City's Land Bank, which will work with residents of the neighborhood to determine the best use of the land.	$406,000	Proposed	No

Strategy: ***Protect wellheads and other drinking water infrastructure from flooding to ensure uninterrupted supply of clean, safe drinking water.***

Two of the three drinking water wellhead facilities nearly flooded during Hurricane Irene and Tropical Storm Lee. During the storms, the City built an emergency earthen berm around the backup generator to prevent loss or failure of the facility, but more permanent solutions would be preferable. Failure of these critical assets would have a detrimental impact on the community. Residents, health care facilities, vulnerable populations, businesses, would be without water for an extended period of time. The pro-

jects included here would protect drinking water infrastructure to ensure it remains in operation during future flooding events without the need for installation of temporary interventions.

Additional Resiliency Recommendations that fall under this strategy can be found in Section V.

Table 11 Strategy: Protect wellheads and other drinking water infrastructure from flooding to ensure uninterrupted supply of clean, safe drinking water.

Project Name	Short Project Description	Estimated Cost	Proposed or Featured Project	Regional Project (Y/N)
Flood Protection of the Rotterdam Water District #5 Wells	Drill a new well and elevate the pump 5 feet above the 500-year flood plain ensuring that the Rotterdam Water District would have potable water during a flood event. This well can also be used to provide additional capacity.	$1,285,000	Proposed	No
Flood Protection of City Well Heads	Protect Schenectady wells are located in a 100-year flood plain that nearly flooded from electrical disruption by installing an outdoor diesel fueled 2400 V, 900 kW backup generator to ensure drinking water wells perform when power is down.	$581,000	Proposed	No
Install an Automatic Transfer Switch at the Rotterdam District #3 Well Head Facility	Install an automatic transfer switch at the Rotterdam District #3 Well Head Facility. This would allow the facility to automatically switch the well pumps over to the existing auxiliary generator in the event of the interruption or loss of National Grid electrical power	$19,400	Proposed	No

Strategy: ***Improve septic and wastewater infrastructure to reduce flood damage and risk of pollution.***

As stated in Section I of this plan, Hurricane Irene and Tropical Storm Lee inundated the North Ferry Street Pump Station, which is located below the base flood elevation in the Stockade District. The City's WWTP is located along the Mohawk River below the 100-year elevation line and nearly flooded during the storms.

In support of this strategy, the Planning Committee and Consultant Team undertook an extensive data collection and mapping process to identify critical infrastructure assets that provide septic and wastewater services. These assets are considered critical due to the catastrophic impact they would have on local and regional communities if they were to fail. Fortunately, the North Ferry Street Pump Station was the only wastewater facility to lose power due to flooding during the storms; future storms could be worse.

Discussions at Planning Committee Meetings also resulted in developing a project that would effectively protect the City's WWTP from future flooding. This project would also protect local and regional communities by preventing the flow of contaminated flood waters into the Mohawk River.

Table 12 Strategy: Improve septic and wastewater infrastructure to reduce flood damage and risk of pollution.

Project Name	Short Project Description	Estimated Cost	Proposed or Featured Project	Regional Project (Y/N)
North Ferry Street Pump Station Relocation Project	Construct a new pump station to replace the existing pump station, which flooded during Hurricane Irene and Tropical Storm Lee. The new pump station will be relocated to a property adjacent to the existing building and include a mat type foundation.	$300,000	Proposed	No
City of Schenectady Wastewater Treatment Plant-Flood Control	The City WWTP nearly flooded during Hurricane Irene and Tropical Storm Lee. This project will map, design, and install a berm around WWTP to protect it from a 500-year flood. The berm would have to be constructed to U.S. Army Corps of Engineering standards.	$1,209,000	Proposed	Yes
East Front Street Combined Sewer System Study	Conduct an engineering study to analyze the cause of the sanitary backups that occur during high rain events and Mohawk River flooding, and developing mitigation measures that reduce sewer overflow as well as the feasibility and costs of elevating structures.	$220,000	Proposed	No

Strategy: ***Improve and maintain culverts and other drainage systems that contribute to flood impacts.***

Poor drainage causes localized flooding in low lying areas, as seen during Hurricane Irene and Tropical Storm Lee in both Schenectady and Rotterdam. The devastating flooding impacts from the storms spurred the Rotterdam Junction community to develop a Long-Term Community Recovery Plan. This plan includes a combination of flood mitigation infrastructure projects that address drainage issues while also strengthening the economic, cultural and natural resource efforts of the community. The Planning Committee has included some of these projects in this NYRCR Plan to support this important strategy. These projects can be combined to strengthen community flood resiliency however the projects will be kept separate for funding purposes.

The SCCC also requires a combination of flood mitigation projects to better prepare the college for future major storms. Poor drainage in this low lying area led to floodwaters inundating college buildings during Hurricane Irene and Tropical Storm Lee. Damage to buildings and power loss delayed the start of classes. To support this strategy, the Planning Committee worked with members of the SCCC to incorporate drainage projects into this NYRCR Plan.

Table 13 Strategy: Improve and maintain culverts and other drainage systems that contribute to flood impacts.

Project Name	Short Project Description	Estimated Cost	Proposed or Featured Project	Regional Project (Y/N)
Mohawk-Hudson Bike-Hike Trail and Culvert Improvements	Provide flood abatement and economic and recreational benefits for Rotterdam Junction by constructing a tunnel of sufficient diameter to serve as both a culvert and bike trail. Remove the sediment and debris from the Old Erie Canal channel. Replace the two culverts at the railroad crossing on Scrafford Lane.	Phase I: engineering/ permitting $660,000 Phase II: construction $2.2 million (estimate)	Proposed	Yes
Replace Lock Street Stormwater Pumps with Gravity Storm Sewer Line	Eliminate flooding on Lock Street, which includes 6 to 8 homes that were impacted by Hurricane Irene and Tropical Storm Lee by replacing current pump drainage system with a gravity storm sewer line.	$600,000	Proposed	No
Schenectady County Community College Flood Abatement	Improve parking lot drainage by replacing the existing aging pumps that serve the parking lot, adding a 4-inch line from the pumps to the storm drain system to increase the amount of water that can be pumped, and adding piping from the current storm drain outflow to the Mohawk. Install five generators to prevent future storm-related power loss at the following locations: Elston Hall, Casola Dining Room, Begley Building, Gateway Building, Stockade Building.	$550,000	Featured	No

Strategy: ***Ensure that critical facilities continue to operate during major storm events through redundant backup systems (e.g., generators, pumps, and connecting supply waterlines).***

To support this strategy, the Planning Committee identified critical assets that require emergency back-up, and developed corresponding projects to protect the community. Investment in these structures would effectively reduce the vulnerability of infrastructure to storms as well as improve and protect services to the community. For example:

- If Schenectady City Hall were to lose power, none of the traffic lights would work throughout the City.
- If the Rotterdam wellheads located in the floodplain fail, then the Town would be without drinking water for an extended period of time.
- The National Grid transformers at the SCCC flooded during Hurricane Irene and Tropical Storm Lee causing the school to suspend operations for an extended period of time.

Investment in these structures would effectively reduce the vulnerability of infrastructure to future storms as well as improve and protect services to the community. Ensuring that critical facilities operate during storm events would also improve resilience and economic growth.

Additional Resiliency Recommendations that fall under this strategy can be found in Section V.

Table 14 Strategy: Ensure that critical facilities continue to operate during major storm events through redundant backup systems (e.g., generators, pumps, and connecting supply waterlines).

Project Name	Short Project Description	Estimated Cost	Proposed or Featured Project	Regional Project (Y/N)
Install Generator at City Hall	Install a back-up generator in City Hall to provide power for critical systems throughout the city.	$170,000	Proposed	No
Install an Automatic Transfer Switch at the Rotterdam District #3 Well Head Facility	Install an automatic transfer switch at the Rotterdam District #3 Well Head Facility. This would allow the facility to automatically switch the well pumps over to the existing auxiliary generator in the event of the interruption or loss of National Grid electrical power	$19,400	Proposed	No

Lock 9 Reconstruction
Source: http://en.wikipedia.org/wiki/File:NY_103_Irene_Construction_FEMA.jpg

IV. Proposed and Featured project profiles

Section IV includes a description of the project identification and screening process. It also features detailed project profiles for each Proposed and Featured project identified by the NYRCR Schenectady and Rotterdam Planning Committee. Project profiles include:

- **Project name, location, and jurisdiction**
- **Associated strategies and recovery functions**
- **Description of the project purpose, scope and expected outcomes**
- **Project cost**
- **Project benefits including an analysis of risk reduction**
- **Project implementation timeframe**
- **Potential regulatory requirements (review, permits, etc.)**
- **Potential alternate funding sources**

The projects and actions set forth in this section of the 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 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.

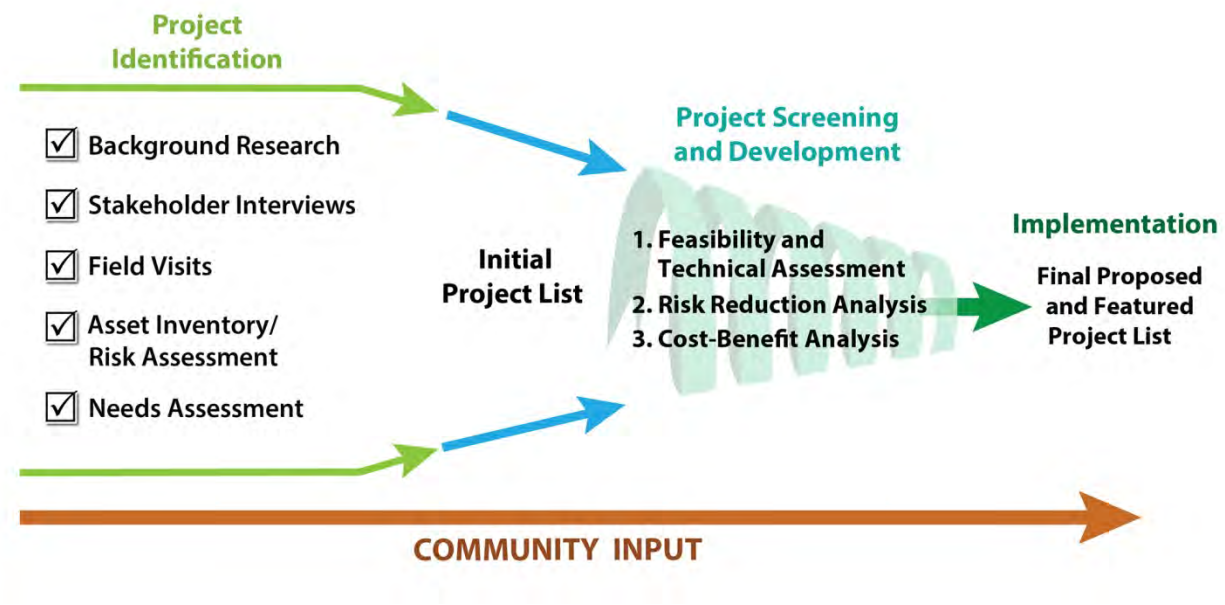
The Planning Committee worked to categorize the proposed projects by the six Recovery Support Functions. Projects that were carried forward for evaluation were tied to the protection of assets, or were regionally protective of property and public safety, such as provisioning of shelters with emergency supplies. The Planning Committee considered the needs and opportunities assessment and public input received during public meetings to further refine the projects.

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 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.

The project screening and evaluation procedure is summarized in the following schematic.



Projects have been grouped by category, Proposed and Featured, and then by geographic scope. They are presented by community, traveling east from Rotterdam to Schenectady. Figure 5 is provided to illustrate the location of Proposed and Featured projects.

Figure 5: Project Locations
City of Schenectady and Town of Rotterdam
Overview

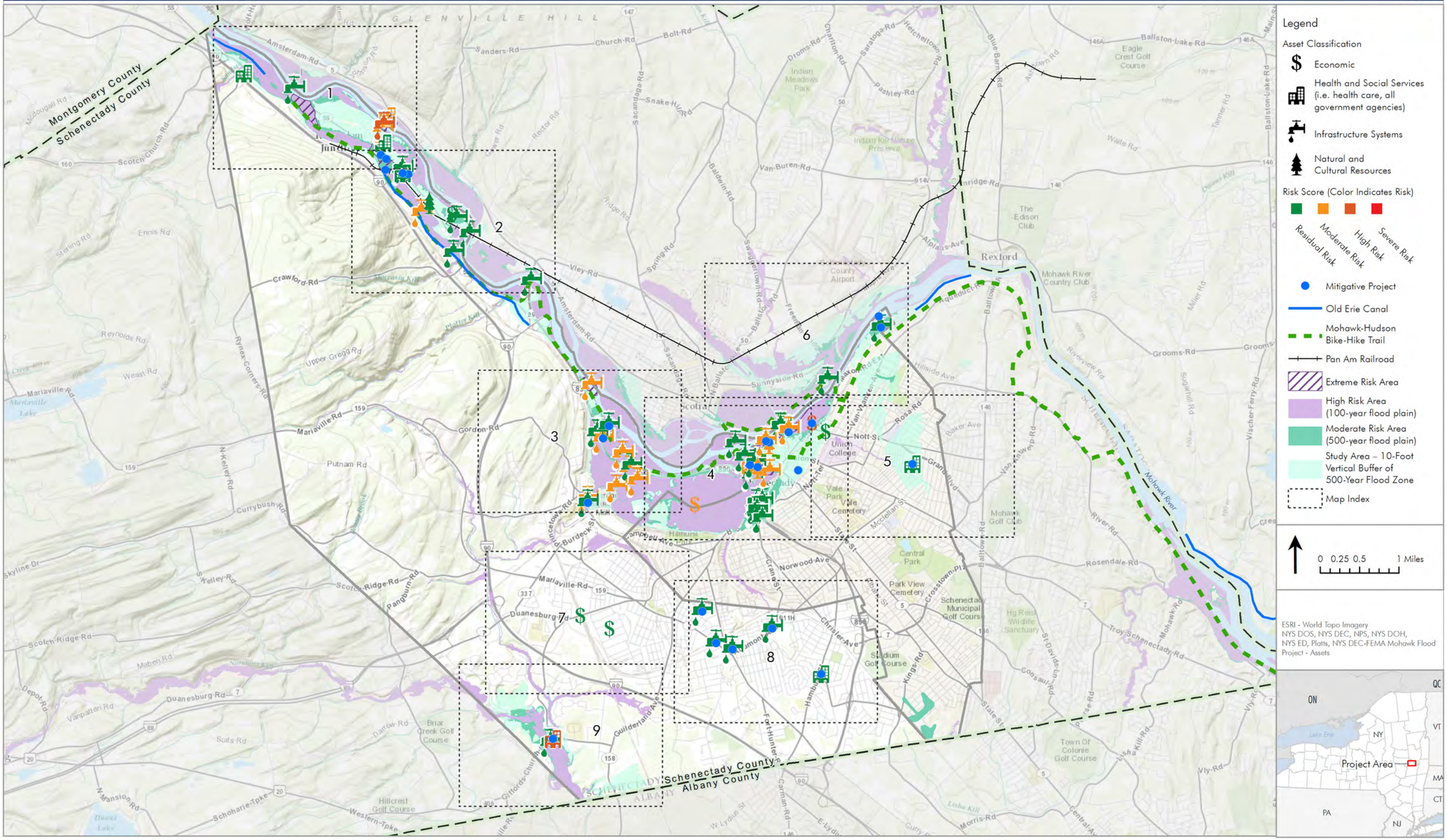


Figure 5: Project Locations
City of Schenectady and Town of Rotterdam
Frame 1 of 9

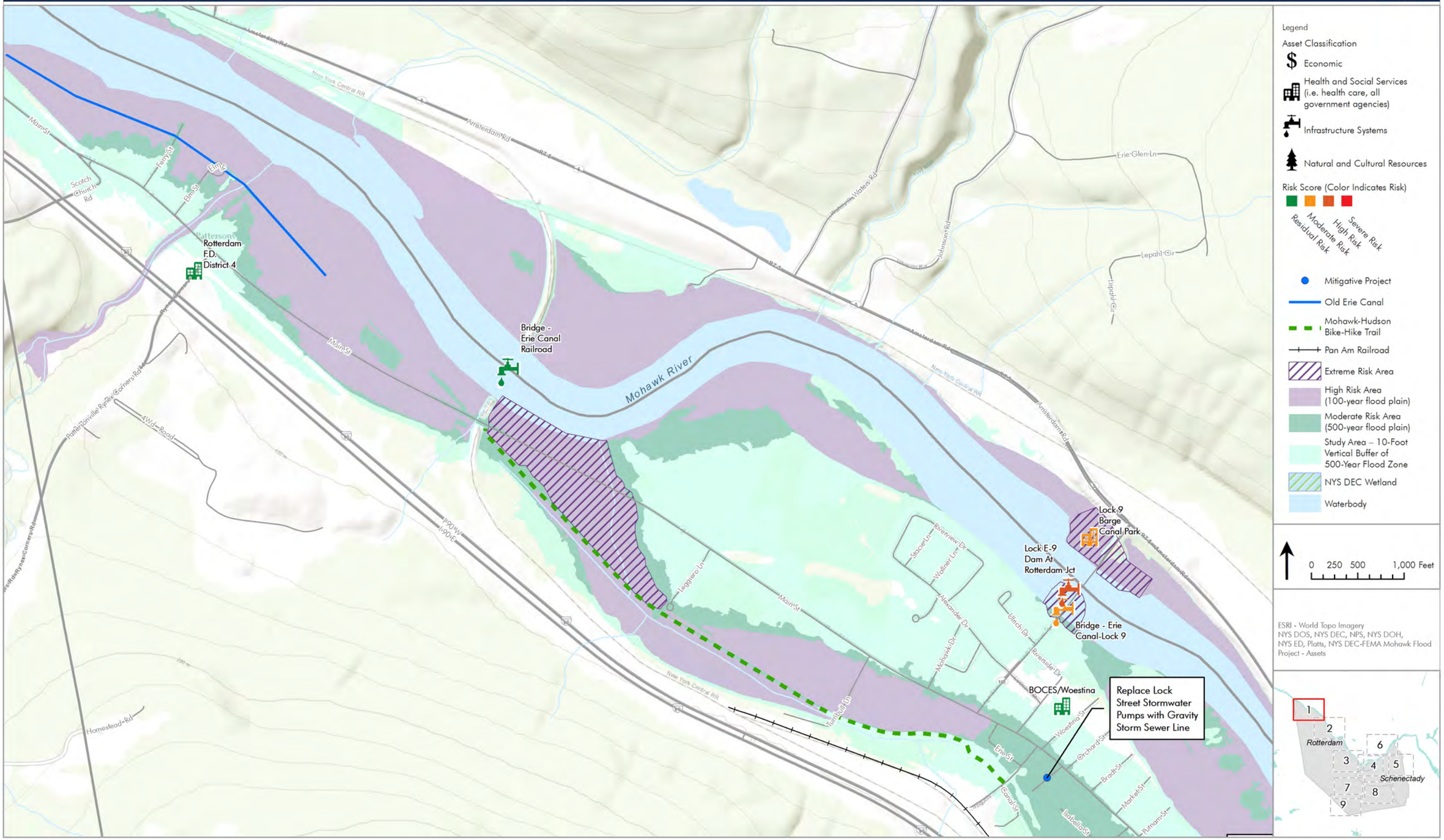


Figure 5: Project Locations
City of Schenectady and Town of Rotterdam
Frame 2 of 9

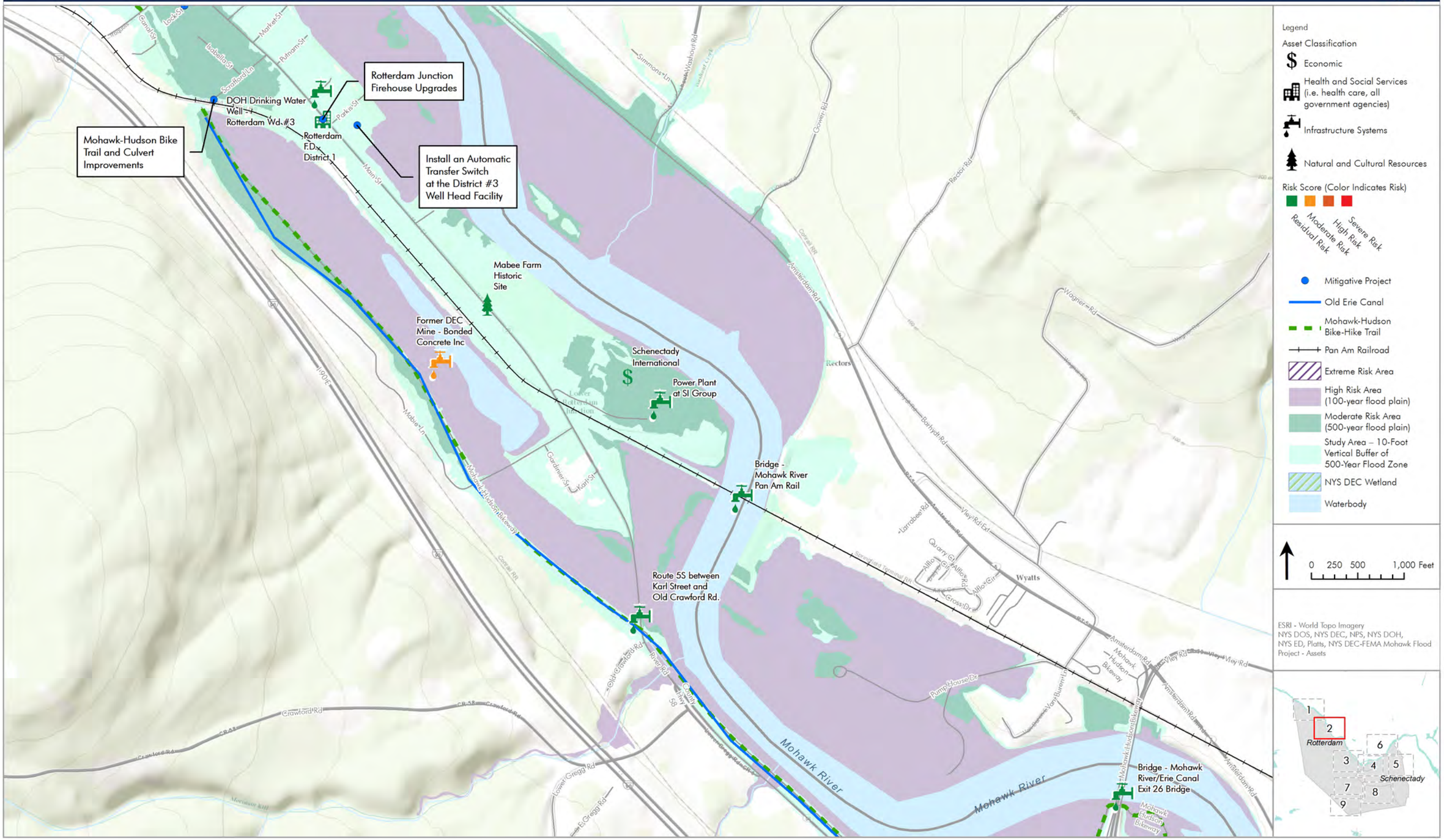


Figure 5: Project Locations
City of Schenectady and Town of Rotterdam
Frame 3 of 9

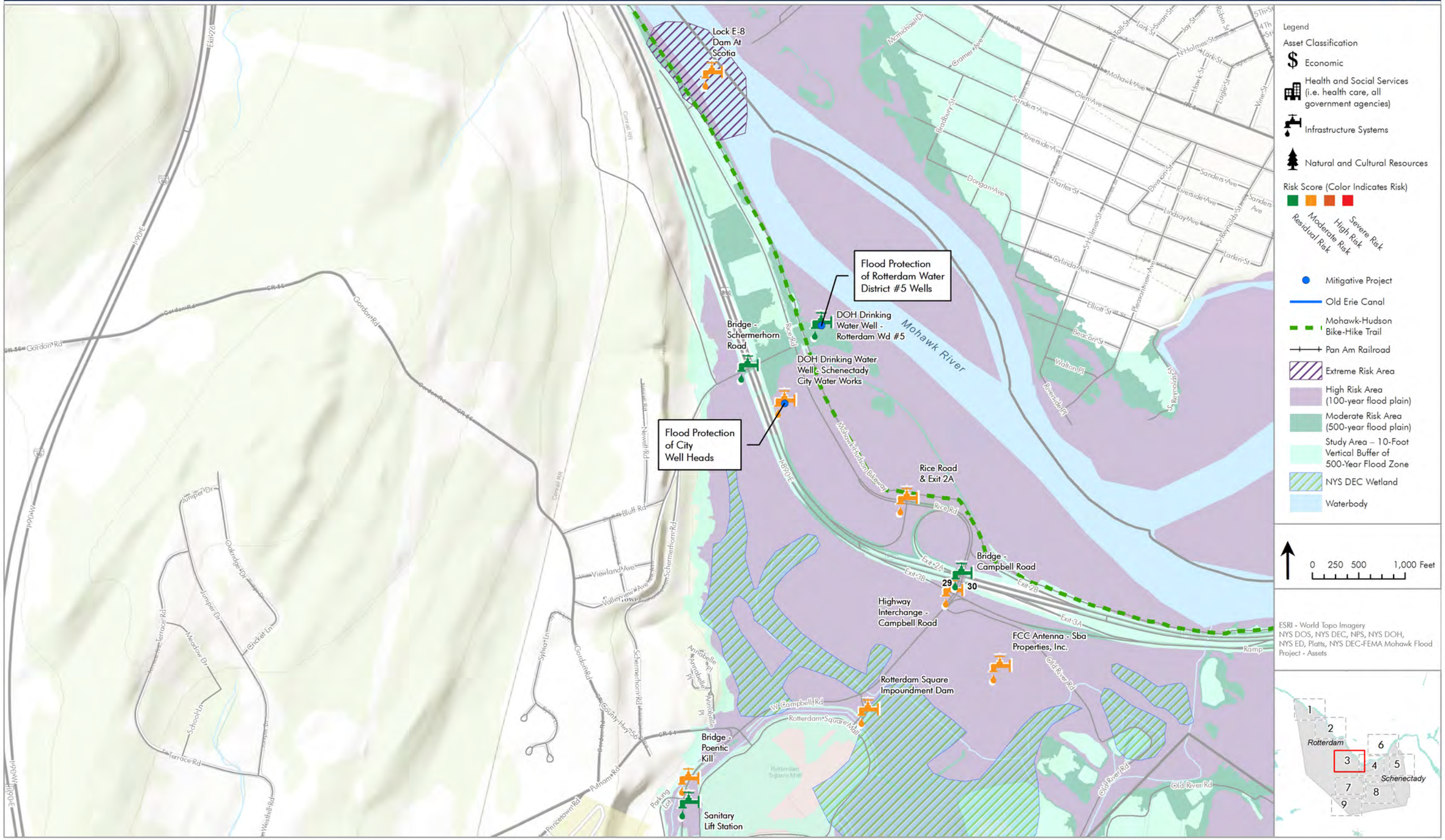


Figure 5: Project Locations
City of Schenectady and Town of Rotterdam
Frame 4 of 9

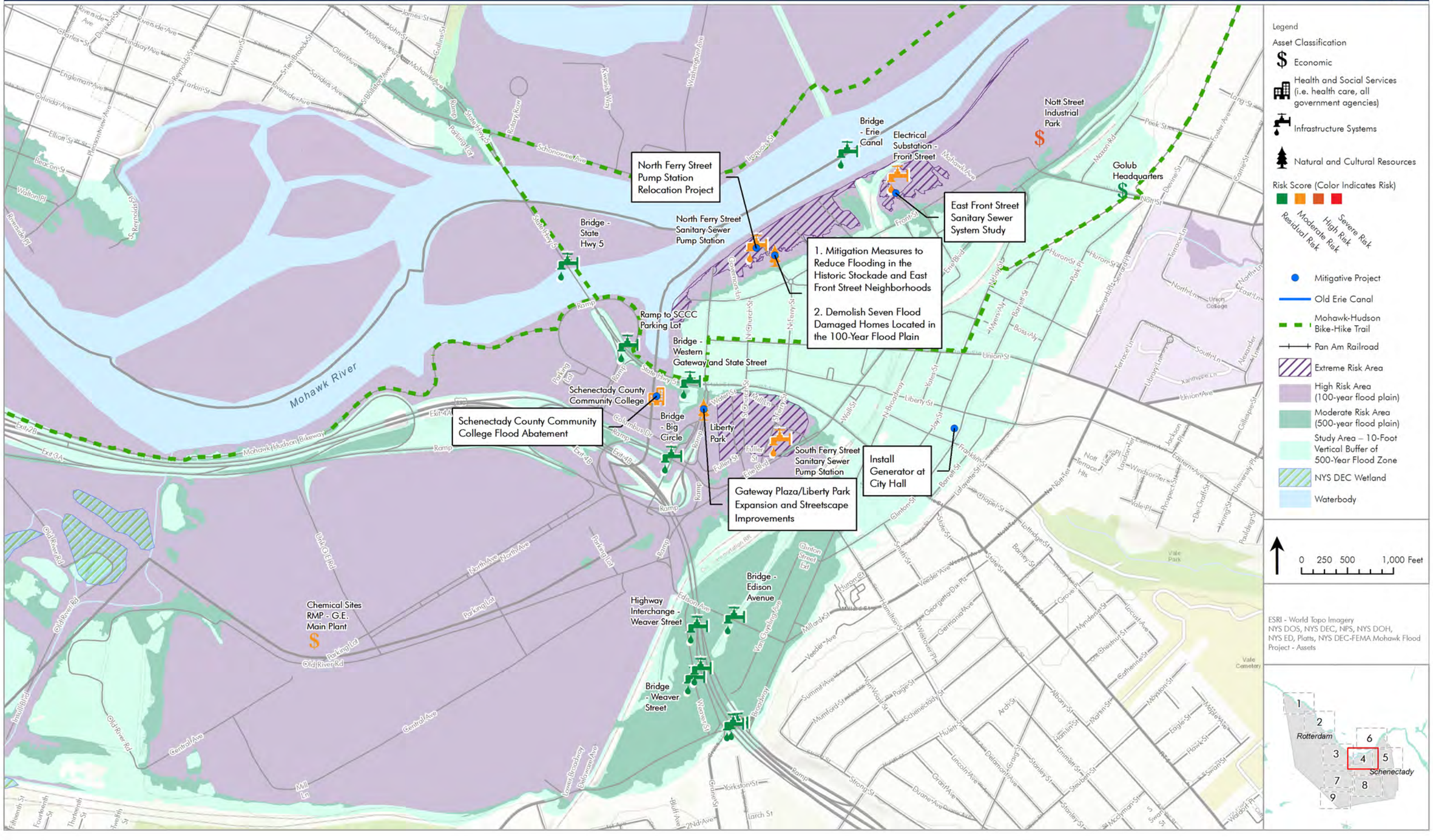


Figure 5: Project Locations
City of Schenectady and Town of Rotterdam
Frame 5 of 9

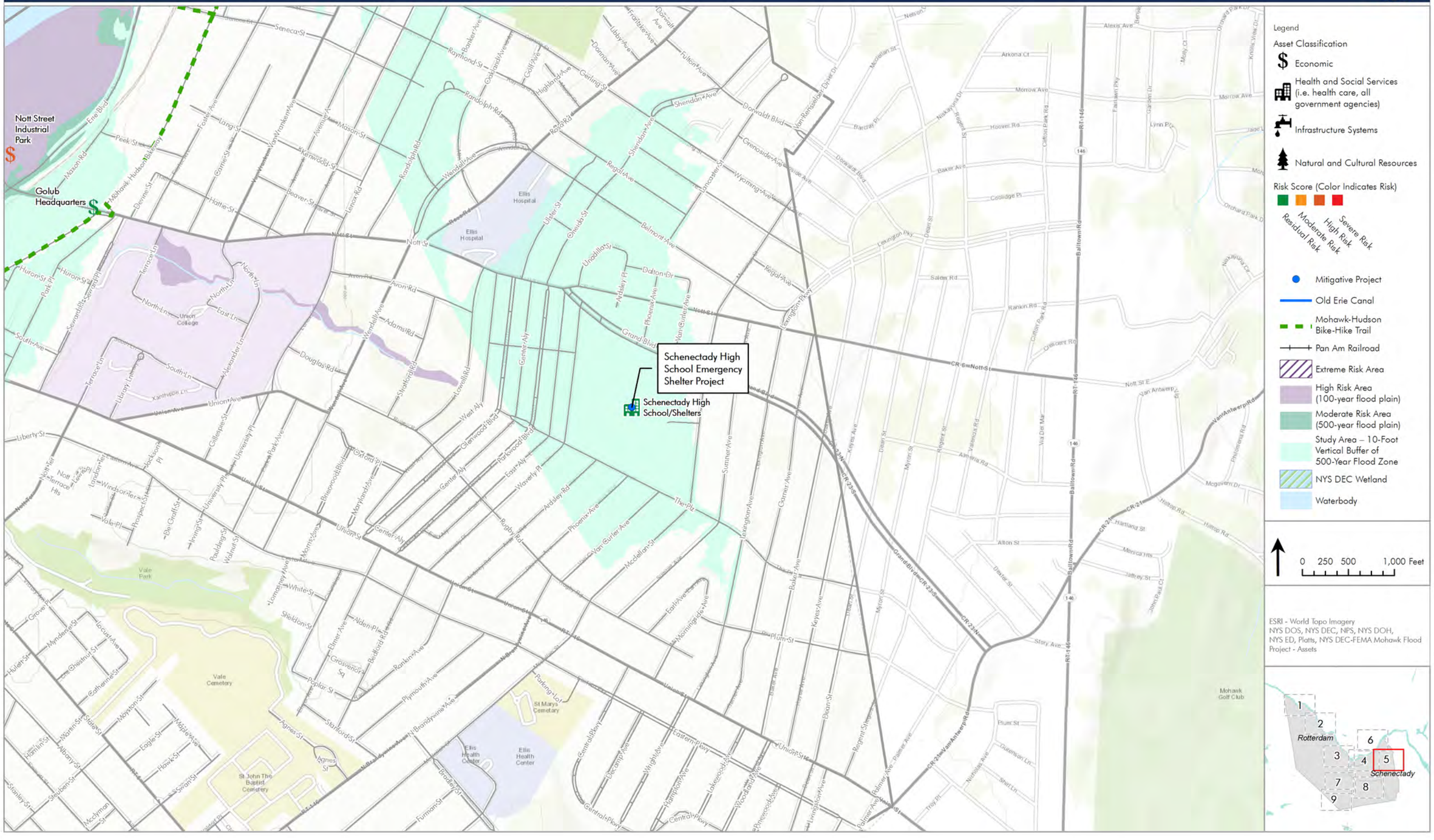


Figure 5: Project Locations
City of Schenectady and Town of Rotterdam
Frame 6 of 9

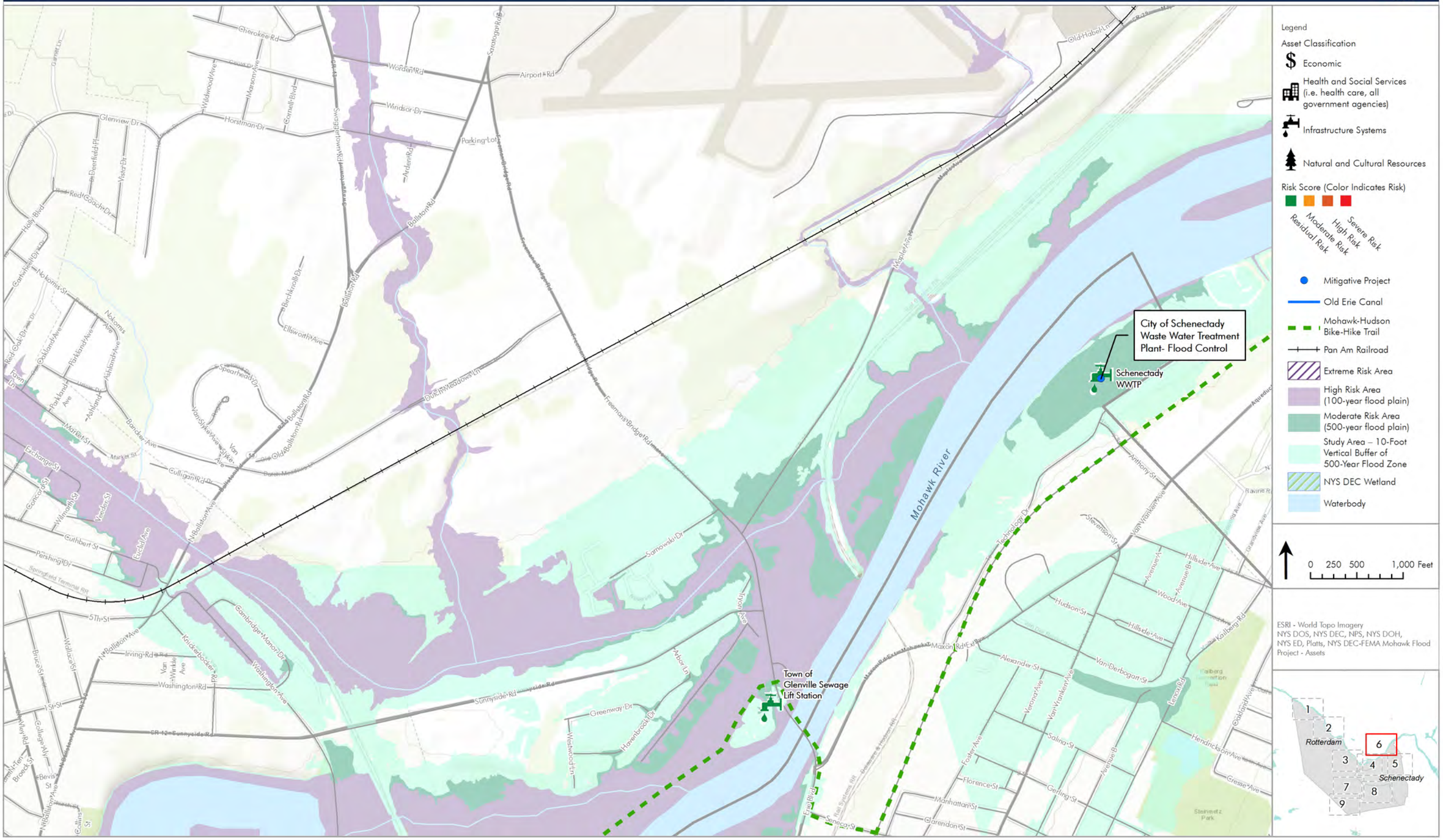


Figure 5: Project Locations
City of Schenectady and Town of Rotterdam
Frame 7 of 9

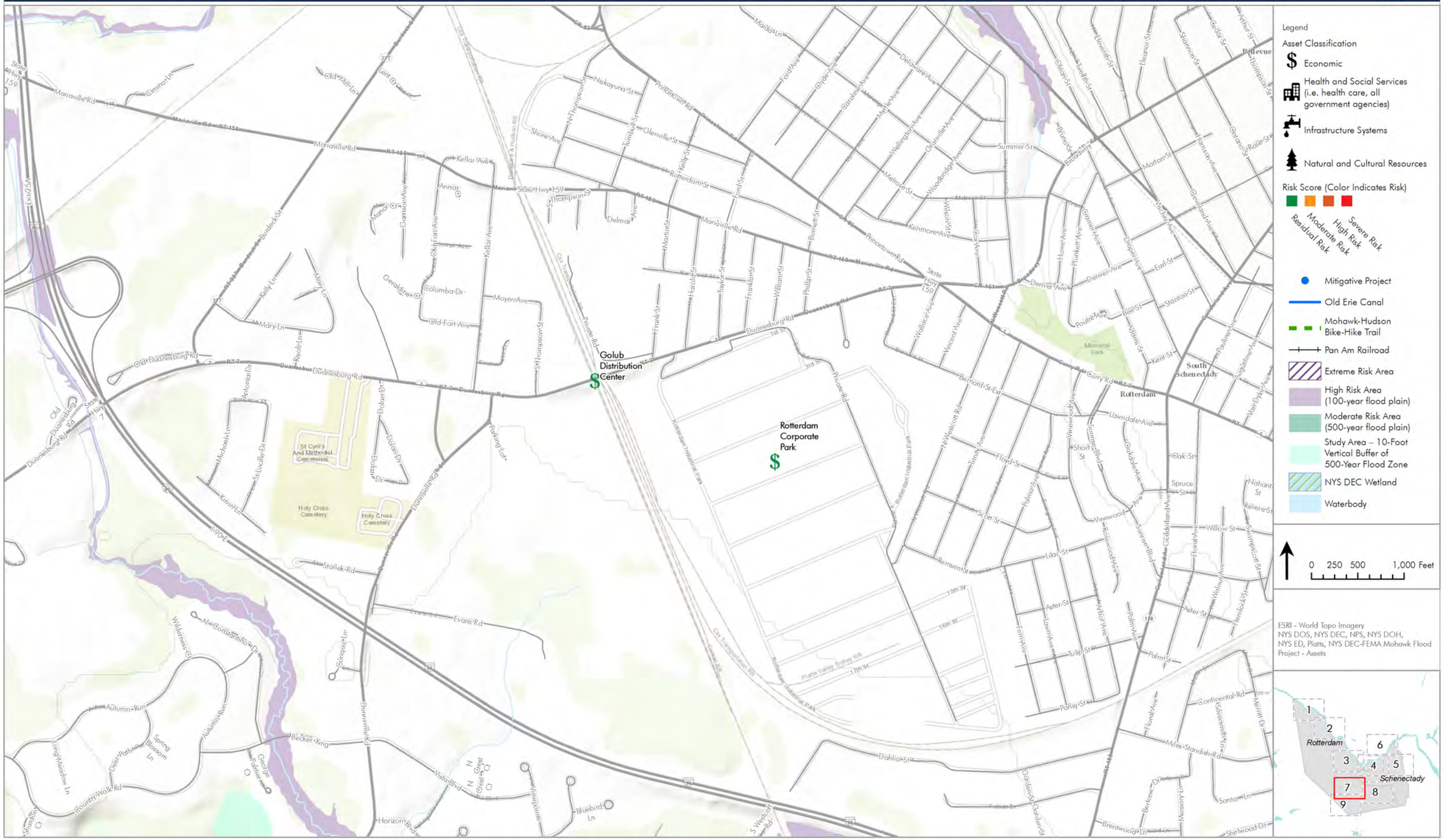


Figure 5: Project Locations

City of Schenectady and Town of Rotterdam

Frame 8 of 9

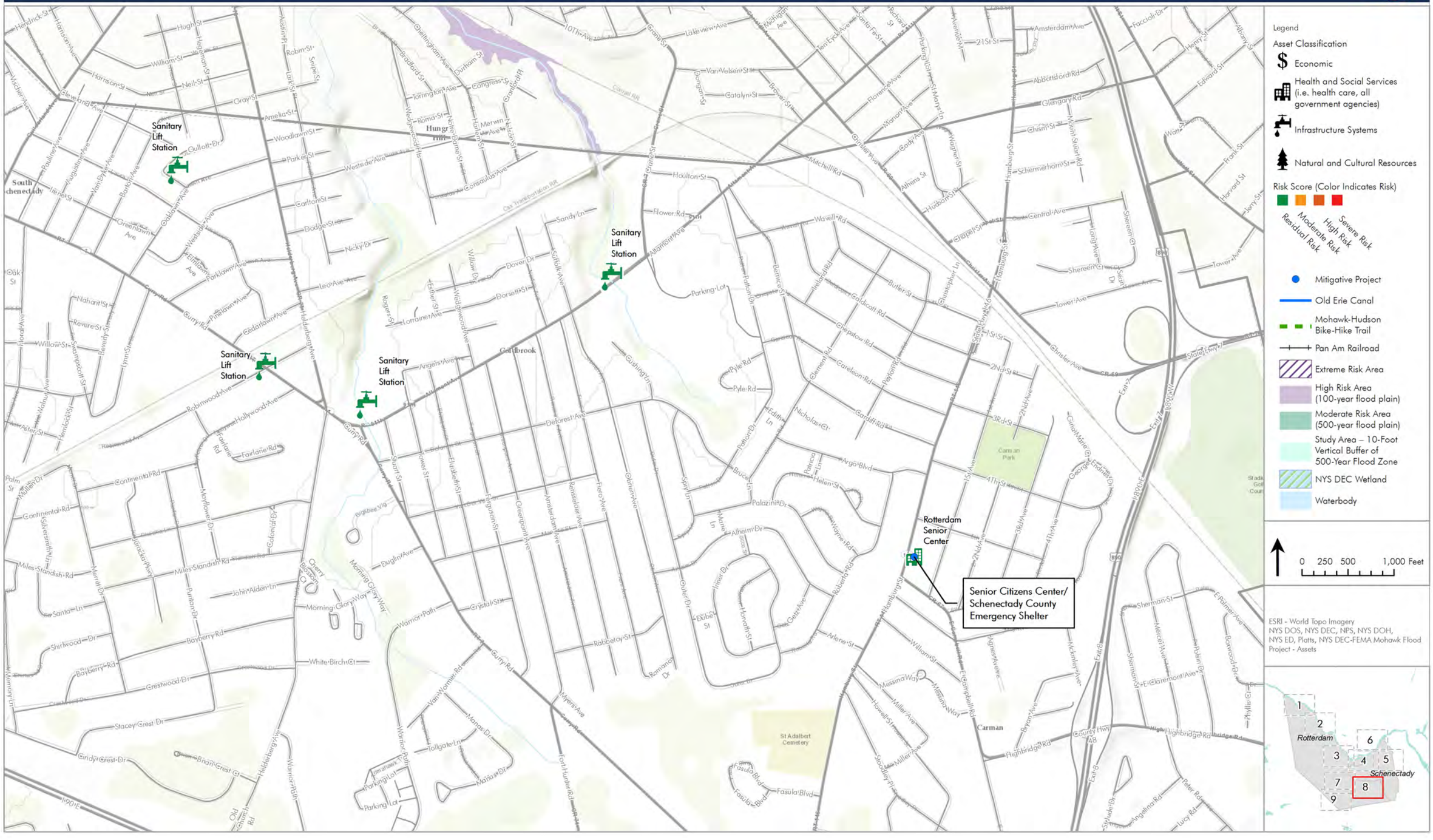
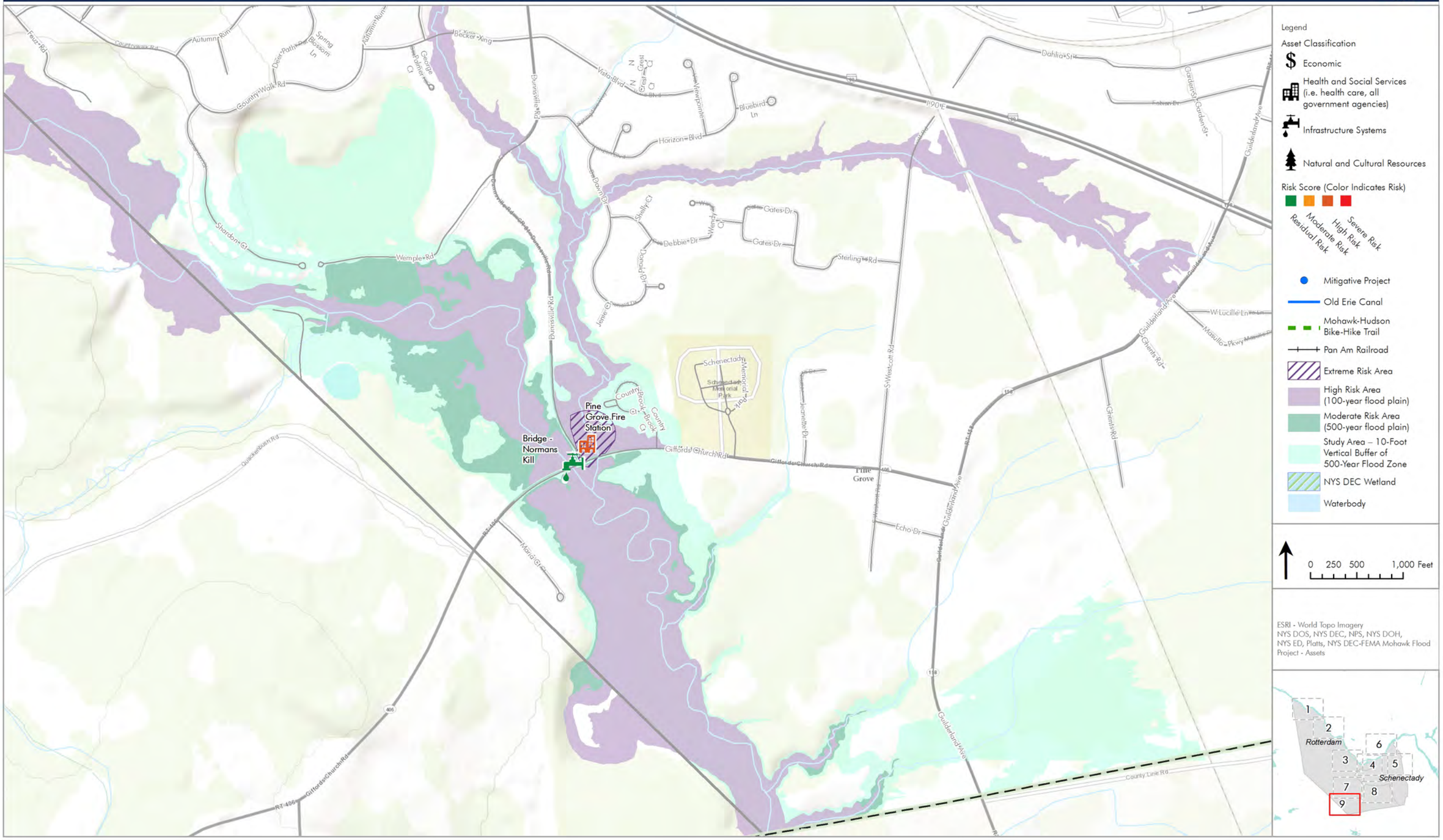


Figure 5: Project Locations
City of Schenectady and Town of Rotterdam
Frame 9 of 9



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Replace Lock Street Stormwater Pumps with a Gravity Storm Sewer Line Proposed Project

Strategy: ***Improve and maintain culverts and other drainage systems that contribute to flood impacts.***

Location: Lock Street to Scrafford Lane, Rotterdam Junction
Jurisdiction: Town of Rotterdam
Recovery Function: Infrastructure

Project Description

Over the last 10 years, Lock Street in Rotterdam Junction has flooded during every major rainstorm, with significant impacts for 6-8 homes. It was a major conduit for flood waters into Rotterdam Junction and became impassable during Hurricane Irene and Tropical Storm Lee. The floodwater has no outlet in this area and must be mechanically pumped out during rain events by Town and Fire Department personnel.

The goal of this project is to improve the drainage system on Lock Street in order to reduce flooding, especially in the area that has historically had an impact on the 6-8 homes. The project would replace the pump drainage system installed in 2005, with a gravity storm sewer line (1,035 feet in length) that will extend from Lock Street to Scrafford Lane. The correction work would include installation of catch basins, piping, pre-treatment system and culverts.

Photo Credit: McDonald Engineering
Lock Street Pump

An engineering study evaluated various options to address flooding in this area. The study concludes that the gravity flow option is the most appropriate option for the Town. As per the study, this project would involve installing approximately 1,000 LF of 18'' High Density Polyethylene Pipe (HDPE) storm sewer piping from the existing catch basin on Lock Street. Installation would continue southeast through the side yard of a house, through a vacant parcel and along the Isabella Street right –of-way to the drainage ditch along Scrafford Lane. An existing 18'' culvert under Isabella Street would need to be replaced with a 24'' HDPE culvert and the drainage ditch along Scrafford Lane would have to be cleaned and shaped to accommodate the increased flow. The contributing drainage area is 35 acres and the proposed new facilities would be capable of handling a 24-hour, 25-year rainfall event.

Project easements will be required to connect between Isabella and Lock Streets. Apart from that, this project should be readily implementable by normal construction means. Construction may be limited by seasonal impacts.

Estimated Project Costs

This preliminary cost estimate of **$600,000** includes engineering design ($100,000), permitting ($25,000), construction ($239,000), project administration costs (25% of the project: $91,000), and contingency costs (30% of the project: $136,500). The cost assumes the system shall include gravity piping, catch basins, culverts and pre-treatment systems.

Project Benefits

Risk Reduction and Resiliency

This project is expected to lead to a direct reduction of the flood risk to physical assets. It increases reliability and resiliency of the infrastructure while reducing flooding in the area of Lock Street, Isabella Street and Scrafford Lane. Improved drainage as a result of this project will provide direct protection for six to eight homes in the vicinity, while contributing to the overall flood resiliency of the hamlet.

Economic Benefits

The value of the homes that will be protected is approximately $1,050,000 (7 homes X $150,000/home). The value of nearby homes that may be considered under the threat of flooding would also increase. Loss of wages and repair costs would also be an economic benefit. Implementing a gravity storm sewer line reduces the cost of pump operation and maintenance for the Town.

Environmental Benefits

Floodwaters often carry septic leachate, gas and oil, and other contaminants. Minimizing the extent and duration of flood waters inundating this area limits the mobilization of contaminants from underground and surface sources, thereby reducing the risk of contamination downstream.

Cost-Benefit Analysis

The cost-benefit analysis indicates positive benefits. The $600,000 project cost clearly offsets the $1,000,000 in property value that would be protected. Non-quantifiable benefits include less disruption to residents during floods and increased property values of homes.

Implementation

Prepare engineering design documents (2 months), submit to regulatory agencies for review and permit approval (6 months), prepare bid documents and review responses (2 months), construction (6-8 months).

Local, State, and Federal Government Regulatory Requirements

- A building permit in compliance with the New York State Building Code.
- New York's State Environmental Quality Review Act (SEQRA).
- SPDES General Permit with Storm Water Pollution Prevention Plan for stormwater discharges from construction activities (only required if impact area exceeds one acre in areal extent).
- NYS Wetland Permit (if state wetlands are being crossed).
- U.S. Army Corps of Engineers Nationwide Permit (if federal wetlands are being crossed).
- NYS DEC Region 4 Protection of Waters General Permit. (if fill is being added to State wetlands).

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Mohawk-Hudson Bike-Hike Trail and Culvert Improvements

Proposed Project

***Strategies:* (1) Improve and maintain culverts and other drainage systems that contribute to flood impacts and (2) Increase opportunities for recreation and tourism through efforts that include improving river access, regional biking and hiking trail development, and new activities and events.**

Location: Town of Rotterdam
Jurisdiction: Schenectady County
Recovery Function: Infrastructure and Economic Development

Project Description

The hamlet of Rotterdam Junction became an island surrounded by flood waters during Hurricane Irene and Tropical Storm Lee. Approximately 60 structures, including private homes and three local businesses, were impacted throughout the hamlet. Floodwaters from the nearby Route 5S backed up into the Old Erie Canal and caused flooding at the intersection of Scrafford Lane and the Pan American railroad.

The flooding was exacerbated by the blocked drainage culverts in the Old Erie Canal (Photo 1), which are intended to carry water from the Old Erie Canal to the Mohawk. The south end of Scrafford Lane forms a dead end depression that collects surface stormwater runoff from Route 5S and the surrounding area. Floodwaters were also blocked from draining to the north by the Pan American railroad that runs along the Old Erie Canal. As a result, floodwater could not drain out of Rotterdam Junction and stood for a week.

Photo Credit: Jim Kalohn, Schenectady County Planner

Photo 1 Blocked drainage in the Old Erie Canal

This project will improve drainage in this low-lying area by providing the floodwaters with an outlet by constructing a new culvert under the elevated Pan American railroad tracks at the south end of Scrafford Lane. It would have the double duty of completing one of the links along the 365-mile Mohawk-Hudson Bike Trail that extends from Albany to Buffalo. A 20-mile portion of this Canalway trail, locally known as the Mohawk-Hudson Bike-Hike Trail (MHBHT), traverses Schenectady County, but

is interrupted in this area, during which cyclists are obliged to ride on Route 5S for half a mile at considerable personal risk (Photo 2).

This project is comprised of the following three components:

1. **Constructing a tunnel of sufficient diameter that would serve as both a culvert and bike trail to convey the Mohawk-Hudson Bike Trail (Erie Canalway Trail) beneath the Pan American Railroad tracks** at the end of Scrafford Lane (Photo 3). This would allow flood water to drain from the low area at Scrafford Lane to the former Bonded Concrete site during large storm events. A properly designed tunnel would become a culvert during flood events, reducing the disastrous impact of long-standing flood waters, and emergency conditions. This tunnel would also provide a much needed connection for one of the few uncompleted sections of the 365-mile Erie Canalway Trail. The trail's former at-grade crossing in this area is blocked by the railroad, obliging users to exit the bike path and ride along State Route 5S for half a mile.

Photo 2 Closed Section of the bikeway

2. **Removing the sediment and debris from the Old Erie Canal** to establish a narrow meandering channel (approximately 800 linear feet) to help the standing water in the canal flow east and return to the Mohawk River. Flow draining the Old Erie Canal to the Mohawk River in this section of the prism is restricted by silt and storm debris, which has caused repeated flooding of homes along Isabella Street, Main Street, Iroquois Street, and Erie Street. Schenectady County has committed $212,000 to initiate the clearing of the canal and the cleaning and replacing of multiple blocked culverts.

3. **Replacing three culverts** to improve drainage conveyance in a west-to-east direction: two at the railroad crossing at the end of Scrafford Lane and one along Mabie Lane. Based on preliminary engineering studies, it was determined that the existing culverts need to be re-designed to the proper size and elevations.

Photo Credit: Steve Feeney , Schenectady County Economic Development & Planning Department

Photo 3 **Two drainage routes were evaluated; the crossing at Scrafford Lane (blue dots) is preferred because it provides the best drainage.**

Meetings with Pan Am Railroad have disclosed an as-of-right easement on the original deed that allows the State access for "highways and minerals." While the proposed design plans must be approved by the railroad for the work to proceed, the railroad has expressed general support of this project.

The first phase of the work would be to complete a preliminary design and cost estimate that is sufficiently detailed to allow the railroad to review the plans for conformance with its engineering and safety policy. The actual culvert construction work could be achieved by using the cut and cover method, whereby an existing switch to the west would be used with a new switch to the east. This would allow one track to be temporarily removed at a time. Alternatively, it may be possible to push a culvert through via horizontal jacking.

Project Support

The completion of the Erie Canalway Trail is cited as a priority in New York State[36] and local plans including Rotterdam's recently completed Brownfields Opportunity Area, the Canal Recreationway Plan, the Regional Transportation Plan, the Rotterdam Junction Long-Term Community Recovery Plan, and the Regional Sustainability Plan. Closing gaps in the area's bike trail and greenway network is the second of 27 regional priority initiatives identified to support local sustainability and this is one of the remaining critical segments of trail necessary to make the statewide trail a reality. The project is also supported by the not-for-profit organizations, including Parks & Trails NY and the Canalway Trails Association.

This project would support the Capital Region Economic Development Council (REDC) Goal 5, *Bring our cities to life within our urban core, restoring, rebuilding, and revitalizing our streets and communities by investing in capital projects for the Region*. The Mohawk-Hudson Bike-Hike Trail is included as a "related project" under Goal 5.

Estimated Project Costs

This is a complex project that will require considerable design effort to accurately determine the capital costs. An early planning estimate is **$2,200,000** for the capital construction. The construction cost is an approximation based on the costs of similar projects conducted elsewhere rather than on site-specific design information. A final cost for construction will be based on the results of a planning and design study. This planning and design study is the basis of the Phase I proposed cost of **$660,000.** The total project cost therefore is the sum of the planning and capital estimates, or **$2,860,000**. This Phase I planning and design project will evaluate and compare alternative designs for conveying the culvert / bike path under an active rail line, perform necessary geotechnical studies, develop safety and implementation plans with the railroad, and create schedules and procurement for the construction activities. Permitting will take place as part of the Phase I effort, resulting in a "shovel-ready" project.

Project Benefits

Risk Reduction and Resiliency

This project is expected to lead to a direct reduction of the high flood risk to physical assets, including the 70 structures such as homes, schools, and firehouses in Rotterdam Junction, that were impacted by Hurricane Irene and Tropical Storm Lee. The project also reduces the risk to public safety from populations that may become isolated during flooding.

Economic Benefits

The direct costs of flooding relate to repairs to structures and infrastructure. The impacts of any particular storm event are variable, depending on the depth of flood water and the rate of flooding and the retreat of flood waters. For this project, the major benefit is the slowing of the rate of flooding and the acceleration of post-flood drainage. This allows time for pumps and other mitigation measures to operate. As an estimate of the total cost, if a flood event recurs every ten years that would cause an average of $50,000 damage to each of 70 structures; the direct value of the reduction in risk is $3,500,000. This is a conservative estimate, and the costs could be several times higher. Another economic benefit is the loss of business activity from flooding.

Completion of the trail would attract many more bicycle tourists and help to strengthen recreational-based tourism of the hamlet. The 2013 "End to End" report[37] summarizes a survey of 500 cyclists who have completed the entire 300+ miles and they self-report average expenditures of $100 per day. The number of cyclists covering parts of the trail is unknown, but this could be an important economic benefit to some business along the trail.

Environmental Benefits

The safe conveyance of stormwater through the Old Erie Canal to groundwater via infiltration and drainage channels to the Mohawk River would provide environmental benefits by avoiding scouring and transport of pollutants from surface waters that may mobilize contaminants from gas stations, flooded cars, filled septic tanks, and other sources. Routine drainage from normal storms will also restore natural wetland habitats along the Old Erie Canal.

The hike-bike trail would also promote the use of alternative modes of transportation.

Health and Social Benefits

The 70 families that will receive alleviation of flood risks are the immediate beneficiaries, but their neighbors, friends, and family in the surrounding area, although not direct beneficiaries would be relieved of providing ad hoc support to these residents during a flood, which was the case during the Hurricane Irene and Tropical Storm Lee events. This community would experience social benefits as well, by avoiding the stress of being displaced from their homes by floodwaters.

The enhancement of the hike-bike trail would expose the residents to many practitioners of healthy lifestyles and confer health benefits by example to the public. It would also provide easy access to a safe and scenic activity.

Co-Benefits

The importance of the extension of the Mohawk-Hudson Bike-Hike trail is a significant co-benefit. This bikeway is a state-wide asset that has very few gaps. The sections of the hike-bike trail, along the Erie Canal on either side of the proposed culvert project are picaresque and steeped in history. This will become an important destination for bike enthusiasts from the Albany region, and local businesses will benefit. The recreational asset will also raise property values.

Cost-Benefit Analysis

The total cost of the planning and construction phases of $2,800,000 can be compared to the direct benefit of $3,500,000 for the reduction in flood damages. The cost benefit analysis concludes that direct benefits of the project out-weigh the costs even before figuring in the myriad other benefits described above. The investment in this project will yield significant benefit to the community of Rotterdam Junction due to the improved drainage and flood control. The project also benefits the larger region by completing a section of the bike path.

Implementation

Prepare engineering design documents (2 months), submit to regulatory agencies for review and permit approval (6 months), prepare bid documents and review responses (2 months). Construction would take an additional 12 months .

Local, State, and Federal Government Regulatory Requirements
• SPDES General Permit with Storm Water Pollution Prevention Plan for stormwater discharges from construction activities (only required if impact area exceeds one acre in areal extent). • New York's State Environmental Quality Review Act (SEQRA). • State Historic Preservation Act (SHPA) review for work in the Old Erie Canal. • Review of plans by the Pan Am Railroad.

Rotterdam Junction Firehouse Upgrades

Proposed Project

***Strategy:* Strengthen capacity of emergency and support services to respond during a major storm event and manage resources throughout recovery.**

Location: Main Street, Rotterdam Junction
Jurisdiction: Town of Rotterdam
Recovery Function: Health and Social Services and Capacity Building and Community Planning

Project Description

Background and Justification:
The Rotterdam Junction Firehouse functioned as an emergency operations center during Hurricane Irene flood mitigation and recovery efforts. Representatives of local, county and state government agencies as well the American Red Cross and Salvation Army coordinated their operations from the Firehouse. Meals for staff and local residents in need were prepared by community volunteers in the firehouse kitchen and served in the dining hall. Take-out meals for the elderly and infirm, who were unable to come to the firehouse, were also prepared and delivered from the firehouse.

Photo Credit: Schenectady County

American Red Cross provides medical care for Rotterdam Junction residents

Because of the *ad* hoc use of the fire station as an emergency shelter and command center, the Rotterdam Junction Firehouse's capacity to operate was severely challenged during Irene/Lee flooding. The four garage bays, which ordinarily house fire equipment, were turned into temporary offices and collection and distribution points for clothing, pots and pans and cleaning supplies for those in need. The American Red Cross used bay space to provide on-site medical care

Photo Credit: Rotterdam Junction Firehouse.

including wound care and preventative vaccinations. Empty trailers donated by corporate sponsors for the collection of donated furniture and appliances were located on the property for security and ease of distribution. A trailer containing portable showers for decontamination was also located on the firehouse property. Space was prioritized; emergency vehicles were outside during most of this time and moved indoors as public need diminished and alternate sites became available.

Photo Credit: Schenectady County

Meals were provided by volunteers

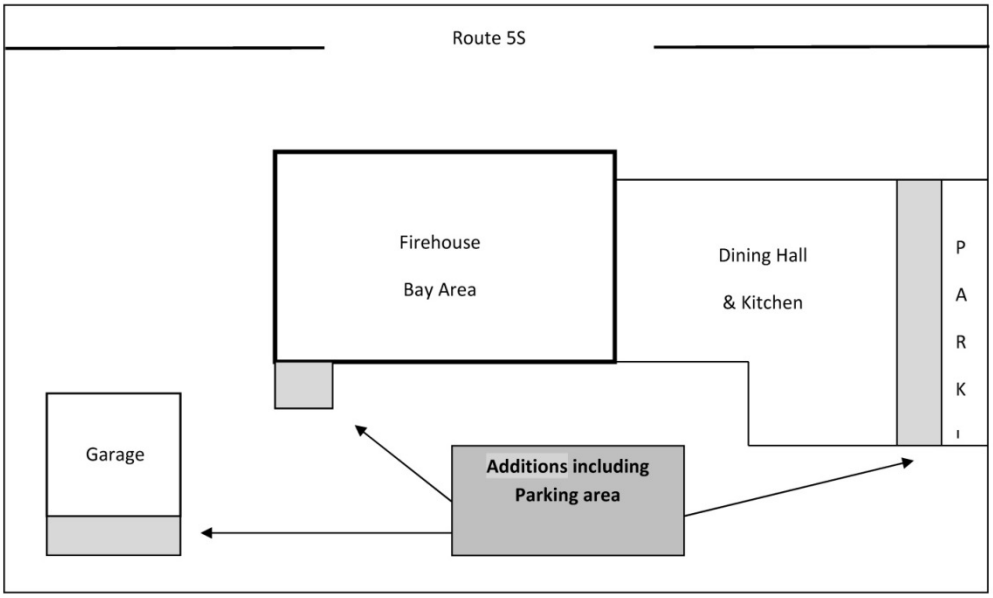
During the evacuation of residents from homes surrounded by flood waters on Erie Street in Rotterdam Junction, the fire department had to rely on a neighboring agency's marine unit. The Fire Department's pontoon boat could not be used because while the flood waters were too deep for residents to safely evacuate they were too shallow for the pontoon boat.

Upgrades and Improvements:

The purpose of this project is to develop the Firehouse as an emergency center. The following upgrades and improvements are required in order to meet recommended standards of the Federal Mass Care Service Delivery System and Schenectady County Emergency Operations Plan so that the Rotterdam Junction Firehouse can be established as a functional emergency operations center for the Western Mohawk River Valley Region of Schenectady County.

- Power system back-up
  - Purchase and install a natural gas-powered generator on an elevated support structure to raise the generator outside of the flood plain
  - Connect the generator to existing firehouse electrical system and required upgrades
  - Increase electrical feed to 400 amp service from standard power supply to support required electrical upgrades
  - Estimated cost: $231,000
- Addition to rear of firehouse bay area
  - Build a 1,000 square foot addition to house the generator switch gear with secure, controlled access and an alarm system
  - Planning and construction
  - Estimated cost: $43,000
- Addition to main hall –east side of Firehouse

  - Build a 2,250 square foot addition to enable the firehouse to accommodate ADA-compliant restrooms (male and female), decontamination showers (allows for year-round utilization) and a storage area.
  - Restore parking area lost as a result of building expansion
  - Planning and construction
  - Estimated cost: $633,000
- Expansion of firehouse septic system to support the building addition to accommodate expansion of bathroom facilities and the decontamination area.
  - Planning and construction
  - Estimated cost: $44,000
- Acquisition of airboat with trailer for emergency response and evacuations
  - Estimated cost: $80,000
- Addition to garage for secure storage of airboat and trailer
  - Planning and construction
  - Estimated cost: $70,000
- Interior environment of firehouse
  - Recommended acquisition of energy efficient AC system and installation on roof of firehouse.
  - Installation of NFPA 1500 full compliant vehicle exhaust extraction system
  - Planning and Construction
  - Estimated cost: $44,000
- Exterior envelope of firehouse
  - Upgrade roof of firehouse to effectively maintain interior environment of firehouse and support new HVAC unit.
  - Estimated cost: $75,000



Schematic of proposed additions to the Rotterdam Junction Firehouse, provided by Rotterdam Junction Firehouse.

Estimated Project Costs

As detailed above, the total project costs are **$1,403,000**. These costs include a 15% contingency and the following:

Power system back-up:	$ 231,000
Addition to rear of firehouse bay area:	43,000
Addition to main hall –east side of Firehouse	633,000
Expansion of firehouse septic system to support the building addition to accommodate expansion of bathroom facilities and the decontamination area:	44,000
Acquisition of airboat with trailer for emergency response and evacuations:	80,000
Addition to garage for secure storage of airboat and trailer:	70,000
Interior environment of firehouse:	44,000
Upgrade/strengthen exterior of firehouse:	75,000

Project Benefits

Risk Reduction and Resiliency

This project will directly reduce the health risk and potential for loss of life from flooding. It will increase the safety of residents and first responders, and allow emergency crews to serve the community faster, safer, and more effectively. It will aid the community in returning to normalcy after a disaster.

Health and Social Benefits

This capacity-building project protects vulnerable populations during flood-related events and is not intended to directly reduce the flood risk to physical assets. It will provide health and social, as well as economic benefits to the community by improving emergency response throughout Rotterdam and bordering hamlets and mitigating risks to the health and welfare of Town residents during emergencies. This project will better prepare emergency responders, municipal leaders, and residents for future storm events.

Cost-Benefit Analysis

A quantitative analysis is not amenable to this type of project. However, the qualitative cost-benefit analysis indicates very positive local and regional benefits. This vital capacity-building project would protect vulnerable populations at risk of flooding and prepare the fire department with adequate resources for carrying out future evacuations and other lifesaving and rescue actions which has a long-term benefit that will continue to increase in the future to offset the immediate costs.

Implementation

Prepare engineering design (2 months), permitting (6 months), construction (10 months).

Local, State, and Federal Government Regulatory Requirements

- A building permit in compliance with the New York State Building Code.
- Local site plan review?

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Install an Automatic Transfer Switch for Rotterdam District #3 Well Head Facility

Proposed Project

***Strategy:* (1) Protect wellheads and other drinking water infrastructure from flooding to ensure uninterrupted supply of clean, safe drinking water and (2) Ensure that critical facilities continue to operate during major storm events through redundant backup systems (e.g., generators, pumps, and connecting supply waterlines).**

Location: Main Street, Rotterdam Junction
Jurisdiction: Town of Rotterdam
Recovery Function: Infrastructure

Project Description

The Rotterdam Junction District #3 well head facility, located on Main Street, provides drinking water to the hamlet. Drinking water facilities are critical and must have redundant protection against impacts such as flooding or loss of power that could cut potable water supply for extended periods. The District #3 well head facility is the only facility that supplies Rotterdam Junction with potable water, making it all the more important to adequately protect it and ensure continued operation in all situations.

The facility has an emergency generator, but it must be switched on manually. In a disaster situation, this may not be possible in a timely manner. Installation of an automatic switch that could handle 0-2.2 kV voltage in the Main Well House Building #1 would allow the well head facility to automatically switch the well pumps over to the existing electric auxiliary generator in the event of the interruption or loss of National Grid electrical power.

Estimated Project Costs

Costs for this project total **$19,400**, and include $2,000 for permitting, $2,000 for design, $3,200 for installation, $6,300 for a 200 amp, three-phase, 480-volt automatic transfer switch, $1,350 for project administration and $4,450 for a 30% contingency.

Project Benefits

Risk Reduction and Resiliency

This project will protect critical assets of Rotterdam Junction's drinking water supply by providing redundant fail-safes to prevent well pump failure during a major storm or other loss of power from the utility.

Economic Benefits

The economic benefit of the project is to avoid costs associated with the unexpected unavailability of potable water. Loss of potable water would result in immediate loss of commerce and would require people to relocate if water service is not quickly restored.

Health and Social Benefits

The loss of potable water represents an immediate and serious health risk. In addition to not being able to obtain drinking water for washing, drinking, and cooking, toilets would not flush. The community would be rendered uninhabitable very quickly without a potable water supply.

Cost-Benefit Analysis

The modest cost of this project would result in a significant benefit for the local community, as this infrastructure project would protect vulnerable populations and businesses at risk of losing their drinking water supply during major storm events by providing a reliable source of potable water.

Implementation

Permitting (1 month), installation (1 month)

Local, State, and Federal Government Regulatory Requirements

- A building permit in compliance with the New York State Building Code.

Flood Protection of the Rotterdam District #5 Well Heads

Proposed Project

Strategy: ***Protect wellheads and other drinking water infrastructure from flooding to ensure uninterrupted supply of clean, safe drinking water.***

Location: Town of Rotterdam
Jurisdiction: Town of Rotterdam
Recovery Function: Infrastructure

Project Description

The Rotterdam District #5 well head facility, located on Rice Road, serves most of the Town of Rotterdam. The facility is located in the 500-year floodplain, and was almost compromised by flooding during Hurricane Irene and Tropical Storm Lee. The aim of this project is to drill a new well and elevate the casing 5 feet above the 500-year flood plain. The new well will ensure that the Rotterdam Water District will have potable water during a flood event and will provide additional capacity for the Town.

Project activities include establishing a well connection to existing pipes, installing a motor and pump, and constructing a new building to house the pump and equipment. The new building design is similar to the design of the existing building that houses Well #4.

Photo Credit: USGS

Drinking water well

Estimated Project Costs

Costs for this project total **$1,285,000**, and include permitting, design, construction, project administration and 10% contingency costs. The construction cost includes mobilization, site preparation, well drilling and testing, site grading, drain installation, and site restoration post-construction.

Project Benefits

Risk Reduction and Resiliency

This project will provide an important backup for Rotterdam Junction's drinking water supply by providing redundant water supply for all of the Town of Rotterdam that will ensure a continued supply of potable water to residents.

Economic Benefits

The economic benefit of the project is to avoid costs associated with the unexpected unavailability of potable water. Loss of potable water would result in immediate loss of commerce and would require people to relocate if water service is not quickly restored.

Health and Social Benefits

The loss of potable water represents an immediate and serious health risk to the 12,314 households in the Town of Rotterdam (2010 census). In addition to not being able to obtain drinking water for washing, drinking, and cooking, toilets would not flush. The community would be rendered uninhabitable very quickly without a potable water supply.

Cost-Benefit Analysis

The qualitative cost-benefit analysis (Table 20, Section V.F) indicates positive local benefits as this infrastructure project would protect vulnerable populations and businesses at risk of losing their drinking water supply during major storm events by providing a reliable source of potable water. In quantitative terms, the cost of the project is $52 per household, based on the 2010 census count of 12,314 households and a project cost of $300,000. Spread out over the 20-year lifespan of the equipment this is only $2.60 per household, which is a very reasonable cost for the security of a water supply system that is resilient to power outages.

Implementation

Prepare engineering design documents (2 months), submit to building department for review and permit approval (3 months), prepare bid documents and review responses (2 months), construction (2 months).

Local, State, and Federal Government Regulatory Requirements

- A building permit in compliance with the New York State Building Code.
- NYS Department of Health approval of public water supply
- State Environmental Quality Review Act (SEQRA) review.

Flood Protection of City Well Heads

Proposed Project

***Strategy:* Protect wellheads and other drinking water infrastructure from flooding to ensure uninterrupted supply of clean, safe drinking water.**

Location: Rice Road, Rotterdam
Jurisdiction: City of Schenectady
Recovery Function: Infrastructure and Community Planning and Capacity Building

Project Description

The Schenectady drinking water well field is located in a 100-year flood plain and came very close to being flooded during Hurricane Irene and Tropical Storm Lee. The City built an emergency earthen berm around the electrical switch gear and existing emergency generator during the storms to protect them from flood waters. Subsequently this berm was stabilized and made permanent. It became a concern that the existing emergency generator which supplies power to three well heads would not be sufficient to provide additional water if the demand for water increased or if the existing generator was to fail.

Photo Credit: Grant Wickes

Existing Portable Emergency Generator

This project would provide the facility with redundant electric back up in case of electrical disruption by installing a second outdoor diesel-fueled 2400 V, 900 kW generator. This will allow continued operation of the drinking water wells even when the power supply is interrupted by major storm events. The generator will be located within the bermed area of the well field, and has been sized to provide backup power to the three other well head pumps.

The City well field provides all of the water needs for Schenectady and provides up to 60% of the daily water demand for the Town of Niskayuna. With the additional emergency generator the City will be capable of providing not only the needs of the City, but also 100% of the water demand for the Town of Niskayuna, if needed.

Estimated Project Costs

The cost for this project includes the procurement and installation of a diesel fueled 2400 V, 900 kW generator, (2) 5 kV metal-enclosed load interrupter switchgear (configured as manual transfer switches) and associated electrical upgrades. Additional renovations include the removal and replacement of the building electrical equipment from walls, disconnect and remove wiring from fans, refinish surfaces, new lights, devices, associated wiring, intercepting and extending one 2.4kV feeder to well pump #5 and pump controller modifications.

The costs for the generator and electric work total $459,000, and the general contracting adds another $122,000, for a total construction cost of **$581,000.**

Project Benefits

Risk Reduction and Resiliency

This project will provide an important backup for the City of Schenectady's drinking water supply by providing a reliable water supply even if the utility power is disrupted.

Economic Benefits

The economic benefit of the project is to avoid costs associated with the unavailability of potable water. Loss of potable water would result in immediate loss of commerce and would require people to relocate if water service is not quickly restored.

Health and Social Benefits

The loss of potable water represents an immediate and serious health risk. In addition to not being able to obtain drinking water for washing, drinking, and cooking, toilets would not flush. The City would be rendered uninhabitable very quickly without a potable water supply.

Cost-Benefit Analysis

It is not feasible to directly estimate the dollar value of the loss of water, but the modest cost of the project would offset the cost of not having a reliable supply if it is needed. Based on the 2010 census, the number of households served by this project would be all of Schenectady (26,663) and 60% of the Town of Niskayuna (9,006 X 60%= 5,404), or 32,067 households. This represents a capital cost of $18.13 per household. Estimated annual operating costs of $95,000 are $2.96. Although the benefit conferred by the added security and relicense of the project is not quantifiable, the low cost per household justifies the expense.

Implementation

Permitting (1 month), installation (1 month)

Local, State, and Federal Government Regulatory Requirements

- A building permit in compliance with the New York State Building Code.
- NY Department of Environmental Conservation Part 500: Floodplain Management Regulations Development Permit

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Liberty Park Expansion and Streetscape Improvements

Proposed Project

***Strategies:* (1) Increase opportunities for recreation and tourism through efforts that include improving river access, regional biking and hiking trail development, and new activities and events and (2) Incorporate green infrastructure and other stormwater management practices into private and public development and infrastructure projects.**

Location: Gateway Plaza/Liberty Park, City of Schenectady
Jurisdiction: City of Schenectady
Recovery Function: Natural and Cultural Resources and Economic Development
Cost:

Proposed Project Description

Liberty Park is a small triangular park located in downtown Schenectady, at the corner of State Street and Washington Avenue. The park is centrally located adjacent to the Stockade district, Schenectady County Community College student housing, and the Greyhound bus terminal. Most of the small, underdeveloped park and surrounding properties are located in the 100-year flood plain and were flooded during Hurricane Irene and Tropical Storm Lee.

Photo Credit: Schenectady Gateway Plaza Implementation Plan

Proposed Water Street Pedestrian Walkway

Redevelopment and expansion of Liberty Park is a central element of the *City of Schenectady Gateway Plaza Implementation Plan* (2012)[38], which envisions the park as the centerpiece of a revitalized "Gateway Plaza" mixed-use neighborhood that includes a mix of affordable and market rate rental housing, commercial activity, and a transit hub.

The park will double in size as a result of this project. The design will enhance pedestrian connectivity to the Community College, Stockade neighborhood, and the Arts and Entertainment District to the east. It will create a gathering place that serves active and passive users, induces mixed use construction along its borders, and serves Capital District Transportation Authority's (CDTA) routes including the Bus Rapid

Transit. The Mohawk-Hudson Bike-Hike Trail is located on the northeastern border of the Study Area and State Street is part of State Bike Route 5.

Funding for this project would support the demolition of two commercial buildings (identified as the AAA buildings on the Existing Conditions plan), which flooded during Hurricane Irene and Tropical Storm Lee. These two buildings are owned by Metroplex, the Downtown Development Authority for Schenectady. The vacant land created as a result of demolition would be converted to park space with perimeter street improvements, such as the incorporation of green infrastructure to increase permeable surface and smart landscaping.

Currently over 60% of the site is impervious - primarily asphalt roadways and parking lots. Reducing the impervious surface and adding green infrastructure in the context of expanding the park would enhance the area's ability to absorb flood waters during future high rain events.

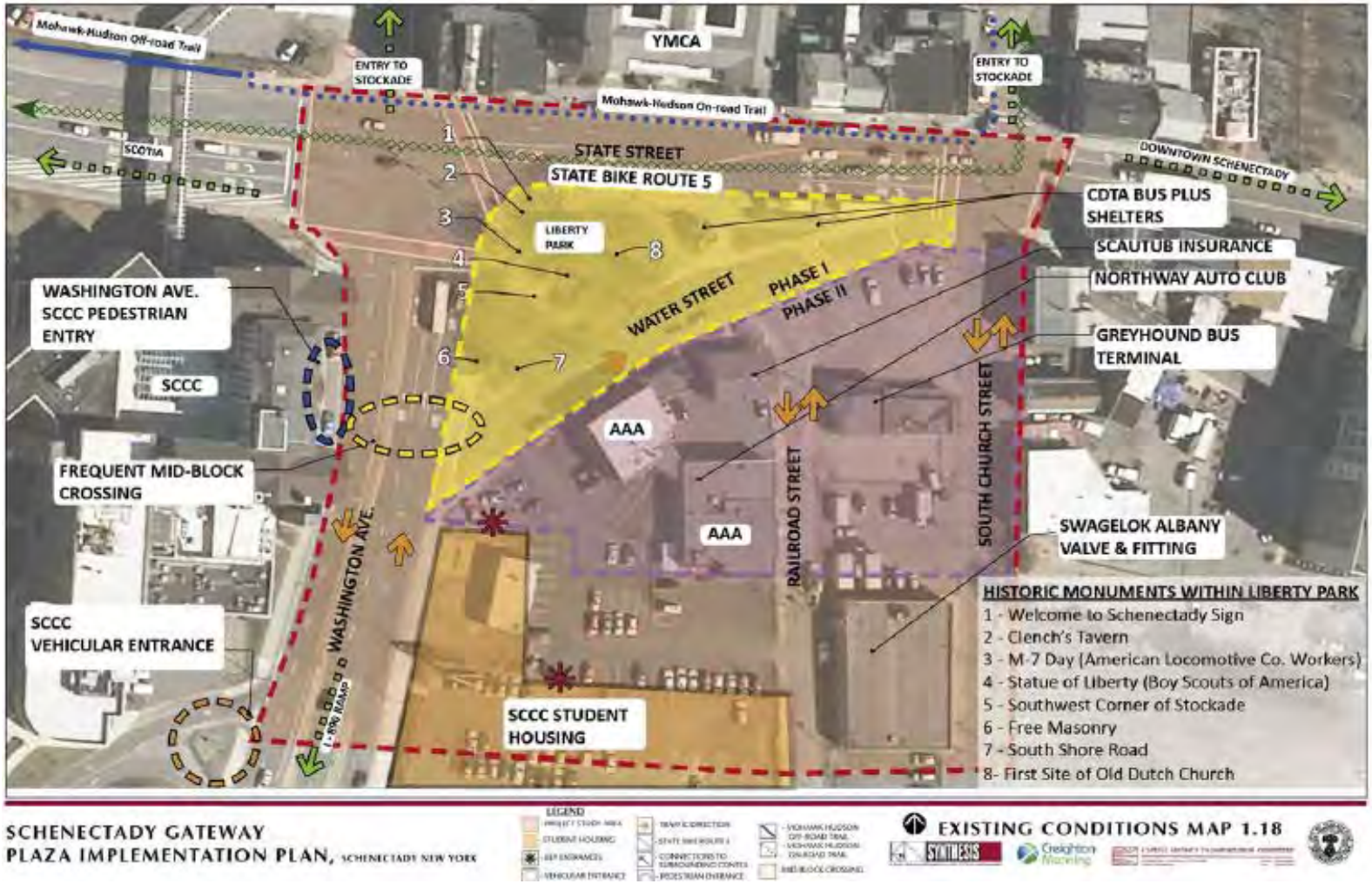
Estimated Project Costs

The cost estimate for the demolition of two buildings, development of green infrastructure, and creation of additional parkland is **$1,000,000**. Permitting is estimated at $50,000, the cost of demolition is $400,000, construction of the park area, which includes green infrastructure would cost $240,000, project administration is estimated at $140,000 and a 20% contingency cost of $170,000.

Project Benefits

Risk Reduction and Resiliency

This area, with abandoned buildings, is currently a liability and sends a poor message of urban blight. In contrast, the Gateway Plaza as envisioned will become a landmark for revitalization for the whole City, and will draw people to the downtown area. It is prime candidate for smart growth and resilient green infrastructure development. This would be achieved in the context of expanding the park and would enhance the area's ability to absorb flood waters during future high rain events.



Before the implementation of the City of Schenectady Gateway Plaza Implementation Plan (2012)

After completion of the project.

Economic Benefits

This project will provide a city park that will attract people including visitors, pedestrians, and the Schenectady College students and staff members. No direct market analysis of the benefits of the project to the surrounding neighborhoods has been conducted, and many of the benefits, such as a more pleasurable walk from the transit center to the community college, are intangible. Increase in real estate values, as has occurred along State Street following the Proctors Theatre redevelopment, project, are tangible and likely to occur.

Environmental Benefits

The replacement of impervious paving and rooftops with permeable surfaces and green stormwater infrastructure will decrease runoff and thus improve water quality. It will also help to mitigate regional flooding and reduce the urban heat island effect and air pollution.

Health and Social Benefits

This project will provide health and social benefits to the community through major streetscape and infrastructure enhancements and an increase in smart growth and community resiliency towards flooding. The expanded park will serve as a focal point for driving redevelopment opportunities for privately owned properties that have experienced repetitive flooding. Implementation will reduce the amount of future flooding throughout the project area.

Urban parks and greenspace also improve the public health by offering both active and passive recreational, ecological, and aesthetic value benefits to the community. The increase in pedestrian walkways will also help to improve public safety.

Cost-Benefit Analysis

The $1,000,000 cost of the project is a small cost compared to the potential redevelopment of this large site that is worth many times this investment. As shown in Table 20, Section V.F, the qualitative cost-benefit concludes that the benefit-to-cost ratio is greater than one. The benefits are based on the economic stimulus of the project including job creation, green infrastructure development, and the attraction and connection of visitors and local people. Although no specific quantitative cost-benefit analysis was conducted for the Liberty Park project, existing studies have demonstrated that urban parks convey significant economic, environmental, public health and social benefits to the surrounding communities. For example, a 2008 Trust for Public Land study found that Philadelphia parks generate over $40 million in tourist revenue, $18 million in property taxes, and $7 million savings in stormwater and air pollution control for the city.[39]

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Implementation

Prepare engineering design documents (4-5 months), submit to regulatory agencies for review and permit approval (6 months), prepare bid documents and review responses (2 months), demolition and construction (6-8 months).

Local, State, and Federal Government Regulatory Requirements
• New York's State Environmental Quality Review Act (SEQRA). • A building permit in compliance with the New York State Building Code. • State Historic Preservation Act (SHPA) review. • Temporary Discharge Permits during construction and SPDES General Permit for construction and Storm Water Pollution Prevention Plan.

North Ferry Street Pump Station Relocation Project

Proposed Project

Strategies: ***Improve septic and wastewater infrastructure to reduce flood damage and risk of pollution.***

Location: Riverside Park at North Ferry Street, City of Schenectady
Jurisdiction: City of Schenectady
Recovery Function: Infrastructure

Project Description

Photo Credit: Jim Kalohn, Schenectady County Planner, courtesy John Garver, Union College

Historic Flooding of the North Ferry Street Pump Station ()

The historic North Ferry Street Pump Station, built in 1913 in the Stockade District, has been inundated with floodwater six times, starting in 1913. This beautiful structure is located in the 100-year floodplain on the southern shore of the Mohawk River at the end of North Ferry Street. The elevation of the pump station is 225 feet above sea level (ASL) [40] which is seven feet below the 100-year flood elevation of 230 feet. The equipment in the pump station is located at an elevation of 228.6 feet ASL and can operate until the flood water reaches the circuit breaker, which is 1.5 feet higher than the equipment base. During the 2011 flooding caused by Hurricane Irene, the pump station, including its electrical systems, control systems, and emergency generator suffered water damage. The facility did not operate for approximately 24 hours.

The purpose of the North Ferry Street Pump Station Relocation Project is to address the historic flooding issues by relocating nearby to connect to existing infrastructure. The new pump station will be wet-flood proofed - designed to withstand flooding of the interior up to an elevation of 235 feet. The existing pump station will be put out of service. The City is evaluating alternative uses for the historic building, including incorporating the vacant historic building into the neighboring Riverside Park. Schenectady has secured funds to rebuild the pump station and has issued an RFP for an Engineering Report, Design,

Construction Administration Services and Construction Inspection Services. Additional funds are needed to cover planning, design and permitting of the project.

Estimated Project Costs

The total project costs are estimated at **$3,800,000**, but the direct construction costs are being supported from other sources. The permitting and design costs proposed for support from the CDBG-DR funding is **$300,000.** Permitting is anticipated to be complicated by the historic designation of the existing North Ferry Street Pump Station.

Project Benefits

Risk Reduction and Resiliency

This project will increase the reliability and the resiliency of the City of Schenectady's wastewater facilities. Should this facility fail during a flood, the City would not be able to pump wastewater and raw sewage would be released in violation of the SPDES discharge permit this project would avoid such as situation.

Economic Benefits

The economic benefit of the project is to avoid costs associated with the unexpected failure of the pump station.

Environmental Benefits

The failure of the pump station would cause the City's sewer system to back up, and could lead to the release of raw sewage, which would contaminate the neighborhood and the Mohawk River with untreated sewage. This would cause a serious degradation of water quality avoid by undertaking this project.

Health and Social Benefits

The release of raw sewage following a failure of the pump station would contaminate the neighborhood and the Mohawk River with untreated sewage. This would expose the public to raw sewage and contaminate inputs for drinking water downstream. A social co-benefit is the re-use of the existing historic pump station building for park uses.

Cost-Benefit Analysis

It is not feasible to directly estimate the dollar value of the loss of wastewater treatment, but the health and environmental risks of a failure clearly justify the costs. Because much of downtown Schenectady is at or below the grade of the wastewater treatment there is no alternative except the pumping of the sewage. The existing lines come to the North Ferry Pump Station, so relocation of the pump station to

another site would require extensive construction of sewage lines, which is not feasible. The qualitative cost-benefit analysis indicates positive benefits. This infrastructure project would protect populations living in low-lying areas and businesses at risk of being exposed to raw sewage carried by floodwaters, reducing the chances of disease transmission and flood damage to structures.

Implementation

Prepare engineering design documents (2 months), submit to regulatory agencies for review and permit approval (6 months), prepare bid documents and review responses (2 months), construction (3 months).

Local, State, and Federal Government Regulatory Requirements

- A building permit in compliance with the New York State Building Code.
- New York's State Environmental Quality Review Act (SEQRA).
- New York State Historic Preservation Act review (SHPA).
- NYS DEC 1988 Design Standard and Plan review.
- NYS DOT Highway Work Permit.
- Floodplain permit
- Site plan review

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Mitigation Measures to Reduce Flooding in the Historic Stockade and East Front Street Neighborhoods

Proposed Project

***Strategy:* (1) Complete long-term community recovery planning, watershed management planning, hazard mitigation planning, and other related planning efforts to build flood resilience and (2) Reduce flood risk to vulnerable neighborhoods located in the floodplain.**

Location: Along portions of the following roads in the City of Schenectady: Front Street, North Front Street, Washington Avenue, Governors Lane, North Ferry Street, North Street, Ingersoll Avenue, River Street, Mohawk Avenue.
Jurisdiction: City of Schenectady, Private
Recovery Function: Housing

Project Description

Photo Credit: Jim Kalohn, Schenectady County Planner

The Stockade neighborhood after Hurricane Irene

Hurricane Irene and Tropical Storm Lee caused severe flood damage to both the National Register listed Stockade District and the East Front Street Neighborhood. The Stockade neighborhood dates back to Dutch settlers in 1661, and its charming streets and alleys attract many visitors during the year. It contains a wide variety of Dutch and English 17th- and 18th-century buildings, many with later embellishments and additions. The Stockade was New York's first local historic district,[41] and its preservation is consistent with the requirements of the National Historic Preservation Act. It has many sections of brick streets, stone walkways and facades set close to the narrow streets, and many architectural amenities. It is a significant historic neighborhood, like Beacon Hill in Boston or Georgetown in Washington, DC. The National Park Service has described it as "the highest concentration of historic period homes in the country," with over 40 older than 200 years. The best plan for preservation will consider the preservation of the integrity of the entire neighborhood. Because of the historic significance, it is possible that State and Federal funds could become available that are in excess of the direct value of the sum of the individual values of each home.

The Stockade's homes along Ingersoll Avenue, North Street, North Ferry Street, Governor's Lane and Washington Avenue are cross streets that descend towards Riverside Park, along the edge of the Mohawk River. This area is in the 100-year floodplain and is subject to repetitive flooding events.

During Hurricane Irene and Tropical Storm Lee, floodwaters rose from the Mohawk River and flooded homes between 2 and 4 feet on the first floor and up to the ceiling in the basements. Many residents evacuated their homes for 6 to 9 months and did not return until restoration was complete. Electricity was out for almost a week. Telephone service took days to restore. The mud on the streets took months to dissipate on its own. Historic appointments such as 214 year-old woodworking and hardwood floors had to be removed. Residents who treasured their historic homes were shaken. Seven homes have been abandoned because of repetitive flood losses

There are 61 homes within the 100-year flood zone. Of these, approximately 40 homes have first floors below the 100-year base flood elevation (BFE) of 230 feet and are at risk of future flooding if they are not elevated to bring their first floor above the 100-year BFE. Of the 40 homes that are candidates for elevation, some would have to be raised as high as much as ten feet. Raising historic homes to this extent would be difficult to accomplish in a manner that would preserve the house's historic appearance. Consequently, any flood mitigation plans need to consider the entire neighborhood, and would require engineering and construction in excess of the NYRCRP resources.

The wavy blue line is the 100 year flood elevation.

The complexities of preserving this neighborhood have stymied flood recovery efforts. This is why this project proposes to identify alternative methods of reducing the neighborhood's vulnerability to flooding, and to evaluate the feasibility of the various mitigation options. The three options to be evaluated include:

1. **Elevating homes in the 100-year flood plain.**
    a. Perform an elevation survey to determine how many homes are candidates for a two foot lift above the BFE.
    b. Meet with the State Historic Preservation Office (SHPO) to discuss their vision for the properties in question.
    c. Develop cost estimates to raise Stockade neighborhood homes onto FEMA-approved foundations if they have been affected by reoccurring flooding.
2. **A combination of demolition and elevation, to at least partially preserve the neighborhood, with the creation of a wider strip of parkland parallel to the Mohawk River**.
    a. In addition to the elevation of homes in the 100-year flood described in (1), some of the homes would have to be elevated so high (up to 15 feet), that the costs would be very high. An important value of these homes is their historic character. Raising them up 15 feet would destroy their historic significance, and would probably not be approvable by the State Historic Preservation Office (SHPO). Consequently, some of these homes would be demolished.
    b. The evaluation of this option would include house by house consultations with the SHPO to determine if their historic integrity could be saved, and then a cost-benefit analysis.
3. **Evaluate the feasibility and costs of elevating streets, backfilling properties and elevating houses** as illustrated below. It involves raising each of the following streets: Ingersoll, North, North Ferry, Governor's Lane, Washington, and River Street in the East Front Street neighborhood. The lower end of each street, toward the Mohawk River, would be raised to the flood level to become an elevated cul-de-sac. The cul-de-sacs would also include urban landscaping, and well-lit overlooks, offering limited parking at the turn-around. The foundations of homes will need to be elevated just above the base 100-year flood elevation of 230 feet. These homes are not set back from the sidewalk. The new elevation would preserve the historic integrity of the neighborhood, but all the homes along the street would require elevation to the new sidewalk level. No bulkhead or retaining wall would be required.

This is a complex plan. It involves the relocation of utilities, coordination of effort all homeowners, approvals by numerous agencies, consideration and compensatory mitigation for reduction in flood storage capacity, historic preservation review, potentially significant environmental impacts, extensive public outreach, and costs that would exceed the value of the sum of the homes. Since the homes would be preserved and increased in value, homeowners could be expected to assist in defraying some costs.

The $500,000 planning project would accelerate this planning and decision-making process, which has been restrained by the lack of resources for several years. This plan would complete the following tasks.

1. Complete the alternatives for elevating to the point of having cost estimates;
2. Develop alternative #3 to a 10% engineering level with a cost estimate;
3. Hold public stakeholder meetings and agency meetings to identify constraints and opportunities of all three alternatives;
4. Identify additional sources of funding for the preferred alternative;

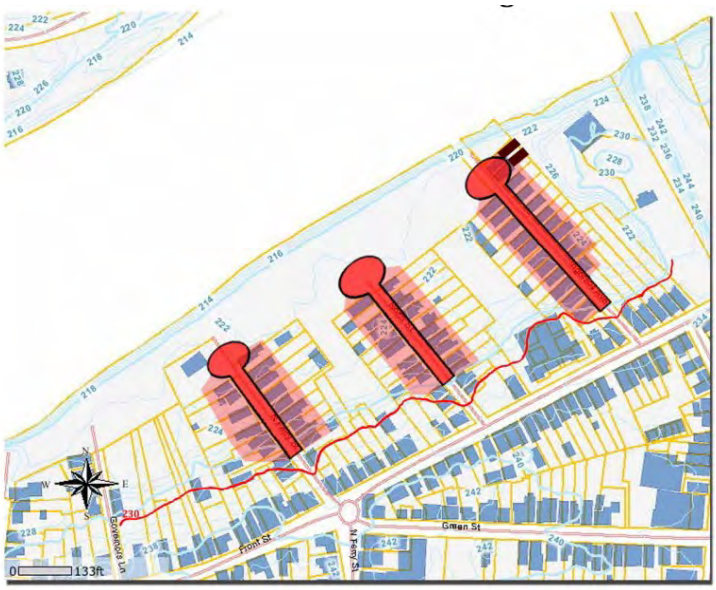

Photo Credit: Stracher Roth Gilmore Architects

Schematic of areas that would be raised under alternative #3

5. Complete cost estimates for each of the three alternatives discussed here;
6. Compare the alternatives and make recommendation.
7. Issue Request for Proposals (RFP) for an engineer and an RFP for a SEQRA and SHPA filing (for the cul-de-sac Plan) to design the preferred alternative.

Estimated Project Costs

The complexity and variety of project alternatives, coupled with the necessity to secure outside funding in excess of available local funding, has led to the recommendation of two phases to the project: Phase I, Planning, and Phase II, Implementation. The initial request for Phase I planning is **$500,000**, which would cover the costs for the development and evaluation of the mitigation alternatives, meetings with the SHPO, exploration for external funding sources, and recommendation for a clear path toward restoration and preservation. The Phase II costs depend on the alternative.

Project Benefits

Risk Reduction and Resiliency

This project aims to develop a series of plans that offer a menu of mitigation measures that reduce vulnerability to flooding while protecting and preserving the historic and cultural character of the Stockade.

Sixty-one historic homes would be protected as a result. Risk reduction is focused on a neighborhood scale. At the conclusion of the project this neighborhood would be protected from extreme flood events.

Economic Benefits

The direct economic benefits include the preservation of 61 historic homes and the preservation of the historic integrity of an entire neighborhood that represents the cultural roots of the City of Schenectady. Direct benefits include the increase in property values associated with these 61 homes, which is on the order of $100,000 (based on conceptual design from Stracher Roth Gilmore Architects) per home or $6,100,000. However, all the homes in the neighborhoods of East Front Street and the Stockade would likely increase in value, which probably represents several million dollars more in benefits.

Environmental Benefits

As part of any final plan, the floodplain mitigation would be required to compensate for the loss of floodplain areas from the raising of streets. Some of this lost floodplain area would be compensated for by adding permeable pavers on streets and sidewalks, which provides an environmental benefit and restores the historic character of the neighborhood. Additional compensation would occur by adding some additional parkland; and the existing riverside parks would benefit from restoration as part of alternatives that include demolition of some houses.

Health and Social Benefits

A less tangible but equally important benefit of this project is the preservation of an iconic neighborhood, along with the "sense of place" that an intact neighborhood supplies to residents.

Co-Benefits

Because of the historic nature of this neighborhood, all of Schenectady benefits with its preservation. In the broadest sense, the designation of the Stockade as a nationally significant neighborhood confirms that its preservation is part of the cultural history of the whole country.

Cost-Benefit Analysis

The cost-benefit ratio will depend on the selection of the final alternative.

If one considers only the tangible benefits to the homeowners versus the costs of preserving homes, the cost of mitigating flood damage would not be justified by alternative #3. However, a designated historic neighborhood of national significance confers a responsibility for preservation. Section 2 of the 1966 federal Historic Preservation Act defines this responsibility[42]:

Section 2
[16 U.S.C. 470-1 — Declaration of policy of the Federal Government]

> *"It shall be the policy of the Federal Government, in cooperation with other nations and in partnership with the States, local governments, Indian tribes, and private organizations and individuals to — … (4) contribute to the preservation of nonfederally owned prehistoric and historic resources and give maximum encouragement to organizations and individuals undertaking preservation by private means; (5) encourage the public and private preservation and utilization of all usable elements of the Nation's historic built environment…"*

Thus a conventional cost-benefit analysis must consider this mandate for preservation of the entire historic neighborhood. With a good planning study completed, it is likely that outside funding can be recruited to make the Phase II implementation feasible.

Implementation

The study will take approximately one to two years to complete. The Phase II implementation depends on the final choice of alternatives but is likely to take another 2-4 years or more, as each homeowner would have to make individual decisions about the best future for their home.

Local, State, and Federal Government Regulatory Requirements
There are no regulatory requirements associated with this project because it is a planning study.

Demolish Seven Flood Damaged Homes Located in the 100-Year Floodplain

Proposed Project

Strategy: ***Reduce flood risk to vulnerable neighborhoods located in the floodplain.***

Location: Historic Stockade Neighborhood: Ingersoll Avenue, Monroe Street, North Mohawk Street, and North Ferry Street
Jurisdiction: Schenectady County, Private
Recovery Function: Housing

Proposed Project Description

Seven abandoned properties within the Stockade neighborhood (shown on the map below) have remained vacant since they were flooded and damaged by Hurricane Irene and Tropical Storm Lee. These buildings have mold issues and are creating a public nuisance, as they have a blighting influence on Schenectady's most historical asset. The City already has taken title to/purchased four of the properties. This project includes acquisition of the three remaining properties and demolition of all seven condemned houses. These properties would remain vacant, and have a great potential use in solving the Stockade's parking deficiency and/or expanding Riverside Park.

Abandoned home, Rotterdam Junction

The green dots represent the vacant homes to be acquired and demolished under this project. Yellow dots are other vacant structures.

Estimated Project Costs

The cost estimates represent a standard average across the City for these types of homes. Estimated costs for this project total **$406,000**. This estimate is based on $20,000 for permitting, $70,000 for the planning for staging, demolition equipment movements, planning for the removal of material, mitigation of dust and traffic impacts, and other aspects related to this work on crowded city streets, $245,000 for the actual demolition ($35,000 per home), $33,500 for administration, legal costs, and engineering, and $36,500 for a 10% contingency.

Project Benefits

Risk Reduction and Resiliency

This project will directly reduce the flood risk to physical assets including neighboring historic homes while providing environmental, social, health, and economic benefits to the community. It will add permeable surfaces that can accommodate floodwaters, incrementally reducing risks.

Economic Benefits

The economic benefit of the project is to remove liability and to raise the value of other nearby properties that will no longer be near abandoned and derelict properties. This project will help to preserve the historic nature of the area, and protect the remaining 54 homes in the 100-year floodplain.

Environmental Benefits

Creating open space will allow for increased absorption of flood waters.

Health and Social Benefits

Seven abandoned, flood-damaged homes that create a blighting influence in the Stockade will be removed under this acquisition program. This housing acquisition program is expected to provide assistance to homeowners that have lost their homes due to Hurricane Irene and Tropical Storm Lee flood damage and to increase resilience to flooding in the City's most historic neighborhood.

Cost-Benefit Analysis

At present, the properties represent a liability, so the costs of $406,000 offset the liability. It is difficult to assess the negative value of the abandoned homes, but converting these properties to public open space is a real value. The qualitative cost-benefit analysis indicates positive physical, economic and social benefits to the Stockade community. This project would protect residents from flooding and help to preserve the historic character of the Stockade from the effects of major storm events.

Implementation

Prepare engineering design documents (2 months), submit to regulatory agencies for review and permit approval (6 months), prepare bid documents and review responses (2 months), demolition (1-3 months).

Local, State, and Federal Government Regulatory Requirements

- State Pollution Discharge Elimination System (SPDES). General Permit for stormwater discharges for construction activities if project footprint exceeds one acre.
- New York's State Environmental Quality Review Act (SEQRA).
- Demolition Permit.
- New York State Historic Preservation Act (SHPA) review.

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Install Generator at City Hall

Proposed Project

***Strategy:* Ensure that critical facilities continue to operate during major storm events through redundant backup systems (e.g., generators, pumps, and connecting supply waterlines).**

Location: City of Schenectady
Jurisdiction: City of Schenectady
Recovery Function: Capacity Building and Community Planning

Project Description

City Hall hosts the control point for the City of Schenectady critical support systems, including traffic control, telecommunications and public service computers. City Hall does not have any back-up power source, so these systems were at risk of losing power during Hurricane Irene and Tropical Storm Lee. During flooding events, power failures anywhere in the system will shut down the supply of electricity to City Hall. This project aims to place a 75KW back-up natural gas fired emergency generator in City Hall to provide power for critical systems throughout the City.

Photo Credit: Daniel Case

City Hall, Schenectady, NY

Estimated Project Costs

The implementation of this project has been estimated to cost approximately **$170,000**. The cost includes permitting ($7,500), design ($7,500), construction ($51,000), equipment ($38,000), 25% project administration, legal and engineering costs ($26,000), and 30% contingency ($40,000).

Project Benefits

Risk Reduction and Resiliency

It is important to ensure that critical systems which support City operations continue to function during major storm events. This project protects assets including traffic control, telecommunications, computers and servers from failing, providing social, health, and economic benefits. This capacity-building project is expected to increase community planning and response capabilities, and secure enhanced reliability of communication and traffic control systems throughout the city. Emergency responders, health and

social service providers and other critical stakeholders will continue to safely operate during storm events. This project also helps to safeguard and improve the management of essential services to the community.

Economic Benefits

The emergency generator will prevent the shut-down or collapse of critical systems that maintain City operations. This avoids the costs associated with shut-down of services in all the non-flood areas that would be impacted by the loss of traffic lights and centralized communications, reducing emergency and recovery costs.

Health and Social Benefits

Health services will be able to operate more efficiently and safely (e.g., ambulances) if critical systems do not fail as a result of storm events.

Cost-Benefit Analysis

The project costs described above total $170,000. The benefits of the project are significant but not amenable to direct cost evaluation because it is not feasible to directly estimate the dollar value of the loss of critical systems during flooding emergencies. The qualitative cost-benefit analysis indicates positive benefits. The social benefits of maintaining critical communications (radio and telephone), traffic signals, street lights, and other infrastructure compensates for the modest cost of this project.

Implementation

Prepare engineering design documents (1 month), submit to regulatory agencies for review and permit approval (4 months), prepare bid documents and review responses (2 months), installation (1 month).

Local, State, and Federal Government Regulatory Requirements

- A building permit in compliance with the New York State Building Code.

East Front Street Combined Sewer System Study

Proposed Project

***Strategy:* (1) Complete long-term community recovery planning, watershed management planning, hazard mitigation planning, and other related planning efforts to build flood resilience and (2) Improve septic and wastewater infrastructure to reduce flood damage and risk of pollution.**

Location: City of Schenectady
Jurisdiction: City of Schenectady
Recovery Function: Infrastructure

Project Description

The combined sewer overflows during short duration high volume storms and ice jams, causing damage to public and private property in the area north of Erie Boulevard to Freemans Bridge and west of the railroad tracks that divide the East Front Street and Stockade neighborhoods. The sewers overflowed causing sewage to back up through the manholes and flood the area. As a direct result, approximately 30 homes in the East Front Street neighborhood were flooded by one to three feet of water on the first floor for roughly 36 hours during Hurricane Irene and Tropical Storm Lee. This study will analyze the cause of the sanitary backups that occur during high rain events and Mohawk River flooding, and develop mitigation measures to reduce sewer overflow. This study will also evaluate the feasibility and costs of elevating homes in this area to above the floodplain level.

Photo Credit: Jim Kalohn, Schenectady County Planner

Sewage overflow after a major storm, Nott Street, Schenectady

Estimated Project Costs

This study has been estimated to cost approximately **$220,000**. The cost includes conducting a sewer system study to identify potential backup issues and, if necessary, determining a plan for removing backup locations. The costs also include an evaluation of the drainage, a sewer infrastructure study, and a determination of dry and wet weather flows as well as a sewer system capacity analysis. The costs do not include the next phase of implementing design or construction improvements that the study recommends.

Project Benefits

Risk Reduction and Resiliency

The results of this study will guide the City in determining necessary mitigation measures to reduce sewer overflows and secure enhanced reliance on infrastructure in the East Front Street neighborhood, during storm and ice jam events. During Hurricane Irene and Tropical Storm Lee and other storm events, the East Front Street neighborhood was at an elevated risk because the existing combined sewer system permitted storm surge water to inundate streets and flood adjacent homes and businesses. This study is the preliminary step in the process for achieving flood reduction in the area, and recovering quicker after major storm events. This project helps to improve the management of essential services to the community. It is expected to lead to a direct reduction of the flood risk to physical assets including water quality, homes, and businesses.

Economic Benefits

Systems performance would be improved and ongoing annual maintenance would be reduced as a result of the study. The resiliency improvements associated with the outcome of this study would reduce storm-related emergency and recovery costs, such as flood-damage repairs for local businesses and surrounding homes.

Environmental Benefits

This study will help the City develop mitigation measures that protect water quality by preventing raw sewage, oils, sediments and floatables from flowing into the Mohawk River and its tributaries and other streams, reducing residents' exposure to contamination floodwater.

Health and Social Benefits

The study will help to reduce the vulnerability to flooding of all residents and business owners in the East Front Street neighborhood and the surrounding commercial area. Flood reduction will maintain accessibility to the area for emergency responders. Flood reduction will also reduce the risk of disease transmission by preventing flow of raw sewage into drinking water sources and reducing direct human contact in basements, first floor of homes, lawns, and waters used for recreation.

Cost-Benefit Analysis

This study will help to provide economic, environmental, health and social benefits to the community and protect critical assets including water quality, businesses and homes. This study is also expected to increase community planning and capacity building capabilities, and secure enhanced reliance on infrastructure. Implementation will better prepare emergency responders, municipal leaders, and residents for future storm events.

A qualitative evaluation of costs and benefits has shown that the costs outweigh the benefits (Table 20, Section V.F). Mitigation measures as a result of this study will decrease vulnerability and risk due to flooding, through maintenance of home and business values and reduction of property damage. The health and well-being of residents and preservation of water quality will be better protected and the public benefits as a whole will include risk reduction, economic development and public health.

Implementation

The study is expected to take 6 to 12 months.

Local, State, and Federal Government Regulatory Requirements
There are no regulatory requirements for this project because it is a study.

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Schenectady High School Emergency Shelter Project
Proposed Project

***Strategy:* (1) Strengthen capacity of emergency and support services to respond during a major storm event and manage resources throughout recovery and (2) Establish health and social service buildings outside the flood zones as shelters during major storm events.**

Location: 1445, The Plaza, Schenectady, NY 12308, Schenectady, NY
Jurisdiction: Schenectady County
Recovery Function: Capacity Planning and Community Building, Health and Social Services

Project Description

There was no emergency shelter for flood victims in the City of Schenectady during Hurricane Irene and Tropical Storm Lee. This project will establish Schenectady High School as an emergency shelter during future major storm events. Built in 1958, the single-story school is located in North Schenectady, approximately 1.6 miles from the flood-prone Stockade and East Front Street neighborhoods. It is not located in or near a NFIP Flood Zone.

Photo Credit: Schenectady High School

The high school would serve as an effective shelter because the entire campus is handicapped accessible and has both a large gymnasium (24,000 square feet) and cafeteria (15,000 square feet) with a full commercial kitchen. In the event of an emergency, the gym would be isolated from the rest of the school if the school is in session. To ensure that the building could be utilized as a shelter, a 545KW emergency generator has been proposed to power the cafeteria, gym and associated support facilities.

Project actions include:

1. Conduct a detailed facility study and design to confirm the final sizing of an emergency generator, and the modifications needed to adapt the school's electrical system.
2. Install an emergency generator to independently power the cafeteria, gym and associated support facilities.

The County Department of Social Services (DSS) has developed and trained staff to activate and conduct intake of people needing shelter and would collaborate with the American Red Cross to open and operate the shelter to serve the community.

Estimated Project Costs

The project cost estimate is approximately **$360,000**. This cost includes $10,000 for permitting, $100,000 for conducting a detailed facility study and design to confirm the final sizing of the generator and the needed modifications to adapt the school's electrical system, and $250,000 for the installation of the 545KW emergency generator and remodeling of the power panel system.

Project Benefits

Risk Reduction and Resiliency

The project is not intended to directly reduce the flood risk to physical assets, however it reduces risks to health and welfare of residents during emergencies and provides a safe refuge for flood victims in Schenectady. This project is expected to strengthen community planning and capacity building, and provide a safety resource to residents during storm events.

Health and Social Benefits

This project will improve access to health and social services and protect vulnerable populations during flood-related emergencies. Services would be provided by trained staff and volunteers and include providing a safe shelter, hot meals, essential relief supplies, emotional support, and health services such as first aid. The high school has private rooms for those in need of immediate medical attention and/or for those who are ill and need to be separated from the general public.

Cost-Benefit Analysis

The benefits of establishing the Schenectady High School as the first evacuation shelter for Schenectady outweigh the cost of upgrades and improvements that are needed to certify the high school as an emergency shelter (Table 20, Section V.F). The shelter will provide important and much needed health and social benefits to the community and strengthen and streamline emergency response within the City. The project has a long-term social benefit that will continue to increase to offset the immediate costs.

Implementation

Prepare engineering design documents (1 month), submit to regulatory agencies for review and permit approval (4 months), prepare bid documents and review responses (2 months), installation (1 month).

Local, State, and Federal Government Regulatory Requirements

- A building permit in compliance with the New York State Building Code.

City of Schenectady Wastewater Treatment Plant Flood Protection

Proposed Project

***Strategy:* Improve septic and wastewater infrastructure to reduce flood damage and risk of pollution.**

Location: City of Schenectady
Jurisdiction: City of Schenectady
Recovery Function: Infrastructure

Project Description

City WWTP

The City of Schenectady Wastewater Treatment Plant (WWTP) was almost flooded during Hurricane Irene. It is located in the 500-year floodplain at an elevation of 228 feet. The level of the river rose to 225.5 feet, within six inches of over topping the river bank adjoining the plant. The average elevation of the plant is 216 to 220 feet; therefore if the riverbank had been overtopped, the low area would have filled with 5 to 12 feet of water, damaging critical equipment. If this plant were to flood, the floodwaters would carry raw sewage into the Mohawk River at a rate of 12 to 13 million gallons per day, which is the average daily flow of the plant. Flood damage to this critical asset would disrupt community recovery from the storm and would cause significant environmental and public health impacts. The Towns of Niskayuna, Colonie, Latham and Cohoes have public water supply wells and/or direct intakes from the Mohawk River, six and eight miles downstream, respectively.

This project is to map, design, and install a 14-foot high berm around the WWTP to protect it from a 500-year flood. The berm would be constructed to U.S. Army Corps of Engineering standards.

Estimated Costs

Estimated costs for building a berm around the City of Schenectady WWTP is approximately **$1,209,000**. This cost estimate includes permitting ($50,000), design ($100,000), construction ($594,000), 25% Project Administration, Legal, and Engineering costs ($186,000), and 30% contingency ($279,000). Construction includes building a triangular shaped-berm with 3:1 horizontal to vertical sloped sides surrounding

three sides of the WWTP property, an estimated 3,000 feet. The fourth side of the property, located adjacent to the Mohawk River, is already protected by the riverbank. Engineering design includes site design, geotechnical testing, restoration design, surveying, and preparation of a Stormwater Pollution Prevention Plan and an Erosion Control Plan. Construction includes mobilization/demobilization, site preparation such as clearing, grubbing, grading, construction of the berm, restoration of disturbed surfaces, and erosion control protection of the disturbed berm surface. The total height of the berm is assumed to be 14 feet based on an assumed lower ground surface elevation of 226 feet, a 500-year flood elevation of 228 feet, and a 2-foot freeboard. It is assumed that existing site topography would only require half of the total fill volume in the 1000-foot length of the property along the river and two-thirds the total fill volume on the east and west 500-foot length sides of the property. The costs assume four drains through the berm with one-way check valves to drain accumulated water behind the berm. Project costs may change based on the engineering design results.

Project Benefits

Risk Reduction and Resiliency

Building a berm around the City WWTP to prevent floodwaters from disrupting service protects not only this critical asset, but the public health of the community. This project would reduce the risk of contaminating the water supply for the communities downstream of the WWTP as well as homes and business within the vicinity of the plant. The project would allow normal wastewater service to continue through a 500-year flood.

Economic Benefits

The resiliency improvements associated with this project would reduce storm-related emergency and recovery costs for the WWTP. Economic benefits also include a reduction in the number of days lost at work due to storm damage.

Environmental Benefits

The berm would help to protect the water quality of the Mohawk River and surrounding water bodies during flood-related events. Without a berm, floodwaters could inundate the facility and carry raw sewage and other contaminants into the Mohawk River, damaging ecological health as it travels downstream.

Health and Social Benefits

Similar to environmental benefits, this project will protect groundwater and public health from raw sewage contamination. Contaminated flood waters could impact public and private land, potentially impacting public health. Contaminated floodwaters could also travel downstream and contaminate neighboring communities and their water supply.

Cost-Benefit Analysis

The many benefits associated with this project outweigh the large costs of building the berm. This project provides environmental, social, health, infrastructure, and economic benefits to the community and protects critical assets such as the City WWTP and nearby businesses and homes. The berm would prevent floodwater from overflowing into low areas, damaging critical equipment, causing raw sewage flowing into the river. This berm would also protect the Town of Niskayuna and Town of Colonie public water supply wells whose intakes are located downstream. This capacity-building project is expected to promote enhanced reliance on infrastructure and protection of public health. This project will also help to safeguard and improve the management of an essential service to the community. The qualitative cost-benefit analysis indicates very positive benefits to this and neighboring communities as this infrastructure project would protect vulnerable populations and businesses at risk of losing their drinking water supply during major storm events through contamination from sewerage overflows.

Implementation

Prepare engineering design documents (2 months), submit to regulatory agencies for review and permit approval (6 months), prepare bid documents and review responses (2 months), construction (3-6 months).

Local, State, and Federal Government Regulatory Requirements

- A building permit in compliance with the New York State Building Code.
- New York's State Environmental Quality Review Act (SEQRA).
- New York State Pollutant Discharge Elimination System (SPDES) for municipal wastewater.
- A SPDES General Permit and Stormwater Pollution Prevention Plan for stormwater discharges from construction activities.
- NYS DEC Part 500: Floodplain Management Regulations Development Permits.

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Senior Citizens Center / Schenectady County Emergency Shelter with Auxiliary Power Generators

Proposed Project

***Strategy:* (1) Strengthen capacity of emergency and support services to respond during a major storm event and manage resources throughout recovery and (2) Establish health and social service buildings outside the flood zones as shelters during major storm events.**

Location: 2369 Hamburg Road, Rotterdam
Jurisdiction: Schenectady County
Recovery Function: Capacity Planning and Community Building

Project Description

Schenectady County has identified the need for a designated emergency evacuation shelter that adheres to the standards established by the American Red Cross and U.S. Department of Homeland Security. The Town of Rotterdam Senior Citizens Center is the most appropriate venue to repurpose to this end, and specific upgrades have been identified through a facility evaluation by the American Red Cross.

The Rotterdam Senior Citizens Center is located less than a mile from the Highbridge Road exit off of I-890 and two miles from I-90. Rotterdam Junction and the flood prone areas of the Mohawk River are within 10 miles of the Senior Citizen Center, both of which are accessible by I-890 and I-90. Carman Fire Department Headquarters is located nearby at 2435 Hamburg Street and the Schenectady County Emergency Communications Center is directly across the street at 2638 Hamburg Street. The Center already is included in the emergency evacuation plan of the Mohonasen School District for Bradt Elementary School. Upon an order to evacuate, the students are to walk to the Center and remain until transportation is provided to take them home.

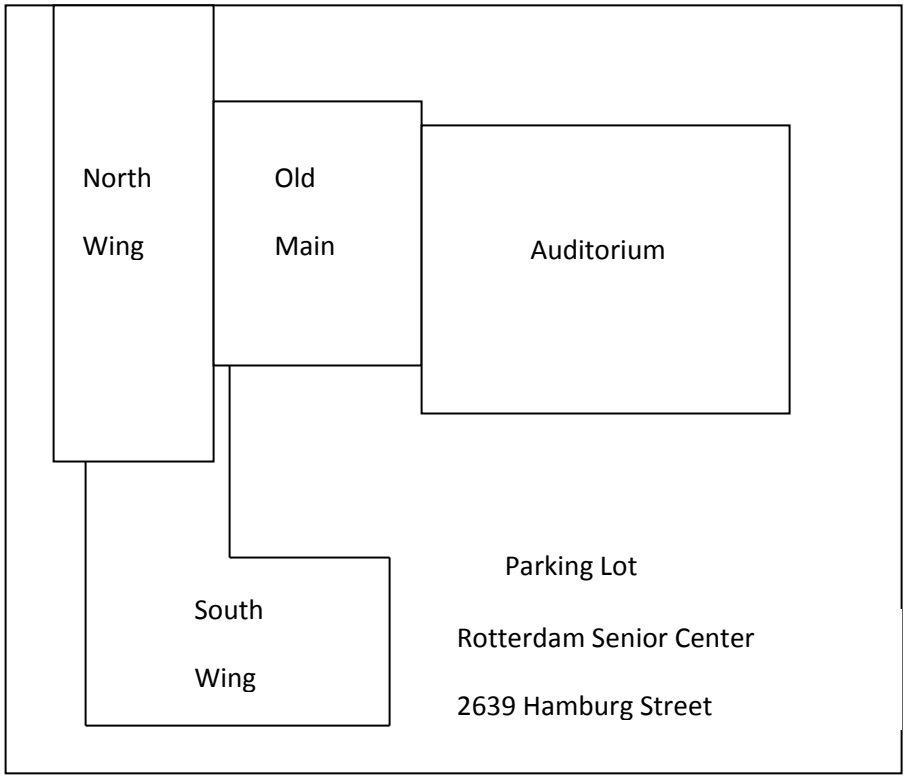
Photo Credit: Eileen Langer-Smith)

Rotterdam Senior Citizens Center

Rotterdam Junction was devastated after Hurricane Irene and Tropical Storm Lee and emergency mandatory evacuations were ordered for the community. Due to the low lying nature of the area, floodwaters remained and most homes were submerged for several days. In response to the flooding, residents were evacuated to the Rotterdam Senior Citizens Center. Warm food and other necessities were provided at the Center for the evacuees by volunteers and staff of the Senior Citizens Center.

The Senior Citizens Center, former Carman Elementary School, was built in the early 1900's. Over the years the building was expanded with two more additions in order to meet the needs of a growing community. In 1975, a new elementary school was built and Carman was closed. Soon after, Rotterdam, through the efforts of senior residents, was able to obtain the school and repurpose the building as a Senior Citizens Center. Through the years renovations have occurred to modernize the Center enabling greater accessibility and update its heating and lighting. Located in the Center is the Brass Rail Café which is supported by a commercial kitchen. In 1990, a 3,300 square foot auditorium was added to enable larger functions including exercise classes, seminars, group meetings and dances. To facilitate the use of the auditorium, a commercial grade kitchen was added to the auditorium in 2010. The Center is a handicap accessible facility with an exterior ramp to the North Wing entrance and a handicap lift from the Auditorium to Old Main (see diagram).

In the fall of 2013, the American Red Cross, as designated by the Federal Government to evaluate evacuation sites, reviewed the Senior Citizens Center for use as an evacuation center in the event of a disaster. Rotterdam was notified by the American Red Cross that the Center is appropriate for use as an evacuation site and a written agreement was sent to formalize coordination of efforts. With the advent of the NY Rising Community Reconstruction Program, Schenectady County has identified the Senior Citizens Center as the countywide evacuation shelter. This formal identification by the County and subsequent development of policies and procedures incorporates the recommendations of the Federal National Mass Care Strategy.



Schematic of the Rotterdam Senior Citizens Center

Estimated Project Costs

Estimated costs for this project are expected to be approximately **$354,000**. The following list breaks down the total costs by the upgrade and/or improvement needed to establish the Rotterdam Senior Citizen Center as an evacuation center for Schenectady County. These upgrades are required in order to meet the recommended standards of the Federal Mass Care Service Delivery System and Schenectady County Emergency Operations Plan.

- Power system back-up required
  - Gas powered generator and support structure
  - Engineering plan and installation
  - Connection of generator to Center electrical and required upgrades
  - Estimated cost: $48,000
- Required Repairs to the Center
  - Auditorium Flooring - This addition was built in 1994 and utilized the original gym/auditorium as part of the addition. Only half of the auditorium flooring was installed

new with the 1994 construction. Recommendation is for repair and replacement as this is the central locations for care and feeding of evacuees.

- Planning and installation
- Estimated cost: $30,000
- Roof of South Wing – In order for the Center to meet evacuation center requirements rooms must be provided for isolation of evacuees in the event of illness. The roof on this part of the building is composed aggregate with a liner underneath and is unable to maintain required environment for evacuees.
- Planning and installation
- Estimated cost: $40,000

- Enhance Septic System - Modernize and update two septic systems to allow for increased use of the facility during declared emergencies. This would also allow for increased use of the two commercial kitchens.
  - Planning and installation
  - Estimated cost: $60,000
  - Enhance Water Lines to Auditorium Kitchen - Enhancement of water lines to kitchen to allow for increased flow and water pressure and use of commercial dishwasher.
  - Planning and installation
  - Estimated cost: $30,000
- Additional costs of $100,000 for design, planning and installations for all aspects of upgrades and improvements and a 15% contingency cost.

Project Benefits

Risk Reduction and Resiliency

The project is not intended to directly reduce the flood risk to physical assets, however it reduces risks to health and welfare of residents during emergencies and provides a safe refuge for flood victims in Schenectady County. This project is expected to strengthen community planning and capacity building, and provide a safety resource for residents during future storm events.

Health and Social Benefits

This project will improve access to health and social services and protect vulnerable populations during flood-related emergencies. Services would be provided by trained staff and volunteers and include providing a safe shelter, hot meals, essential relief supplies, emotional support, and health services such

as first aid. The Center has private rooms for those in need of immediate medical attention and/or for those who are ill and need to be separated from the general public.

Cost-Benefit Analysis

The benefits of establishing the Senior Citizens Center as the first countywide evacuation shelter outweigh the cost of upgrades and improvements that are needed to certify the Center as an emergency shelter. The shelter will provide important and much needed health and social benefits to the community and strengthen and streamline emergency response within the county. The project has a long-term social benefit that will continue to increase in the future to offset the immediate cost of implementation.

Implementation

Prepare engineering design documents (2 months), submit to regulatory agencies for review and permit approval (6 months), prepare bid documents and review responses (2 months), construction (3-6 months).

Local, State, and Federal Government Regulatory Requirements

- A building permit in compliance with the New York State Building Code.

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Evacuation Plan for Rotterdam Junction

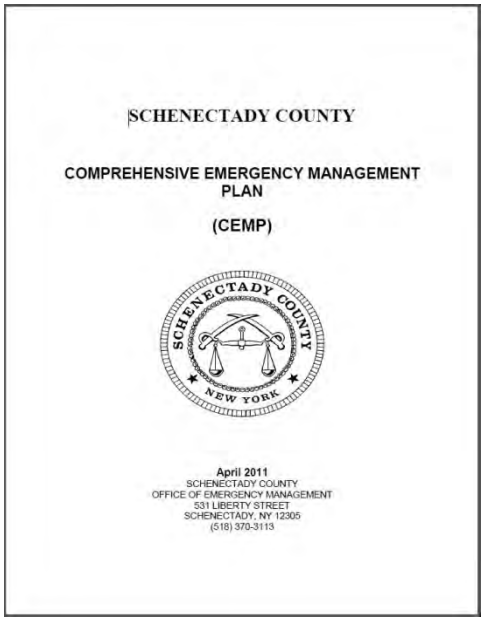
Proposed Project

***Strategy:* Strengthen capacity of emergency and support services to respond during a major storm event and manage resources throughout recovery.**

Location: Town of Rotterdam
Jurisdiction: Schenectady County
Recovery Function: Capacity Building and Community Planning

Project Description

Rotterdam Junction did not have an evacuation plan in place during and after the Irene/Lee storms. Rotterdam Junction Firehouse volunteers rescued trapped flood victims from their homes using a boat borrowed from the Alphaus Fire Department, which is 20 miles downstream and outside of the Town of Rotterdam Fire Districts. Those who were able walked to the local firehouse to obtain food, water, and other supplies.


SCHENECTADY COUNTY

COMPREHENSIVE EMERGENCY MANAGEMENT PLAN

(CEMP)

April 2011
SCHENECTADY COUNTY
OFFICE OF EMERGENCY MANAGEMENT
531 LIBERTY STREET
SCHENECTADY, NY 12305
(518) 370-3113

The existing Schenectady County Comprehensive Emergency Management Plan (CEMP) needs to be updated so that it includes lessons learned during Hurricane Irene and Tropical Storm Lee, especially with regard to responding to flooding in Rotterdam. The updated plan will be used to inform residents of proper protocols for future events (e.g., town evacuation route plans, how to create a personal evacuation plan, information specific to those with special needs, primary emergency broadcast units, emergency supplies, emergency communications options, local emergency shelter locations, and a list of local resources).

The process for revising the Schenectady County CEMP to incorporate more robust emergency response and evacuation components will include robust community engagement. Community meetings will be held to present the plan, gather community feedback and better understand the needs and constraints of residents, businesses and vulnerable populations. This process presents an opportunity to not only engage the community in developing the plan, but also educate residents to be better prepared for emergencies. Emergency guides and pamphlets will be developed and distributed throughout the com-

munity. These educational materials and the updated plan will be published on the Town and County websites.

Estimated Project Costs

The development of this emergency evacuation plan for Rotterdam Junction has been estimated to cost approximately **$100,000.** The cost includes writing the plan and including it in the updated Schenectady County CEMP. The plan will include information on how to write a personalized evacuation plan, a Town evacuation route, lessons learned from Hurricane Irene and Tropical Storm Lee, special needs emergency procedures, emergency shelter locations, and other resources.

Project Benefits

Risk Reduction and Resiliency

The project provides health and social benefits to the community. It is not intended to directly reduce the flood risk to physical assets; however it reduces risks to the safety, health, and welfare of residents during emergencies. This project is expected to strengthen community planning and capacity building, and better prepare emergency responders, municipal leaders, and residents for future storm events.

Health and Social Benefits

An evacuation plan will ensure the safety of vulnerable populations during emergencies and strengthen emergency response to major storms. Developing an evacuation plan may also help to discover unrecognized hazardous conditions that could exacerbate an emergency situation as well as expose deficiencies, such as lack of resources. An emergency plan will develop enhanced safety awareness.

Cost-Benefit Analysis

Rotterdam recognizes inefficiencies in flood-related emergency planning based on lessons learned during the storms. The Town is therefore interested in developing an emergency evacuation plan in both a cost-effective and efficient manner that is easily accessible to its residents. This proposed plan would provide actions to improve and streamline emergency response and resiliency in advance of major storm events. The health and social benefits of protecting the lives of those affected by flooding outweigh the low cost of this Proposed Project. Evacuation becomes essential when the benefits of leaving significantly outweigh the risk of “sheltering-in-place.” Table 20 in Section V.F summarizes the qualitative cost-benefit results.

Implementation

The Schenectady County CEMP states that the Plan should be updated every 3 years. It was last updated in 2011. The plan will take approximately 12 months to update.

Local, State, and Federal Government Regulatory Requirements
This project does not have any regulatory requirements because it is a plan.

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Schenectady County Community College Flood Abatement

Featured Project

***Strategy:* Improve and maintain culverts and other drainage systems that contribute to flood impacts.**

Location: 78 Washington Avenue, Schenectady
Jurisdiction: City of Schenectady
Recovery Function: Infrastructure and Economic Development

Project Description

Schenectady County Community College, built on the banks of the Mohawk River, sustained an estimated $1 million worth of flood damage from Hurricane Irene and Tropical Storm Lee. Flood waters inundated the community college parking lot, the copy and mailroom on the first floor of Elston Hall (approximately 3 feet deep), and the basement of Begley Hall. The SCCC was closed for approximately a week. During this time, there was no electricity.

Photo Credit: Times Union

Schenectady County Community College flooding after the storms.

As can be seen in the photograph, the impacts were widespread. By reconsidering the parking lot, and evaluating porous soil covers instead of asphalt, it may be possible to further develop a creative and beneficial flood mitigation area that can help reduce downstream flooding. The damage caused by the storms prompted the SCCC to develop a list of flood mitigation projects. These include:

Upgrade and Improve the SCCC Parking Lot Drainage System. This project includes overhauling the parking lot storm drainage system to prevent or minimize flooding from the Mohawk River during flood events. Actions include:

1. Replace the existing aging pumps that serve the parking lot. ($30,000)
2. Add an additional 4 inch line from the pumps to the storm drain system to increase the amount of water that can be pumped. ($40,000)
3. Add piping from the current storm drain outflow in the Binnekill Creek to extend out to the edge of Mohawk River. ($40,000)

The pump replacements and additional pipes would lessen the likelihood of damage to vehicles in the SCCC parking lot during sudden storms that occur throughout the year. Extending the outflow of water from the edge of the Binnekill to the Mohawk River would make back flows from the River less likely. **(**$110,000)

Install Five Emergency Backup Generators. Purchase five emergency natural gas powered generators to provide back-up power for key services including computers, communications, heat, and Culinary Department food storage. The five generators include:

1. 250KW generator for Elston Hall to power the College's computers;
2. 60KW generator for the Casola Dining Room;
3. 30KW generator for the Begley Building; and
4. Two 10KW generators – one for the Gateway Building and one for the Stockade Building.

All five generators would be installed on the roof of each of the identified buildings. The Elston Hall generator would be located on the roof of the Elston Hall north addition. The generator for the Casola Dining room is important to the Committee because a power outage during peak period could potentially cause the SCCC to lose $20,000 worth of food. The loss of food would also disrupt classes for 500 students enrolled in the culinary program. ($440,000)

Relocation of National Grid Transformers. Flood waters from Hurricane Irene and Tropical Storm Lee inundated the basement of Begley Hall. The water level reached the windows of the building and flooded the generator. This project will relocate the National Grid electrical transformers that serve most of the SCCC campus from an underground vault in Begley Hall to an exterior above grade location above 500-year flood elevation.

Estimated Project Costs

The cost estimate for these generators and the drainage projects associated components is **$550,000**. This includes $110,000 for the drainage work described above, $25,000 for design and permitting, $210,000 for construction associated with the installation of the generators, and $205,000 for the generators.

Project Benefits

Risk Reduction and Resiliency

The SCCC is an economic anchor for Schenectady. It provides jobs and education to residents of the community. Project components were developed to improve the reliability of SCCC's infrastructure to protect this critical and vulnerable asset from flooding.

Economic Benefits

As discussed above, the loss of food in the dining hall, flood damage to vehicles and classrooms, and damage to the electrical systems resulted in over $1 million in damage. Mitigation of future risks of this magnitude and the restoration of normal activities at the College would prevent additional losses of economic activity.

Health and Social Benefits

The project would prevent the cancellation of classes, and ensuring the quick return to business and other important services provided by the SCCC.

Cost-Benefit Analysis

The $550,000 cost of the project offsets the $1 million in potential losses from a storm similar to Hurricane Irene and Tropical Storm Lee. The qualitative cost-benefit analysis indicates positive local and regional benefits. The economic, health, and social benefits of this project (described above) clearly outweigh the project costs.

Implementation

Prepare engineering design documents (2 months), submit to regulatory agencies for review and permit approval (6 months), prepare bid documents and review responses (2 months), construction (5 months).

Local, State, and Federal Government Regulatory Requirements and Additional Funding Sources

- A building permit in compliance with the New York State Building Code.
- New York's State Environmental Quality Review Act (SEQRA).
- SPDES General Permit and Stormwater Pollution Prevention Plan for stormwater discharges from construction activities.
- NYS DEC Protection of Waters Program Article 15, Environmental Conservation Law Implementing Regulations, 6NYCRR PART 608.
- Water Quality Certification.

Potential Alternate Funding Sources

- FEMA Pre-disaster (PDMC)
- Flood Assistance (FMA)
- Economic Development Assistance Programs Public Works Program;
- Cisco Donation Program

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Houses on South Ferry Street, Schenectady
Source: http://commons.wikimedia.org/wiki/File:Houses_on_South_Ferry_Street,_Schenectady,_NY.jpg

Mabee Farm, Rotterdam Junction
Source: http://en.wikipedia.org/wiki/File:Mabee_House_Jan_09.jpg

V. Additional materials

Section V includes additional materials that support and/or elaborate on content presented in Sections I – IV. This includes:

- **A master table of projects**
- **Description of the public engagement process**
- **Community asset inventory maps**
- **Assessment of risk to assets methodology**
- **Risk reduction and cost-benefit analysis**
- **End notes**
- **Glossary**

A. Additional resiliency recommendations

Table 15 Additional Resiliency Recommendations

Strategy	Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
Complete long-term community recovery planning, watershed management planning, hazard mitigation planning, and other related planning efforts to build flood resilience.	Update the Town of Rotterdam Comprehensive Plan	The plan is 13 years old and should be updated to reflect changes in the community and its vision for the future with regard to flood resiliency, land use, economic development, resource protection and community services.	Additional Resiliency Recommendation	None	Yes
Incorporate green infrastructure and other stormwater management practices into private and public development and infrastructure projects	Streetscape Improvements on Main Street, Rotterdam Junction	The existing poor conditions of Main Street near Rotterdam Junction (e.g., pot holes, broken curbside) were exacerbated by flood waters from Hurricane Irene and Tropical Storm Lee. This project would incorporate green infrastructure and other drainage improvements, as well as address poor sidewalk conditions, consolidate and eliminate curb cuts, plant street trees, and add pedestrian benches and decorative lighting.	Additional Resiliency Recommendation	$3,000,000	No
Reduce flood risk to vulnerable neighborhoods located in the floodplain.	Rotterdam Junction Housing Acquisition Program	There are approximately 3 vacant/abandoned homes located in the 100-year flood plain in Rotterdam Junction as a result of Tropical Storm Irene and Hurricane Lee. This project proposes to purchase these three homes from owners who do not want to rebuild or return. These homes would be demolished, revitalized, and/or sold to interested individuals that are seeking to rebuild the homes or redevelop the vacant lots.	Additional Resiliency Recommendation	$220,000	No

Table 15 (continued) Additional Resiliency Recommendations

Strategy	Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
Ensure that critical facilities continue to operate during major storm events through redundant backup systems (e.g., generators, pumps, and connecting supply waterlines).	Install Emergency backup Generators at Five Sanitary Lift Stations throughout Rotterdam	Install permanent automatic back-up auxiliary generators at each of five critical sanitary sewer lift pump stations located in various areas in Rotterdam. These generators will ensure that each of the five sanitary lift stations will operate during critical storm events.	Additional Resiliency Recommendation	$351,000	No
Increase opportunities for recreation and tourism through efforts that include improving river access, regional biking and hiking trail development, and new activities and events.	Waterfront Access to the Mohawk River	The BOA Nomination Study recommended enhancing the existing character of Rotterdam Junction by increasing economic and recreational activity through water access for residents and tourists. This project includes establishing trail heads and access points to the Mohawk River. The waterfront could be enhanced with a place for community gatherings, such as an outdoor amphitheater, picnic area and pavilions. A floating dock, boat launch, and additional trails should also be considered. Connectivity between these new recreational resources should be completed with the existing Town cultural recourses such as Mabee Farm and the Keepers of the Circle.	Additional Resiliency Recommendation	$5,000,000	Yes

Table 15 (continued) Additional Resiliency Recommendations

Strategy	Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
Increase opportunities for recreation and tourism through efforts that include improving river access, regional biking and hiking trail development, and new activities and events.	Overlook Project	To further encourage tourism and highlight the Town's history and heritage by cleaning up and revitalizing the old Erie Canal Lock #25. An interpretative overlook should be created to provide for scenic views and a historical perspective of the lock. This project could be incorporated as part of the Drainage/Bike Trial Tunnel Project. A similar project was undertaken at the Town's historic lock #23 on the bike path through the Union College Civil Engineering Program.	Additional Resiliency Recommendation	$75,000	Yes
Increase opportunities for recreation and tourism through efforts that include improving river access, regional biking and hiking trail development, and new activities and events.	Convert Former Bonded Concrete Site into Parkland	The 78-acre former Bonded Concrete mining site is currently open space with no active recreational opportunities. This project would convert this area into a park that provides both passive and active recreation that could be linked to waterfront redevelopment. The park could be constructed with pedestrian trails along the perimeter of the lake, boat and fishing docks, and picnic shelters. In addition, this park could be designed for flood water storage with consideration of a berm or other protective measure to protect the lake and aquifer from potential toxins resulting from train derailment. Recreational enhancements to Rotterdam Junction are essential to the long-term revitalization of the hamlet.	Additional Resiliency Recommendation	$3,000,000	Yes

Table 15 (continued) Additional Resiliency Recommendations

Strategy	Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
Strengthen capacity of emergency and support services to respond during a major storm event and manage resources throughout recovery.	Emergency Preparedness Training for Code Enforcement	Provide training for Rotterdam Code Enforcement personnel so that they are better equipped to handle any future storm related damage. There is currently no local training provided. Investigate through the NYS Emergency Management Office when and where additional training can be carried out.	Additional Resiliency Recommendation	$5,000	Yes
Protect wellheads and other drinking water infrastructure from flooding to ensure uninterrupted supply of clean, safe drinking water.	Re-Establish Waterline Connection between the City of Schenectady and the Town of Rotterdam	Re-installation of connection water main valves between Rotterdam main water lines and the Schenectady main water lines. This connection would allow for either municipality to provide emergency support for the other during major storm events.	Additional Resiliency Recommendation	None	Yes
Incorporate green infrastructure and other stormwater management practices into private and public development and infrastructure projects	ALCO Riverfront Revitalization Project	The ALCO Redevelopment project area floods during major storm events impacting the homes in East Front Street neighborhood. A private developer is returning the abandoned 57-acre brownfield to a productive mixed-use waterfront community with green space, offices, retail, residential units, and public use harbor. This project includes conducting a feasibility analysis and installing green infrastructure to better manage flood waters.	Additional Resiliency Recommendation	$300,000	Yes

Table 15 (continued) Additional Resiliency Recommendations

Strategy	Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
Complete long-term community recovery planning, watershed management planning, hazard mitigation planning, and other related planning efforts to build flood resilience.	Lock Dam Study	The Lock 7 Dam was completed in November 1913 between Clifton Park and Niskayuna. This inoperable dam is more than 30 feet high and almost 2,000 feet in length. The purpose of this study is to evaluate the effect of the dam on flooding, and investigate a possible engineered adaptation of the Lock 7 (Vischer Ferry) dam complex to minimize its role in hydraulically inducing flooding experienced at the upstream communities of Scotia, Schenectady and shoreline eastern Glenville for the past century.	Additional Resiliency Recommendation	$30,000	Yes

B. Master table of projects

Table 16 Master Table of Projects

Strategy	Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
Improve and maintain culverts and other drainage systems that contribute to flood impacts.	Replace Lock Street Stormwater Pumps with a Gravity Storm Sewer Line	Eliminate flooding on Lock Street which includes 6 to 8 homes that were impacted by Hurricane Irene and Tropical Storm Lee by replacing current pump drainage system with a gravity storm sewer line.	Proposed	$600,000	No
1. Improve and maintain culverts and other drainage systems that contribute to flood impacts. 2. Increase opportunities for recreation and tourism through efforts that include improving river access, regional biking and hiking trail development, and new activities and events.	Mohawk-Hudson Bike-Hike Trail and Culvert Improvements	Provide flood abatement and economic and recreational benefits for Rotterdam Junction by constructing a tunnel of sufficient diameter to serve as both a culvert and bike trail. Remove the sediment and debris from the Old Erie Canal channel. Replace the two culverts at the railroad crossing on Scrafford Lane.	Proposed	Phase I: engineering/ permitting $660,000 Phase II: construction $2.2 million (estimate)	Yes
Strengthen capacity of emergency and support services to respond during a major storm event and manage resources throughout recovery.	Rotterdam Junction Firehouse Upgrades	Enhance the Rotterdam Junction Firehouse facilities and grounds to strengthen disaster response including the installation of an emergency backup generator; expansion of the main hall; expansion of the septic system; purchase of a rescue air boat and trailer; expansion of the garage to the accommodate air boat and trailer; and other upgrades. The capacity of the firehouse was compromised during the storms due to the lack of space and supplies.	Proposed	$1,403,000	No

Table 16 (continued) Master Table of Projects

Strategy	Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
1. Protect wellheads and other drinking water infrastructure from flooding to ensure uninterrupted supply of clean, safe drinking water. 2. Ensure that critical facilities continue to operate during major storm events through redundant backup systems (e.g., generators, pumps, and connecting supply waterlines).	Install an Automatic Transfer Switch for District #3 Well Head Facility	Install an automatic transfer switch at the Rotterdam District #3 Well Head Facility. This would allow the facility to automatically switch the well pumps over to the existing auxiliary generator in the event of the interruption or loss of National Grid electrical power	Proposed	$19,400	No
Protect wellheads and other drinking water infrastructure from flooding to ensure uninterrupted supply of clean, safe drinking water.	Flood Protection of the Rotterdam District #5 Well Heads	Drill a new well and elevate the pump 5 feet above the 500-year flood plain ensuring that the Rotterdam Water District would have potable water during a flood event. This well can also be used to provide additional capacity.	Proposed	$1,285,000	No
Protect wellheads and other drinking water infrastructure from flooding to ensure uninterrupted supply of clean, safe drinking water.	Flood Protection of City Well Heads	Protect Schenectady wells are located in a 100-year flood plain that nearly flooded from electrical disruption by installing an outdoor diesel fueled 2400 V, 900 kW backup generator to ensure drinking water wells perform when power is down.	Proposed	$581,000	No

Table 16 (continued) Master Table of Projects

Strategy	Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
Improve and maintain culverts and other drainage systems that contribute to flood impacts.	Schenectady County Community College (SCCC) Flood Abatement	The SCCC parking lot and various buildings flooded during Hurricane Irene and Tropical Storm Lee. This project intends to improve parking lot drainage by replacing the existing aging pumps that serve the parking lot, add a 4-inch line from the pumps to the storm drain system to increase the amount of water that can be pumped, and add piping from the current storm drain outflow to the Mohawk. The SCCC lost power during the storms. Install five generators at the following locations: Elston hall, Casola Dining Room, the Begley Building, the Gateway Building, and the Stockade Building.	Featured	$550,000	Yes
1. Increase opportunities for recreation and tourism through efforts that include improving river access, regional biking and hiking trail development, and new activities and events. 2. Incorporate green infrastructure and other stormwater management practices into private and public development and infrastructure projects.	Liberty Park Expansion and Streetscape Improvements	This project supports a portion of the proposed *City of Schenectady Gateway Plaza Implementation Plan*, developed during the years of 2008 and 2012. It includes the acquisition and demolition of two buildings (the AAA buildings) that flooded during Hurricane Irene and Tropical Storm Lee. The vacant land created as a result of demolition would be converted to park space with perimeter street improvements, such as the incorporation of green infrastructure to increase permeable surface and smart landscaping.	Proposed	$1,000,000	No

Table 16 (continued) Master Table of Projects

Strategy	Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
Improve septic and wastewater infrastructure to reduce flood damage and risk of pollution.	North Ferry Street Pump Station Relocation Project	Construct a new pump station to replace the existing pump station, which flooded during Hurricane Irene and Tropical Storm Lee. The new pump station will be relocated to a property adjacent to the existing building and include a mat type foundation.	Proposed	$300,000	No
1. Complete long-term community recovery planning, watershed management planning, hazard mitigation planning, and other related planning efforts to build flood resilience. 2. Reduce flood risk to vulnerable neighborhoods located in the floodplain.	Mitigation Measures to Reduce Flooding in the Stockade and East Front Street Neighborhoods	Provide assistance to homeowners in the Stockade and East Front Street neighborhood whose homes were inundated by floodwaters from Hurricane Irene and Tropical Storm Lee. Develop a series of plans that offer a menu of options to alleviate vulnerability to flooding.	Proposed	$500,000	No
Reduce flood risk to vulnerable neighborhoods located in the floodplain.	Demolish Seven Flood Damaged Homes Located in the 100-Year Floodplain	The City has taken title to four vacated properties, and proposes to take title of the remaining three abandoned properties located in the Stockade District. The City will donate the purchased properties to the City's Land Bank, which will work with residents of the neighborhood to determine the best use of the land.	Proposed	$406,000	No

Table 16 (continued) Master Table of Projects

Strategy	Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
Ensure that critical facilities continue to operate during major storm events through redundant backup systems (e.g., generators, pumps, and connecting supply waterlines).	Install Generator at City Hall	Install a back-up generator in City Hall to provide power for critical systems throughout the city.	Proposed	$170,000	No
1. Complete long-term community recovery planning, watershed management planning, hazard mitigation planning, and other related planning efforts to build flood resilience. 2. Improve septic and wastewater infrastructure to reduce flood damage and risk of pollution.	East Front Street Combined Sewer System Study	Conduct an engineering study to analyze the cause of the sanitary backups that occur during high rain events and Mohawk River flooding, and developing mitigation measures that reduce sewer overflow as well as the feasibility and costs of elevating structures.	Proposed	$220,000	No
1. Strengthen capacity of emergency and support services to respond during a major storm event and manage resources throughout recovery 2. Establish health and social service buildings outside the flood zones as shelters during major storm events.	Schenectady High School Emergency Shelter Project	Establish Schenectady High School as the first emergency shelter for residents in need of a shelter during major storm events. Install a backup emergency generator to ensure shelter services do not fail during storm-related events.	Proposed	$360,000	Yes

Table 16 (continued) Master Table of Projects

Strategy	Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
Improve septic and wastewater infrastructure to reduce flood damage and risk of pollution	City of Schenectady Wastewater Treatment Plant Flood Protection	The City WWTP nearly flooded during Hurricane Irene and Tropical Storm Lee. This project will map, design, and install a berm around WWTP to protect it from a 500-year flood. The berm would have to be constructed to U.S. Army Corps of Engineering standards.	Proposed	$1,209,000	No
1. Strengthen capacity of emergency and support services to respond during a major storm event and manage resources throughout recovery. 2. Establish health and social service buildings outside the flood zones as shelters during major storm events.	Senior Citizens Center / Schenectady County Emergency Shelter with Auxiliary Power Generators	Establish the first certified emergency shelter in Schenectady County at the Rotterdam Senior Citizens Center. This project requires building upgrades and the installation of an emergency backup generator and associated electrical switchgear.	Proposed	$354,000	Yes
Strengthen capacity of emergency and support services to respond during a major storm event and manage resources throughout recovery	Evacuation Plan for Rotterdam Junction	Work with Schenectady County to refine and improve the existing emergency response and evacuation plan to address lessons learned during Hurricane Irene and Tropical Storm Lee. Provide adequate education about the plan to inform residents of proper protocols for future events.	Proposed	$100,000	Yes

Table 16 (continued) Master Table of Projects

Strategy	Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
Complete long-term community recovery planning, watershed management planning, hazard mitigation planning, and other related planning efforts to build flood resilience.	Update the Town of Rotterdam Comprehensive Plan	The plan is 13 years old and should be updated to reflect changes in the community and its vision for the future with regard to flood resiliency, land use, economic development, resource protection and community services.	Additional Resiliency Recommendation	None	Yes
Incorporate green infrastructure and other stormwater management practices into private and public development and infrastructure projects	Streetscape Improvements on Main Street, Rotterdam Junction	The existing poor conditions of Main Street near Rotterdam Junction (e.g., pot holes, broken curbside) were exacerbated by flood waters from Hurricane Irene and Tropical Storm Lee. This project would incorporate green infrastructure and other drainage improvements, as well as address poor sidewalk conditions, consolidate and eliminate curb cuts, plant street trees, and add pedestrian benches and decorative lighting.	Additional Resiliency Recommendation	$3,000,000	No
Reduce flood risk to vulnerable neighborhoods located in the floodplain.	Rotterdam Junction Housing Acquisition Program	There are approximately 3 vacant/abandoned homes located in the 100-year flood plain in Rotterdam Junction as a result of Tropical Storm Irene and Hurricane Lee. This project proposes to purchase these three homes from owners who do not want to rebuild or return. These homes would be demolished, revitalized, and/or sold to interested individuals that are seeking to rebuild the homes or redevelop the vacant lots.	Additional Resiliency Recommendation	$220,000	No

Table 16 (continued) Master Table of Projects

Strategy	Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
Ensure that critical facilities continue to operate during major storm events through redundant backup systems (e.g., generators, pumps, and connecting supply waterlines).	Install Emergency backup Generators at Five Sanitary Lift Stations throughout Rotterdam	Install permanent automatic back-up auxiliary generators at each of five critical sanitary sewer lift pump stations located in various areas in Rotterdam. These generators will ensure that each of the five sanitary lift stations will operate during critical storm events.	Additional Resiliency Recommendation	$351,000	No
Increase opportunities for recreation and tourism through efforts that include improving river access, regional biking and hiking trail development, and new activities and events.	Waterfront Access to the Mohawk River	The BOA Nomination Study recommended enhancing the existing character of Rotterdam Junction by increasing economic and recreational activity through water access for residents and tourists. This project includes establishing trail heads and access points to the Mohawk River. The waterfront could be enhanced with a place for community gatherings, such as an outdoor amphitheater, picnic area and pavilions. A floating dock, boat launch, and additional trails should also be considered. Connectivity between these new recreational resources should be completed with the existing Town cultural recourses such as Mabee Farm and the Keepers of the Circle.	Additional Resiliency Recommendation	$5,000,000	Yes

Table 16 (continued) Master Table of Projects

Strategy	Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
Increase opportunities for recreation and tourism through efforts that include improving river access, regional biking and hiking trail development, and new activities and events.	Overlook Project	To further encourage tourism and highlight the Town's history and heritage by cleaning up and revitalizing the old Erie Canal Lock #25. An interpretative overlook should be created to provide for scenic views and a historical perspective of the lock. This project could be incorporated as part of the Drainage/Bike Trial Tunnel Project. A similar project was undertaken at the Town's historic lock #23 on the bike path through the Union College Civil Engineering Program.	Additional Resiliency Recommendation	$75,000	Yes
Increase opportunities for recreation and tourism through efforts that include improving river access, regional biking and hiking trail development, and new activities and events.	Convert Former Bonded Concrete Site into Parkland	The 78-acre former Bonded Concrete mining site is currently open space with no active recreational opportunities. This project would convert this area into a park that provides both passive and active recreation that could be linked to waterfront redevelopment. The park could be constructed with pedestrian trails along the perimeter of the lake, boat and fishing docks, and picnic shelters. In addition, this park could be designed for flood water storage with consideration of a berm or other protective measure to protect the lake and aquifer from potential toxins resulting from train derailment. Recreational enhancements to Rotterdam Junction are essential to the long-term revitalization of the hamlet.	Additional Resiliency Recommendation	$3,000,000	Yes

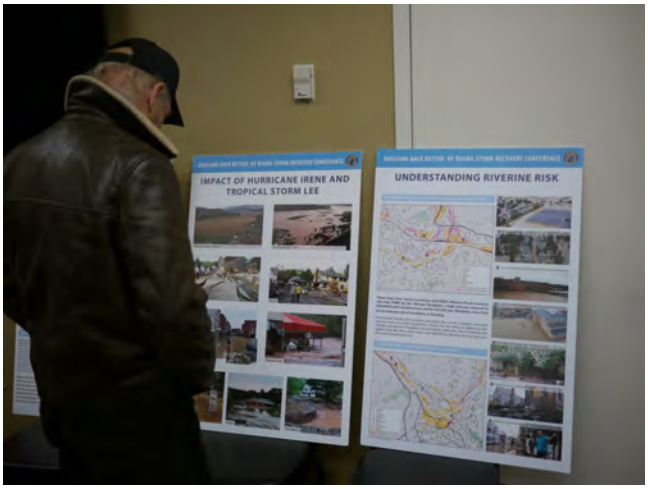
Table 16 (continued) Master Table of Projects

Strategy	Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
Strengthen capacity of emergency and support services to respond during a major storm event and manage resources throughout recovery.	Emergency Preparedness Training for Code Enforcement	Provide training for Rotterdam Code Enforcement personnel so that they are better equipped to handle any future storm related damage. There is currently no local training provided. Investigate through the NYS Emergency Management Office when and where additional training can be carried out.	Additional Resiliency Recommendation	$5,000	Yes
Protect wellheads and other drinking water infrastructure from flooding to ensure uninterrupted supply of clean, safe drinking water.	Re-Establish Waterline Connection between the City of Schenectady and the Town of Rotterdam	Re-installation of connection water main valves between Rotterdam main water lines and the Schenectady main water lines. This connection would allow for either municipality to provide emergency support for the other during major storm events.	Additional Resiliency Recommendation	None	Yes
Incorporate green infrastructure and other stormwater management practices into private and public development and infrastructure projects	ALCO Riverfront Revitalization Project	The ALCO Redevelopment project area floods during major storm events impacting the homes in East Front Street neighborhood. A private developer is returning the abandoned 57-acre brownfield to a productive mixed-use waterfront community with green space, offices, retail, residential units, and public use harbor. This project includes conducting a feasibility analysis and installing green infrastructure to better manage flood waters.	Additional Resiliency Recommendation	$300,000	Yes

Table 16 (continued) Master Table of Projects

Strategy	Project Name	Short Description	Project Category	Estimated Cost	Regional (Y/N)
Complete long-term community recovery planning, watershed management planning, hazard mitigation planning, and other related planning efforts to build flood resilience.	Lock Dam Study	The Lock 7 Dam was completed in November 1913 between Clifton Park and Niskayuna. This inoperable dam is more than 30 feet high and almost 2,000 feet in length. The purpose of this study is to evaluate the effect of the dam on flooding, and investigate a possible engineered adaptation of the Lock 7 (Vischer Ferry) dam complex to minimize its role in hydraulically inducing flooding experienced at the upstream communities of Scotia, Schenectady and shoreline eastern Glenville for the past century.	Additional Resiliency Recommendation	$30,000	Yes

C. Public engagement process



NYRCR Public Engagement Event

To gain a real understanding of community needs, opportunities, perceived risks and priorities a vigorous public and stakeholder engagement process was initiated. Participation throughout the planning period significantly helped shape and enrich the NYRCR Schenectady/Rotterdam Plan. The NYRCR Planning Committee, comprised of regional and local leaders, including two Co-Chairs (one from Schenectady and one from Rotterdam), worked with NYS Department of State planners and the Consultant Team to validate the outreach program. This helped to ensure that the outreach undertaken was appropriate to the community and helped facilitate public input. The public meetings were also used to educate residents and other stakeholders on severe weather events and flooding risks, critical community issues, and potential reconstruction and resiliency mitigation projects.

Residents, public and private agencies, and community organizations provided direction to the Planning Committee through Public Engagement Events; social media including the Governor's Office of Storm Recovery's website and Facebook page; and through interviews during Public Engagement Events. The Planning Committee also attended a Stockade Association and East Front Street Association meeting to present the NYRCR Program and gather feedback on the planning process and projects.

The Planning Committee held a series of three Public Engagement Events on:

- September 9, 2014 at the Schenectady County Community College,
- October 4, 2013 at Mabee Farm in Rotterdam Junction, and
- February 13, 2014 at the Schenectady County Public Library

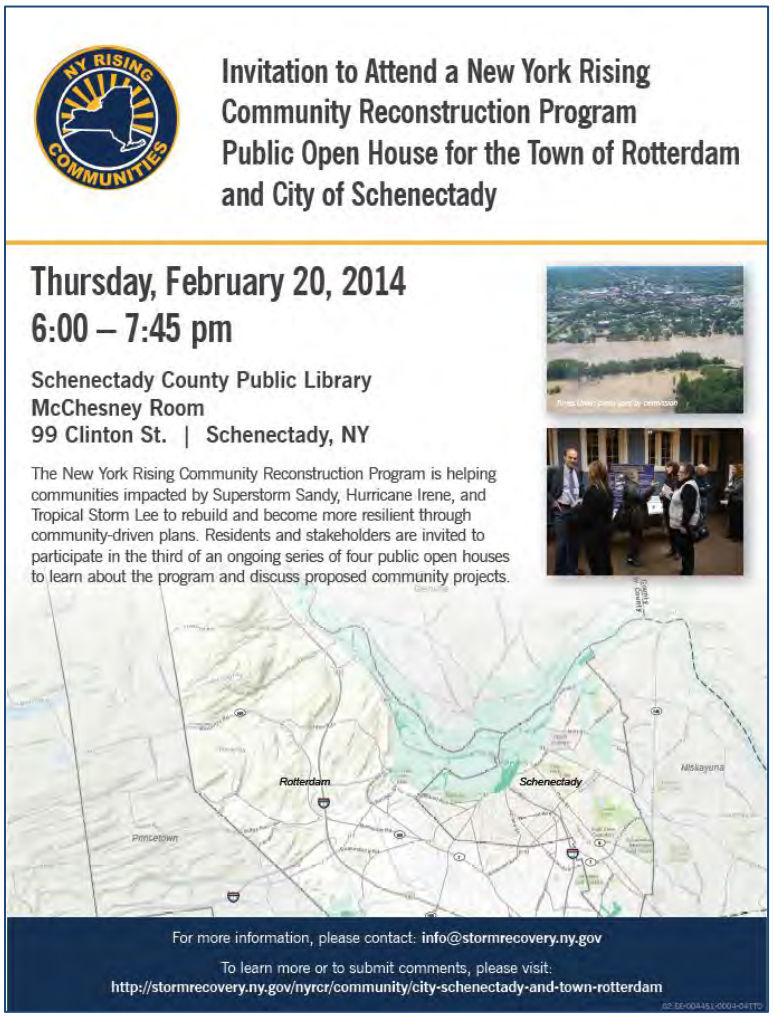
A fourth meeting will be held in May 2014. The Planning Committee will present the final NYRCR Plan to the public.

NYRCR Public Engagement Event

Public Engagement Event locations alternated between Schenectady and Rotterdam and were selected based on convenience for the communities. At each of these open house style events, the Planning Committee and Planning

Team provided information on the NYRCR Program, presented key milestones of the planning process and draft components of the NYRCR Plan to give the public an opportunity to provide comments and ask questions. The public also had the option to submit comments on the NY Rising Community Reconstruction Program website.

In October of 2013, the NYRCR Schenectady/Rotterdam Conceptual Plan was posted to the NY Rising Community Reconstruction Program website for public review and comments. This document represented a snapshot of the direction the communities and the Planning Committee were expecting to take to enhance community resiliency towards flooding. With guidance from the public, the planning process evolved from the Conceptual Plan as communities analyzed the risk to their assets, their needs and opportunities, the potential costs and benefits of projects and actions, and their priorities.



NYRCR Flyer announcing the third Public Engagement Event.

The resulting NYRCR Plan, combined with other community mitigation plans, has helped strengthen community understanding and ownership of this and other ongoing efforts to improve community resilience. It is expected that after the conclusion of the NYRCR planning process, continuing input and participation from engaged stakeholders will be solicited within each community, especially as proposed projects come underway, and funding sources are identified for the other projects discussed in the plan.

D. Community asset inventory

Table 17 Asset Inventory Worksheet

Asset Information										Landscape Attributes						
Asset Name	Address	Longitude	Latitude	Risk Area	Asset Class	Asset Subcategory	Socially Vulnerable Populations	Critical Facility	Community Value	Defensive Flood Protection Measures[1]	Elevation[2]	Freeboard[3]	Point of Confluence[4]	Storm Water Discharge[5]	Vegetated Stream Bank Buffers[6]	Vulnerability Score
Bridge - Erie Canal-Lock 9	Town of Rotterdam	42.8775	-74.0427	Extreme	Infrastructure Systems	Transportation	No	No, Locally Significant	High	No	No	No	No	No	No	**2**
Lock E-9 Dam At Rotterdam Junction	Town of Rotterdam	42.8781	-74.0425	Extreme	Infrastructure Systems	Navigable Waterway Facilities	No	No, Locally Significant	High	Yes	Yes	Yes	No	No	Yes	**2**
State Owned Property - Lock 9 Barge Canal Park	Town of Glenville	42.8797	-74.0417	Extreme	Natural and Cultural Resources	Parks and Recreation	No	No	Medium	Yes	Yes	Yes	No	No	Yes	**1**
Pine Grove Fire Station	Dunnsville Rd	42.7646	-74.0011	Extreme	Health and Social Services	Emergency Operations/Response	No	Yes, FEMA	High	Yes	Yes	Yes	Yes	No	No	**3**
Lock E-8 Dam At Scotia	Town of Rotterdam	42.8297	-73.9908	Extreme	Infrastructure Systems	Navigable Waterway Facilities	No	No, Locally Significant	High	Yes	Yes	No	No	No	No	**2**
North Ferry Street Sanitary Sewer Pump Station	North Ferry St, Schenectady	42.8193	-73.9472	Extreme	Infrastructure Systems	Wastewater	No	No, Locally Significant	High	Yes	Yes	Yes	Yes	Yes	Yes	**1**
South Ferry Street Sanitary Sewer Pump Station	155 Erie Blvd, Schenectady	42.8135	-73.9462	Extreme	Infrastructure Systems	Wastewater	No	No, Locally Significant	High	Yes	Yes	Yes	No	No	No	**1**
Nott Street Industrial Park	City of Schenectady	42.8225	-73.9356	Extreme	Economic	Large Business	No	No, Locally Significant	High	Yes	Yes	Yes	Yes	Yes	No	**2**
Bridge - Erie Canal Railroad	Town of Rotterdam	42.8847	-74.0650	High	Infrastructure Systems	Transportation	No	No, Locally Significant	High	No	No	No	No	No	No	**1**
Former DEC Mine - Bonded Concrete Inc	Mabie Ln	42.8619	-74.0332	High	Infrastructure Systems	Hazardous Materials, Solid Waste, and Recycling	No	No	Medium	Yes	Yes	Yes	No	Yes	No	**2**
Bridge - Mohawk River Pan Am Rail	Town of Rotterdam	42.8579	-74.0211	High	Infrastructure Systems	Transportation	No	No, Locally Significant	High	No	No	No	No	No	No	**1**
Bridge - Mohawk R/Erie Canal Exit 26 Bridge	Town of Rotterdam	42.8490	-74.0058	High	Infrastructure Systems	Transportation	No	No, Locally Significant	High	No	No	No	No	No	No	**1**
Bridge - Normans Kill	Town of Rotterdam	42.7639	-74.0016	High	Infrastructure Systems	Transportation	No	No	Medium	No	No	No	No	No	No	**1**
Bridge - Poentic Kill	Town of Rotterdam	42.8088	-73.9919	High	Infrastructure Systems	Transportation	No	No	Medium	Yes	Yes	Yes	No	No	No	**1**
DOH Drinking Water Well - Schenectady City Water Works	Town of Rotterdam	42.8200	-73.9880	High	Infrastructure Systems	Water Supply	No	No, Locally Significant	High	Yes	Yes	Yes	No	No	No	**1**
Rice Road & Exit 2A	Town of Rotterdam	42.8171	-73.9831	High	Infrastructure Systems	Transportation	No	No	Medium	Yes	Yes	Yes	No	No	No	**1**
Highway Interchange - Campbell Road	Town of Rotterdam	42.8149	-73.9811	High	Infrastructure Systems	Transportation	No	No	Medium	Yes	Yes	Yes	No	No	No	**1**
Bridge - Campbell Road	Town of Rotterdam	42.8148	-73.9809	High	Infrastructure Systems	Transportation	No	No	Medium	No	No	No	No	No	No	**1**
FCC Antenna - Sba Properties, Inc.	Old River Rd	42.8121	-73.9794	High	Infrastructure Systems	Telecommunications	No	No	Medium	Yes	Yes	Yes		No	No	**1**
Chemical Sites RMP - G.E. Main Plant	City of Schenectady	42.8077	-73.9652	High	Economic	Industrial, Warehousing and Manufacturing	No	No, Locally Significant	High	Yes	Yes	Yes	No	No	No	**1**
Bridge - State Hwy 5	Town of Rotterdam	42.8188	-73.9548	High	Infrastructure Systems	Transportation	No	No	Medium	No	No	No	No	No	No	**1**

Table 17 (continued) Asset Inventory Worksheet

Asset Information										Landscape Attributes						
Asset Name	Address	Longitude	Latitude	Risk Area	Asset Class	Asset Subcategory	Socially Vulnerable Populations	Critical Facility	Community Value	Defensive Flood Protection Measures[1]	Elevation[2]	Freeboard[3]	Point of Confluence[4]	Storm Water Discharge[5]	Vegetated Stream Bank Buffers[6]	Vulnerability Score
Schenectady County Community College	Washington Ave, Schenectady	42.8149	-73.9512	High	Health and Social Services	Higher Education Institutions	No	No	Medium	Yes	Yes	Yes	No	Yes	No	**2**
Stockade Historic District	City of Schenectady	42.8157	-73.9507	High	Natural and Cultural Resources	Historic Landmarks and Facilities	No	No, Locally Significant	High	Yes	Yes	Yes	No	No	No	**4**
Electrical Substation - Front Street	City of Schenectady	42.8214	-73.9414	High	Infrastructure Systems	Power Supply	No	Yes, FEMA	High	Yes	Yes	Yes	No	No	No	**1**
Bridge - Erie Canal	Grand Central Stat, Schenectady	42.8336	-73.9272	High	Infrastructure Systems	Transportation	No	No	Medium							**1**
Schenectady High School	City of Schenectady	42.8149	-73.9105	Residual	Health and Social Services	Schools	No	Yes, FEMA	High	No	No	No	No	No	No	**1**
Schenectady International	1000 Main St, Rotterdam	42.8615	-74.0257	Moderate	Economic	Large Business	No	No, Locally Significant	High	No	Yes	Yes	No	No	No	**1**
Power Plant at SI Group	1000 Main St, Rotterdam	42.8607	-74.0244	Moderate	Infrastructure Systems	Power Supply	No	Yes, FEMA	Medium	No	Yes	Yes	No	No	No	**1**
Bridge - Schermerhorn Road	Town of Rotterdam	42.8210	-73.9895	Moderate	Infrastructure Systems	Transportation	No	No	Medium	No	No	No	No	No	No	**1**
DOH Drinking Water Well - Rotterdam Wd #5	River Rd	42.8223	-73.9865	Moderate	Infrastructure Systems	Water Supply	No	No, Locally Significant	High	No	No	Yes	No	No	No	**1**
Rotterdam Square Impoundment Dam	93 W Campbell Rd, Rotterdam	42.8108	-73.9847	Moderate	Infrastructure Systems	Navigable Waterway Facilities	No	No, Locally Significant	High	Yes	Yes	Yes	No	Yes	No	**1**
Ramp to SCCC Parking Lot	Town of Rotterdam	42.8164	-73.9524	Moderate	Infrastructure Systems	Transportation	No	No	Medium	Yes	Yes	Yes	No	No	No	**1**
Niagara Mohawk Remediation Site-Broadway - Schenectady	City of Schenectady	42.8051	-73.9508	Moderate	Economic	Industrial, Warehousing and Manufacturing	No	No	Medium	No	No	No	No	Yes	No	**1**
Bridge - Big Circle	City of Schenectady	42.8130	-73.9506	Moderate	Infrastructure Systems	Transportation	No	No	Medium	Yes	Yes	Yes	No	No	No	**1**
Bridge - Western Gateway and State Street	City of Schenectady	42.8153	-73.9499	Moderate	Infrastructure Systems	Transportation	No	No, Locally Significant	High	No	No	Yes	No	No	No	**1**
Bridge - Weaver Street	City of Schenectady	42.8064	-73.9498	Moderate	Infrastructure Systems	Transportation	No	No	Medium							**1**
Highway Interchange - Weaver Street	City of Schenectady	42.8079	-73.9497	Moderate	Infrastructure Systems	Transportation	No	No	Medium	No	No	No	No	No	No	**1**
Bridge - Delaware & Hudson	City of Schenectady	42.8067	-73.9495	Moderate	Infrastructure Systems	Transportation	No	No	Medium	No	No	No	No	No	No	**1**
Bridge - Broadway	City of Schenectady	42.8050	-73.9482	Moderate	Infrastructure Systems	Transportation	No	No	Medium	No	No	No	No	No	No	**1**
Bridge - Edison Avenue	Campbell Ave, Schenectady	42.8082	-73.9481	Moderate	Infrastructure Systems	Transportation	No	No	Medium	No	No	No	No	No	No	**1**
Bridge - Erie Boulevard	City of Schenectady	42.8051	-73.9480	Moderate	Infrastructure Systems	Transportation	No	No	Medium	No	No	No	No	No	No	**1**
Schenectady WWTP	Anthony St, Schenectady	42.8401	-73.9182	Moderate	Infrastructure Systems	Wastewater	No	Yes, FEMA	High	No	No	Yes	No	No	No	**2**

Table 17 (continued) Asset Inventory Worksheet

Asset Information										Landscape Attributes						
Asset Name	Address	Longitude	Latitude	Risk Area	Asset Class	Asset Subcategory	Socially Vulnerable Populations	Critical Facility	Community Value	Defensive Flood Protection Measures[1]	Elevation[2]	Freeboard[3]	Point of Confluence[4]	Storm Water Discharge[5]	Vegetated Stream Bank Buffers[6]	Vulnerability Score
Rotterdam F.D. District 4	Town of Rotterdam	42.8877	-74.0776	Residual	Health and Social Services	Emergency Operations/Response	No	Yes, FEMA	High	No	No	No	No	No	No	**1**
BOCES/Woestina School	Town of Rotterdam	42.8747	-74.0428	Residual	Health and Social Services	Schools	No	No, Locally Significant	High	No	No	No	No	No	No	**1**
Rotterdam F.D. District 1	Town of Rotterdam	42.8692	-74.0379	Residual	Health and Social Services	Emergency Operations/Response	No	Yes, FEMA	High	No	No	No	No	No	No	**1**
DOH Drinking Water Well - Rotterdam Wd #3	1198 Main St, Rotterdam	42.8690	-74.0365	Residual	Infrastructure Systems	Water Supply	No	Yes, FEMA	High	No	No	No	No	No	No	**1**
Route 5S between Karl Street and Old Crawford Rd.	Town of Rotterdam	42.8543	-74.0252	Moderate	Infrastructure Systems	Transportation	No	No, Locally Significant	High	Yes	Yes	Yes	Yes	Yes	No	**2**
Rotterdam Senior Center	2637 Hamburgh St, Rotterdam	42.7763	-73.9338	Residual	Health and Social Services	Community Centers	No	No, Locally Significant	High	No	No	No	No	No	No	**1**
Town of Glenville Sewage Lift Station	Town of Glenville	42.8304	-73.9316	Residual	Infrastructure Systems	Wastewater	No	No, Locally Significant	High	No	No	Yes	No	No	No	**1**
Liberty/Gateway Park	City of Schenectady	42.8145	-73.9493	High	Natural and Cultural Resources	Parks and Recreation	No	No, Locally Significant	Medium	Yes	No	Yes	No	Yes	No	**2**
Sanitary Lift Station	Town of Rotterdam	42.80812270	-73.9919	High	Infrastructure Systems	Wastewater	No	No	High	No	No	No	No	Yes	No	**1**
Sanitary Lift Station	Town of Rotterdam	42.78209045	-73.9600	Residual	Infrastructure Systems	Wastewater	No	No	High	No	No	No	No	No	No	**1**
Sanitary Lift Station	Town of Rotterdam	42.78092544	-73.9559	Residual	Infrastructure Systems	Wastewater	No	No	High	No	No	No	No	No	No	**1**
Sanitary Lift Station	Town of Rotterdam	42.78470347	-73.9460	Residual	Infrastructure Systems	Wastewater	No	No	High	No	No	No	No	No	No	**1**
Sanitary Lift Station	Town of Rotterdam	42.78795822	-73.9635	Residual	Infrastructure Systems	Wastewater	No	No	High	No	No	No	No	No	No	**1**
Golub Headquarters	City of Schenectady	42.8210	-73.9323	Residual	Economic	Large Business	No	No	Medium	No	No	No	No	No	No	**1**
Golub Distribution Center	Town of Rotterdam	42.7873	-73.9940	Residual	Economic	Industrial, Warehousing and Manufacturing	No	No	Medium	No	No	No	No	No	No	**1**
Mabee Farm Historic Site	Town of Rotterdam	42.8637	-74.0313	Residual	Natural and Cultural Resources	Historic Landmarks and Facilities	No	No	Medium	No	No	No	No	No	No	**1**
Rotterdam Corporate Park	Town of Rotterdam	42.7848	-73.9868	Residual	Economic	Employment Hub	No	No	Medium	No	No	No	No	No	No	**1**

1 Defensive Flood Protection Measures are absent, below BFE, in poor condition, or lack maintenance commitment.
2 Elevation of the asset site is below BFE.
3 Elevation of the habitable or occupied portion of the asset is less than two (2) feet above BFE.
4 Asset is located within area subject to increased flood risk due to confluence of merging streams.
5 Asset is located within area subject to increased flood risk due to storm water system discharge
6 Asset is within Floodway Fringe of stream and without adequate vegetated buffers to absorb or divert flood waters.

E. Assessment of risk to assets methodology

A **hazard value** described the likelihood and magnitude of future store events. As the primary purpose was to determine the relative risk for each asset based on a 100-year flood event, a pre-determined hazard value (multiplication factor) of three was assigned to each asset.

> ***Base Flood Elevation*** *refers to the computed elevation to which floodwater is anticipated to rise during the base flood. Base Flood Elevations (BFEs) are shown on Flood Insurance Rate Maps (FIRMs) and on the flood profiles.*
>
> *Source: FEMA*

The **exposure value** was assigned for each asset based on the sum of a group of attributes. This group of attributes includes the risk area in which the asset is included, and six landscape attributes that influence the potential for storm impacts. A score of 0.5 was assigned for each attribute that received a "yes" and summed together to produce the exposure value. The six landscape attributes that were evaluated include:

- **Defensive Flood Protection Measures**: Are they absent, below base-flood-elevation, in poor condition, and/or do they lack a maintenance commitment?
- **Elevation**: Is the elevation of the asset site below Base Flood Elevation?
- **Freeboard**: Is the elevation of the habitable or occupied portion of the asset < 2 feet above Base Flood Elevation?
- **Point of Confluence**: Is the asset subject to increased flooding due to the confluence of merging streams?
- **Storm Water Discharge**: Is the asset subject to increased flood risk due to storm water system discharge?
- **Vegetated Stream Bank Buffers**: Is the asset within the Floodway Fringe, and without adequate vegetated buffers?

The **Vulnerability value** (Table 18) refers to the level of impairment or consequences that a given asset may experience from a storm event and the ability of an asset to resist damage from a storm. The table below describes the methodology by which the vulnerability scores were assigned for each asset.

Description of Risk Scores

After the values for each of the factors described above were determined for each asset, the NYRCR Risk Assessment Tool was utilized. This tool multiplied together the hazard, exposure and vulnerability scores and assigned a final risk score for each asset.

Table 18 Vulnerability Based on Impact on Service or Function of Community Assets

Impact	Insignificant 1	Minor 2	Moderate 3	Significant 4	Major 5
A. Economic Assets	Limited interruption in service or short term reduced service	Service loss for up to 1 week or longer term reduced service	Service loss for more than 1 week up to 1 month or longer term reduced service	Service loss for more than 1 month or permanent reduced capacity	Permanent loss of service of the economic asset
B. Health and Social Services Assets	Limited interruption in service or short term reduced service; Services under more than usual stress but manageable	Service loss for up to 1 week or longer term reduced service; Services under more than usual stress on several fronts	Service loss for more than 1 week up to 1 month or longer term reduced service; Services under severe pressure	Service loss for more than 1 month or permanent reduced capacity	Permanent loss of service of any one of the essential services listed
C. Housing Assets	Limited inconvenience	Out of use for up to 1 week	Out of use for more than 1 week up to 1 month	Out of use for up to 6 months [OR] permanent loss of 15% or less of housing in a group asset	Out of use for more than 6 months [OR] permanent loss of more than 15% of housing in a group asset
D. Infrastructure Systems Assets	Limited interruption in service or short term reduced service	Service loss for up to 1 week or longer term reduced service	Service loss for more than 1 week up to 1 month or longer term reduced service	Service loss for more than 1 month or permanent reduced capacity	Permanent loss of service of any one of the facilities listed

Table 18 (continued) Vulnerability Based on Impact on Service or Function of Community Assets

Impact	Insignificant 1	Minor 2	Moderate 3	Significant 4	Major 5
E. Natural and Cultural Resources Assets	Limited interruption in service or short term reduced service [OR] Limited loss of access, habitat, or use	Service loss for up to 1 week or longer term reduced service; Minimal natural habitat impacts, temporary loss of public access, temporary loss of open space/tourism assets	Service loss for more than 1 week up to 1 month [OR] Moderate impacts on natural habitats, sustained loss of public access, long term loss of private open space	Service loss greater than 1 month [OR] Permanently diminished capacity of natural resource; substantial damages of important natural habitats	Permanent loss of service of the cultural asset [OR] complete loss of important natural habitats
F. Assets Providing Services for Socially Vulnerable Populations	Limited service interruption	Service interruption for up to 1 week	Service interruption of more than 1 week up to 1 month	Permanent service interruption of more than 1 and less than 6 months	Service interruption of 6 or more months

F. Risk reduction and cost benefit analysis

Risk Reduction

A risk assessment was conducted for Schenectady and Rotterdam. This tool was used to identify assets vulnerable to flood impacts due to their location within the flood plain. Risk assessment results helped the community develop projects that aim to mitigate flooding and maximize co-benefits.

The risk-reduction analysis is a qualitative analysis that was conducted on each of the identified Proposed and Featured Projects intended to reduce flood risk to critical community assets. Section IV presents a brief description of the anticipated flood risk reduction and the assets that will be protected for each of the Proposed and Featured projects.

The risks of property damage, environmental damage, and risk to health and safety in Schenectady and Rotterdam from flooding are related to the rising of the Mohawk River. The broad flood floodplain of the river has ample infiltration to accept runoff from the watersheds that support the small local tributaries, but if the water from the river has overflowed its banks, the flood storage capacity of the land that is flooded is exceeded. The rising of river water occurs for two reasons: massive storms that raise the surface elevation of the Mohawk, and ice jams, which can occur very quickly and unpredictably. Historically, ice jam flooding is more frequent. The rising water from large storms is predicted by hydrological models of the entire system; local modeling is not necessary or particularly relevant if the localized conditions are overwhelmed by rising floodwaters from the river. Ice jam flooding is not amenable to modeling because it depends on where moving ice becomes caught and the shape and condition of the ice that becomes trapped. It occurs at certain bridges and river bends with more frequency, so that flood frequency is predictable in a general way. Because of the inability of models to predict the flood potential of any particular site, local hydrologists use the flood elevation and the historic frequency of floods to predict the risk of occurrence of flooding.

No project-specific HEC-RAS modeling was conducted for the projects considered for these communities. Consequently, the potential for risk reduction of any of the measures proposed here are based on the potential to avoid damage from flooding similar to the flooding that has occurred recently from Hurricane Irene and Tropical Storm Lee.

Cost-Benefit Analysis

Objective

The NYRCR Plan for Schenectady and Rotterdam intends to achieve multiple benefits through well-designed projects and programs that address economic, environmental, and social aspects of resilience and sustainability. The purpose of the Cost-Benefit Analysis (CBA) is to help the Planning Committee to analyze the relative value of the projects under consideration for the Plan. The analysis includes calculating the ratio of the number of benefits (including Risk-Reduction) to costs (Benefit/Cost). The ratio and CBA process will assist the community with prioritizing projects.

Approach

To provide cost data at the same level for all proposed projects, a qualitative approach to analyzing costs and benefits was adopted and described below and in Table 19. These rankings and scores are included in Section IV.

Table 19 Cost-Benefit Analysis Ranking Matrix

Costs		Benefits		
Cost Category	Cost Ranges	Risk Reduction Category	Risk Reduction Descriptions	Other Benefits
1	< $100,000	1	Negligible, minor disruptions, minor loss of property	Economic Benefits- creation of permanent new jobs, permanent jobs secured, new economic activity, contribution to a Regional Economic Development Plan or cost savings to public agencies.
2	$100,000 < $500,000	2	Marginal, serious disruptions and closures of businesses, schools, significant losses of property	Environmental Benefits- habitat enhancements and/or connectivity, migration, wildlife preservation, open space created, and in the broad sense restoration of historic or cultural resources.
3	$500,000 < $1,000,000	3	Critical, permanent losses of assets, health risk	Health and Social Benefits- public health enhancements including improved access to health and social services, recreational activities, or preservation of health and welfare for people displaced by disasters.
4	$1,000,0000	4	Catastrophic, permanent losses of entire neighborhoods, schools, or business districts, potential health risks and loss of life	
	1-4 points	0-4 points		"+" scores added, No maximum

Costs. Cost estimates were developed using the best available information. For some projects, little information was available beyond a project description. In other cases, preliminary engineering drawings, quantities, survey data, and other resources allowed for more detailed cost estimation. All of the cost estimates should be considered planning-level conceptual cost estimates. Detailed costing will need to be completed as part of project development and implementation. In some cases the first phase of the project involves the development of costs. Because of the uncertainty in the cost estimates at the early stages of project planning, costs were lumped into four categories, with 1 being the least expensive projects and 4 being the most expensive.

Life-cycle costs were not calculated for this exercise. The life-cycle cost would be a consideration for the project owner, since these costs can represent a significant long-term cost. In all cases the project owners are aware of their responsibilities for operations and maintenance. For some projects, such as emergency generators, the annual maintenance and cost of exercising the generator over a 20-year life cycle would likely exceed the initial capital cost. Other projects, such as the construction of berms and preparation of shelters, have negligible operating costs. The commitment of resources that could be used for other purposes is called an "opportunity cost." The local cost share for some of the capital projects and long-term operations and maintenance represents an opportunity cost. However, as CDBG-DR funding is funding of last resort and a reimbursement source, there is little opportunity cost with deploying these funds. Rather the savings in costs during an emergency identified during the community involvement justify the expenditures associated with the proposed projects. In addition, negative externalities were considered to the extent possible. Projects that could negatively affect or exacerbate flood impact were modified or removed from consideration.

Benefits. The first benefit to be evaluated is the reduction in risk to the asset. The immediate benefit of the projects that preserve an asset is reduction in risks to safety, well-being and economic losses, for which a numerical value was assigned. This value was scored 1-4 as described in Table 19, based on the value of the asset that is being preserved. Additional project benefits (co-benefits) span several categories (Economic, Environmental, Health and Social). A plus (+) was added to the table for each co-benefit in the categories described below in Table 20. The plus (+) scores were counted to determine the sum of the co-benefits.

Cost / Benefit Analysis. As discussed above in **Costs,** long-term operations and maintenance costs can alter the cost side of the CBA in future years. Likewise the benefits can potentially change over time. For the projects presented Section IV, benefits remain fixed throughout the lifespan of the projects, which is assumed to be 20 years for generators, pumps, and mechanical equipment and 25 years for earthwork, shelter equipment, and other non-mechanical projects.

To develop a numerical assessment of costs and benefits, the Costs were compared to the Benefits by dividing the numerical Benefit score by the numerical value of the Cost category. The Benefits were placed in the numerator so that projects that have higher value will have a larger numerical value.

These ratios allow the projects to be compared with each other, but it must be recognized that the sources of these numbers are qualitative, not quantitative, and that the benefit-cost ratio is not intended to substitute for best professional judgments. Results of the analysis are presented in Table 20.

Table 20 Qualitative Assessment of Costs, Risk-Reduction, and Benefits of Proposed and Featured Projects

Project	Cost Category	Project Cost Estimate	Asset Value Risk-Reduction	Benefits			Cost-Benefit Analysis
				Economic	Environmental	Health and Social	
Replace Lock Street Stormwater Pumps with a Gravity Storm Sewer Line	3	$600,000	2 Reduce overall flooding in the area, protecting 6-8 homes.	+ Reduces cost of pump operation and maintenance. + Reduces flooding of nearby homes.	+ Reduces risk of floodwater contamination. + Protection of water quality.	N/A	6/3
Mohawk-Hudson Bike Trail and Culvert Improvements	3	$660,000 (Planning, Design, Permitting ONLY. Does not include Construction costs of $2.2 million)	3 Reduce overall flooding of Rotterdam Junction. Rotterdam Junction was isolated by floodwaters during Hurricane Irene and Tropical Storm Lee. 70 structures including homes, schools, and firehouses were impacted by the storms.	+ Potential increase in economic activity. + Contribution to a Regional Economic Development Plan. + Reduced emergency and recovery costs. + Reduces flooding of nearby homes.	+ Reduces scouring and transport of pollutants. + Restores natural wetland habitat.	+ Building a culvert under the railroad tracks connects the missing segment of the Mohawk-Hudson Bike Path providing recreational/health benefits to the region.	10/3

Table 20 (continued) Qualitative Assessment of Costs, Risk-Reduction, and Benefits of Proposed and Featured Projects

Project	Cost Category	Project Cost Estimate	Asset Value Risk-Reduction	Benefits			Cost-Benefit Analysis
				Economic	Environmental	Health and Social	
Rotterdam Junction Fire-house Up-grades	3	$1,403,000	3 Increase the ca-pacity of firehouse as an emergency shelter, mitigating risks to health and welfare of Town residents during emergencies.	N/A	N/A	+ Expanding the capacity of the firehouse will enable the Town of Rot-terdam to pro-vide support to its vulnerable populations during emer-gencies. + Population served by es-sential health and social ser-vice facility with the capacity to provide contin-ued service during flooding emergencies.	5/3
Install an Au-tomatic Trans-fer Switch for the Rotterdam District #3 Well Head Facility	1	$19,400	1 Protect the water supply for the Town of Rotter-dam by preventing well pump failure during a major storm.	+ Net effect on local government expenditures (reduced emer-gency and recov-ery costs less implementation costs for project life).	N/A	+ Enables Rot-terdam resi-dents to have access to clean water during emergencies. + Health and social services will have access to clean water during emer-gencies.	4/1

Table 20 (continued) Qualitative Assessment of Costs, Risk-Reduction, and Benefits of Proposed and Featured Projects

Project	Cost Category	Project Cost Estimate	Asset Value Risk-Reduction	Benefits			Cost-Benefit Analysis
				Economic	Environmental	Health and Social	
Flood Protection of the Rotterdam District #5 Well Heads	2	$1,285,000	4 Protect Town of Rotterdam's water supply by reducing the risk of flood waters inundating the generator room and newly installed pump during major storm events.	+ Reduced emergency and recovery costs.	N/A	+ Lowers the risk of health and social services, residents, and others losing access to the water supply.	6/2
Flood Protection of City Well Heads	3	$581,000	4 Protect the City's water supply from failure and contamination.	+ Reduced emergency and recovery costs.	N/A	+ Enables Rotterdam residents to have access to clean water during emergencies. + Health and social services will have access to clean water during emergencies.	7/3
North Ferry Street Pump Station	4	$300,000	4 Relocate the Sanitary Pump Station outside the flood plain to protect East Front Street and Stockade residents from sewer overflows during flooding events. This also facilitates a reduction of flood risk to this historic structure.	+ Reduced emergency and recovery costs.	+ Relocating the pump station will prevent overflow of sewage into the Mohawk River during flooding events.	+ Relocating the pump station will prevent sewage overflow into adjacent historic homes located in the 100-year flood plain. + Preservation of a historic resource for park use.	8/4

Table 20 (continued) Qualitative Assessment of Costs, Risk-Reduction, and Benefits of Proposed and Featured Projects

Project	Cost Category	Project Cost Estimate	Asset Value Risk-Reduction	Benefits			Cost-Benefit Analysis
				Economic	Environmental	Health and Social	
Mitigation Measures to Reduce Flooding in the Historic Stockade and East Front Street Neighborhoods	3	$500,000	2 Preserve 61 homes located in the 100-year flood plain of this National Register District. This neighborhood is the oldest historic district in New York, Risk reduction is focused on a neighborhood scale. A large portion of these homes are located in the Historic Stockade neighborhood. An estimated 40 homes are likely to lose low-cost flood insurance and are at risk of future flooding. Seven of these homes are abandoned.	+Increases property values of historic homes	+ This planning study will help the communities design and designate open space. + Creates open space that improves infiltration of stormwater and floodwaters.	+Preservation and restoration of cultural and historic resources. + Reduces flooding of nearby homes.	7/3

Table 20 (continued) Qualitative Assessment of Costs, Risk-Reduction, and Benefits of Proposed and Featured Projects

Project	Cost Category	Project Cost Estimate	Asset Value Risk-Reduction	Benefits			Cost-Benefit Analysis
				Economic	Environmental	Health and Social	
Demolish Seven Flood Damaged Homes Located in the 100-Year Floodplain	4	$406,000	2 East Front Street neighborhood and Historic Stockade: Remove the seven abandoned, flood damaged homes that create a blighting influence in the Historic Stockade Neighborhood. The City would donate these properties to the City's Land Bank, which will determine an alternate use of the vacant land. This project will help to preserve the remaining 54 homes in the 100-year flood plain.	+ Reduces liability associated with the flood damaged properties. + Increase in real estate values	+ Creates open space that potentially improves infiltration of stormwater and floodwaters. +Preservation and restoration of cultural and historic resources.	+ Demolishing homes will remove the blight in the community + Provides assistance to homeowners who have lost their homes due to flood damage.	8/4
Install Generator at City Hall	2	$170,000	1 Install a permanent backup generator at City Hall to protect critical systems throughout the City including traffic control, telecommunications and computers from failing during major storm events.	+ Prevents the collapse of critical systems that maintain City operations. + Reduced emergency and recovery costs.	N/A	+ Health services such as ambulances will be able to safely operate when critical systems remain operable.	4/2

Table 20 (continued) Qualitative Assessment of Costs, Risk-Reduction, and Benefits of Proposed and Featured Projects

Project	Cost Category	Project Cost Estimate	Asset Value Risk-Reduction	Benefits			Cost-Benefit Analysis
				Economic	Environmental	Health and Social	
East Front Street Combined Sewer System Study	2	$220,000	3 Reduce sewer overflows during storm and ice jam events that cause flooding of homes in the East Front Street neighborhood.	+ Improved system performance as a result of this study would reduce ongoing annual maintenance costs	+ Protects water quality by preventing raw sewage from flowing into the Mohawk River and its tributaries and other streams.	+ Reduces risk of disease transmission by: • preventing raw sewage from flowing into drinking water sources and • reducing direct contact in areas of high public access such as basements, lawns or streets, or waters used for recreation	6/2
Schenectady High School Emergency Shelter Project	2	$360,000	1 Reduce risks to health and welfare of City of Schenectady residents during emergencies. Provide a safe refuge for flood victims in the City of Schenectady.	N/A	N/A	+ Improved access to health and social services during emergencies + Protection of vulnerable populations during flooding emergencies.	3/2

Table 20 (continued) Qualitative Assessment of Costs, Risk-Reduction, and Benefits of Proposed and Featured Projects

Project	Cost Category	Project Cost Estimate	Asset Value Risk-Reduction	Benefits			Cost-Benefit Analysis
				Economic	Environmental	Health and Social	
City of Schenectady Wastewater Treatment Plant Flood Protection	4	1,209,000	4 Protect this critical asset from flooding. Reduces the likelihood of water overflowing into this low area, damaging critical equipment, resulting in raw sewage flowing into the river. The Town of Niskayuna and Town of Colonie have public water supplies wells and intakes located on the Mohawk River downstream.	+ Reduced emergency and recovery costs.	+ Protects the water quality and ecological health of the Mohawk River and other surrounding waterbodies.	+ Prevents contaminated flood waters from WWTP from flowing into public and private land, potentially impacting public health. + Prevents raw sewage from traveling downstream and contaminating neighboring communities and their water supply.	8/4
Senior Citizens Center / Schenectady County Emergency Shelter with Auxiliary Power Generators	3	$354,000	1 Reduce risks to health and welfare of residents during emergencies. Provides a safe refuge for flood victims in Rotterdam Junction.	N/A	N/A	+First certified emergency shelter for the Schenectady County. + Improved access to health and social services during emergencies + Protection of vulnerable populations during flooding emergencies.	4/3
Evacuation Plan for Rotterdam Junction	1	$100,000	1 Adopt an evacuation plan to help protect the lives of residents during major storm events.	N/A	N/A	+ An evacuation plan will ensure the safety of vulnerable populations during emergencies.	2/1

Table 20 (continued) Qualitative Assessment of Costs, Risk-Reduction, and Benefits of Proposed and Featured Projects

Project	Cost Category	Project Cost Estimate	Asset Value Risk-Reduction	Benefits			Cost-Benefit Analysis
				Economic	Environmental	Health and Social	
Liberty Park Expansion and Streetscape Improvements	4	$1,000,000	1 Expand Liberty Park and incorporate green infrastructure development to enhance the ability to absorb flood waters during future high rain events.	+ Creation of permanent jobs + Increase in economic activity + Increase in real estate values	+ Creates open space that improves infiltration of stormwater and floodwaters. + Improves stormwater runoff quality + Reduces urban heat island effect and air pollution.	+ Increase in recreational activities + Increase pedestrian safety	9/4
Schenectady County Community College Flood Abatement	2	$550,000	2 Reduce flood damage risk to critical areas of the community college. Protect property and safety of the community at Schenectady County Community College from potential power failure during major storm events.	+ Reduces lost time due to disruption of routine activities and reduces the associated losses of economic activity.	N/A	+ Increases public safety during flooding emergencies + Prevents cancellation of classes and other important services provided by the college	5/2

[1] Cost estimate does not include Annual Operation and Maintenance costs.

G. End notes

[1] Office of the Governor of New York State. *New York State Responds - Hurricane Irene and Tropical Storm Lee: One Year Later August 2012.* New York State, 2012. PDF file.

[2] U.S. Census Bureau, Public Information Office. *2008-2012 American Community Survey*. U.S. Census Bureau, Public Information Office, n.d. Web. 07 April 2014.

[3] Ibid.

[4] City of Schenectady, New York Official Website, http://cityofschenectady.com/history/html

[5] Town of Glenville, Town of Niskayuna, Town of Rotterdam, County of Schenectady, City of Schenectady, Village of Scotia. *Mohawk River Waterfront Revitalization Plan for Schenectady County*. New York State Department of State, 2010. Print.

[6] "Schenectady History." *City of Schenectady*. N.p., 2006. Web. 11-20-2013. <http://www.cityofschenectady.com/history.html>.

[7] US Census Bureau, 2008-2012 American Community Survey 5-year Estimates for Census Tract 326.02. The income figures are in 2012 inflation-adjusted dollars.

[8] "History of Rotterdam." *Rotterdam, New York*. Town of Rotterdam, New York, 2012. Web. February 2014. http://www.rotterdamny.org/main/history.htm

[9] Ibid.

[10] Data is not available for Rotterdam Junction because it is not designated as a "Census Designated Place."

[11] The 10-foot buffer was generated from NYS 2-meter digital elevation models. The additional project area included by the 10-foot vertical buffer was included because the Committee reported that floodwaters in some areas backed up above the 100-year flood boundary due to poor drainage as well as barriers to drainage such as the railroad tracks and debris in culverts along the Old Erie Canal.

[12] U.S. Department of State, U.S. Geological Survey. "USGS 01354500 Mohawk River at Freeman's Bridge at Schenectady NY." *U.S.GS*. U.S.GS, n.d. Web. 07 April 2014.

[13] "Advanced Hydrologic Prediction Service." *NOAA's National Weather Service Advanced Hydrologic Prediction Service*. U.S. Department of Commerce, National Oceanic and Atmosphere Administration, National Weather Service, 2013. Web. December 2013.

[14] Schenectady County Environmental Advisory, 2012, *State of the Environment, Schenectady County, New York*, Schenectady County Department of Economic Development and Planning.

[15] Flood Recovery Coalition, Schenectady County. *Looking Back: Lessons Learned (12 month report)*. 2012.

[16] Ibid.

[17] City of Schenectady, New York Official Website. Accessed October 2013. http://cityofschenectady.com/history/html

[18] Ibid.

[19] According to the U.S. Census American Community Survey 2012 estimates, "Journey to Work" data, on average Rotterdam residents traveled 20 minutes to work.

[20] Town of Rotterdam. *Rotterdam Junction Brownfield Opportunity Area Nomination Study*. February 2013, p.7

[21] United States Census Bureau. *2008-2012 America Community Survey.* http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml

[22] US Census Bureau, 2008-2012 American Community Survey 5-year Estimates for Census Tract 326.02. The income figures are in 2012 inflation-adjusted dollars.

[23] Ibid.

[24] Town of Rotterdam. NYS Homes & Community Renewal Application Community Development Block Grant 2012. Rotterdam Junction Housing Rehabilitation Project.

[25] City of Schenectady, *City of Schenectady Comprehensive Plan 2020*. 2008.

[26] Ibid.

[27] Capital Region Economic Development Council*. 2013 Progress Report: The Tech Valley Advancing September* 24. 2013, pgs. 2-3.

[28] Ibid. Part 2 p.2.

[29] Capital Region Cleaner, Greener Communities Consortium. *Capital Region Sustainability Plan*. 2012, p. 12.

[30] NYS DOS. The data sets provided by NYS DOS originated from Federal Communications Commission, Insurance Services Office, Inc., National Oceanic & Atmospheric Administration, NYS Department of Environmental Conservation, NYS Department of Health, NYS Department of Transportation, NYS Division of Homeland Security & Emergency Services, NYS Division of State Police, NYS Office for People with Developmental Disabilities, NYS Office of General Services, NYS Office of Information Technology Services, NYS Office of Mental Health, and NYS Thruway Authority. Additionally, E & E incorporated data from NYS Department of Environmental Conservation (2009), ESRI (2010), National Park Service (2011), NYS Department of Health (2010), NYS Education Department (2000), Platts (2009), the 2012 NYSDEC-FEMA Mohawk Flood Project.

[31] Federal Emergency Management Agency. *Recovery Support Functions*. Federal Emergency Management Agency, 14 June 2012. Web. 07 April 2014.

[32] FEMA. *Managing Floodplain Development through The National Flood Insurance Program*. March 1998, Page 6-18: http://www.fema.gov/pdf/floodplain/is_9_complete.pdf.

[33] Projects were not created to protect assets owned by private companies. They do not qualify for CDBG-DR funding.

[34] Projects were not created to protect assets owned by State Agencies. They do not qualify for CDBG-DR funding.

[35] National Register of Historic Places. Accessed October 2013. http://www.nationalregisterofhistoricplaces.com/ny/schenectady/state.html

[36] "Although more than 75% of the Erie Canalway Trail is off-road, it remains a work in progress. Over 150 miles of Erie Canalway Trail have been completed over the last 20 years and more miles are slated for construction over the next five years. The Canal Corporation, along with partners such as the Erie Canalway National Heritage Corridor and Parks & Trails New York, other state agencies and local municipalities are working to complete the trail across the state." http://www.canals.ny.gov/trails/about.html

[37] Parks and Trails, New York, *Erie Canalway Trail End-to-End Program.* 2013. http://www.ptny.org/pdfs/canalway_trail/End2EndFinalReport2013.pdf.

[38] City of Schenectady. *Gateway Plaza Implementation Plan*. November 2012.

[39] How Much Value Does the City of Philadelphia Receive from its Park and Recreation System, Trust for Public Land Center for City Park Excellence, 2008.

[40] Schenectady County Multi-Jurisdictional All Hazard Mitigation Plan, October 2007.

[41] The Stockade Association Homepage. http://historicstockade.com/?page_id=206.

[42] http://www.achp.gov/nhpa.html

H. Glossary

ADA	Americans with Disabilities Act
ALCO	American Locomotive Company
ALS	Advanced life-saving support services
BOA	Brownfield Opportunity Area
CDBG-DR	Community Development Block Grant-Disaster Recovery
CDTA	Capital District Transportation Authority
CEMP	Comprehensive Emergency Management Plan
CREDC	Capital Region Economic Development Council
DSS	Department of Social Services (Schenectady County)
E & E	Ecology and Environment, Inc.
EMS	Emergency Medical Services
FEMA	Federal Emergency Management Authority
GOSR	Governor's Office of Storm Recovery
HUD	U.S. Department of Housing and Urban Development
HDPE	High Density Polyethylene Pipe
IMA	Interim Mortgage Assistance
LTCRP	Draft Long-Term Community Recovery Plan (Rotterdam)
MHBHT	Mohawk-Hudson Bike Hike Trail
NDRF	National Disaster Recovery Framework
NFIP	National Flood Insurance Program (FEMA)
NRHP	National Register of Historic Places
NYRCR	New York Rising Community Reconstruction
NYS	New York State
NYS DEC	New York State Department of Environmental Conservation
NYS DOS	New York State Department of State
NYS DOT	New York State Department of State
Planning Firm	Consulting Firm(s) Assigned to Each Community

SART	State Agency Review Teams
SCCC	Schenectady County Community College
SEMO	New York State Emergency Management Office
SEQRA	New York State Environmental Quality Review Act
SHPA	New York State Historic Preservation Act
SHPO	State Historic Preservation Office
SI Group	Schenectady International
SPDES	State Pollutant Discharge Elimination System
Working Group	NYS DOS Uniform Approach Working Groups
Work Plan	NYRCR Work Plan
WWTP	Wastewater Treatment Plant

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