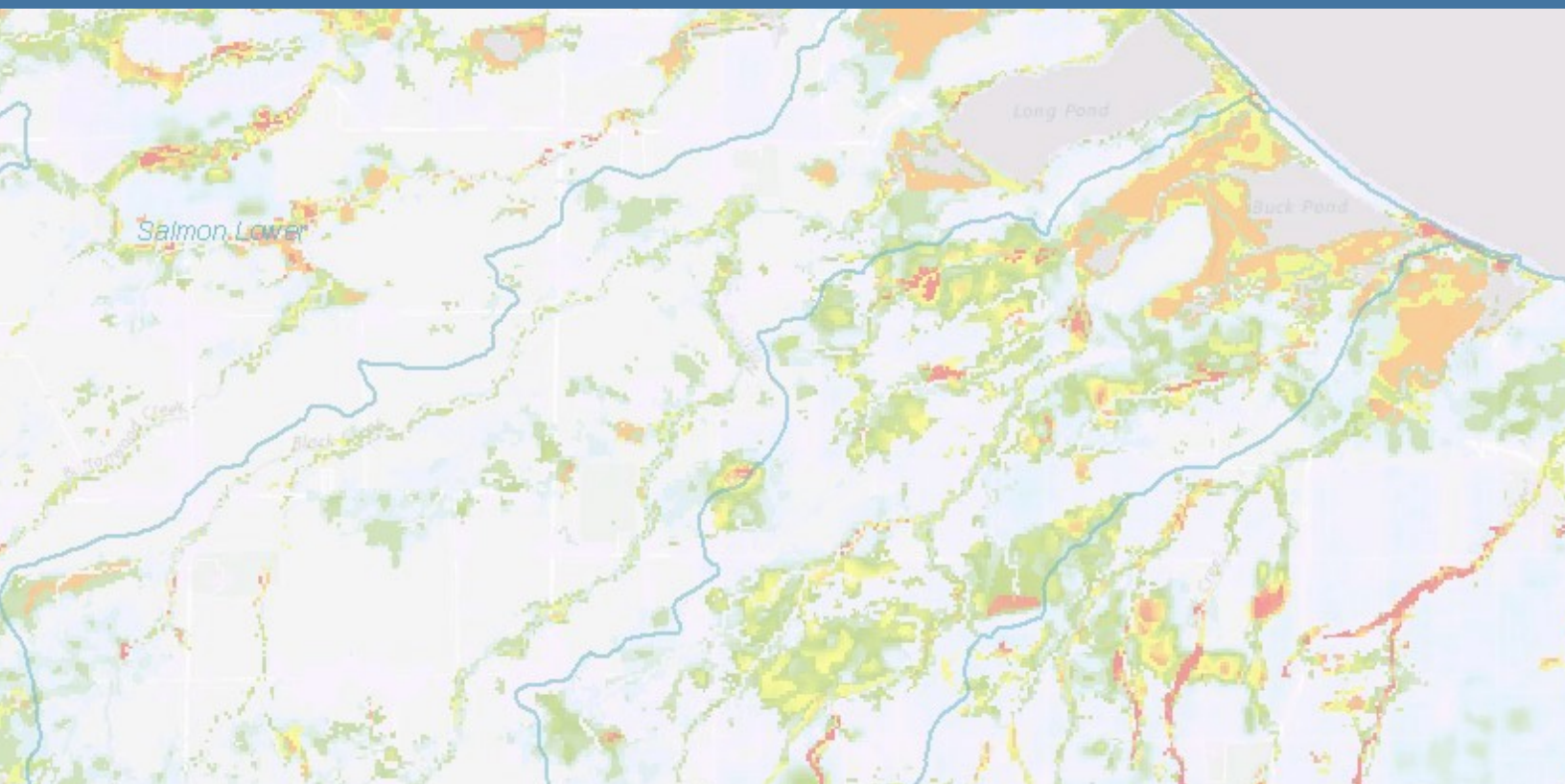




# Flood Smart Action Plan

Town of Greece, Town of Parma and Village of Hilton





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September 2016

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**In collaboration with:**

Town of Greece, Town of Parma, and Village of Hilton



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**Cover photo and map:** Photo of Salmon Creek by Mathew Levine, The Nature Conservancy. Map of vulnerable areas by Brian Conley, University of Buffalo Regional Institute.

# Flood Smart Action Plan

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## ACRONYM DEFINITIONS

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ACOE - Army Corps of Engineers  
BCA - Benefit Cost Analysis  
CRS - Community Rating System  
EPOD - Environmental Protection Overlay District  
FDPL - Flood Damage Prevention Law  
FEMA - Federal Emergency Management Agency  
FIRM - Flood Insurance Rate Map  
G/FLRPC - Genesee/Finger Lakes Regional Planning Council  
GSE - Government-Sponsored Enterprise  
LFDPL – Local Flood Damage Prevention Law  
NFIP - National Flood Insurance Program  
NOAA - National Oceanic and Atmospheric Administration  
NWI - National Wetlands Inventory  
NYSDEC - NYS Department of Environmental Conservation  
PAC - Project Advisory Committee  
POD - Protection Overlay District  
PUD - Planned Unit Development  
SWCD - Soil & Water Conservation District  
SFHA - Special Flood Hazard Area  
TNC - The Nature Conservancy  
UB - University of Buffalo  
UBRI - University of Buffalo, Regional Institute  
USDA - US Department of Agriculture  
USEPA - US Environmental Protection Agency  
USFWS - US Fish and Wildlife Service





## OVERVIEW

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### 1 OUR PURPOSE FOR WRITING THIS DOCUMENT

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Over 4-inches of rain fell in the Salmon Creek watershed in early September of 2004, and caused excess water to overload the stream channels and flow out onto the floodplain in the communities of Hilton, Ogden, Spencerport, and Brockport. Overbank flooding resulted in road closures, home evacuations, and impacts to small businesses. The Hilton Fire Hall was inundated even though emergency responders and numerous volunteers worked tirelessly to protect it from the rising waters. Flood damages were estimated at more than \$400,000 in the Village of Hilton and \$500,000 in the Village of Spencerport. On Brush Creek in Greece, three homes were lost.

Flooding is the primary natural hazard in New York State. Forty-one major disaster declarations due to flooding have occurred between 1953 and 2015, which includes four declarations in Monroe County. Regular flooding has been occurring in Monroe County since documentation in 1865, with 25 precipitation-related flooding events from 1972 to 2010.<sup>1</sup>

The way that people and local government have dealt with floods has evolved over many decades. The term “flood control” has gradually been replaced with terms such as “flood-risk management” or “flood-risk reduction.”<sup>2</sup> While flood control suggests mastery over rivers and the ability to stop flooding, the latter terms acknowledge that risks can never be completely eliminated, but they can be managed and reduced. Flood control relies primarily on structures that attempt to determine where water should go. Flood management draws upon a broader range of tools, interweaving structural with nonstructural approaches. Nonstructural approaches encompass a broad range of tools, including zoning that avoids development in flood-prone areas, elevating or flood proofing structures, insurance, forecasting and evacuation systems, and using natural features to manage floodwaters. By utilizing both structural and nonstructural approaches, flood management works to keep floods away from people and people away from floods.

While the flood of September 2004 was estimated to be a 25-year event and thus had a 4% chance of occurring annually, smaller damaging flood events happen regularly in these communities. By proactively planning for these events, the communities of Greece, Parma, and Hilton will be more resilient to flooding. Resilience describes the ability of a system to recover from a disturbance. The more resilient a system is, the more quickly and effectively it recovers.



*Figure 1. Flooding of the Hilton Fire Hall, September 2004.*

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<sup>1</sup> 2010 Monroe County Pre-Disaster Mitigation Plan.

<sup>2</sup> Opperman, J.J. 2014. A Flood of Benefits: Using Green Infrastructure to Reduce Flood Risks. The Nature Conservancy, Arlington, Virginia.

## 2 WHO WE ARE

In 2014 the municipal governments of the Town of Greece, Town of Parma, and Village of Hilton committed to working through the *Flood Smart Communities* approach to develop actions they can take to reduce the flooding vulnerability of their communities. *Flood Smart Communities* is a multi-jurisdictional planning effort funded by the U.S. Department of Commerce and National Oceanic and Atmospheric Administration (NOAA) through Ohio Sea Grant. It was developed by The Nature Conservancy, Genesee/Finger Lakes Regional Planning Council and University of Buffalo. Working with various stakeholders through a highly engaging planning process, this action plan has been developed to innovatively address flooding impacts and concerns with multidimensional solutions.

Greece, Parma, and Hilton were selected to participate in *Flood Smart Communities* because they represent a diversity of community types—from high density and commercial development to rural residential with agriculture. They regularly experience flooding and are connected by streams that flow to the Braddock Bay Fish and Wildlife Management Area, a wetland complex owned and operated by the New York State Department of Environmental Conservation (NYSDEC). The three communities have a strong history of collaboration and currently work together on stormwater management activities through the Stormwater Coalition of Monroe County, an intermunicipal partnership among 29 municipal members.

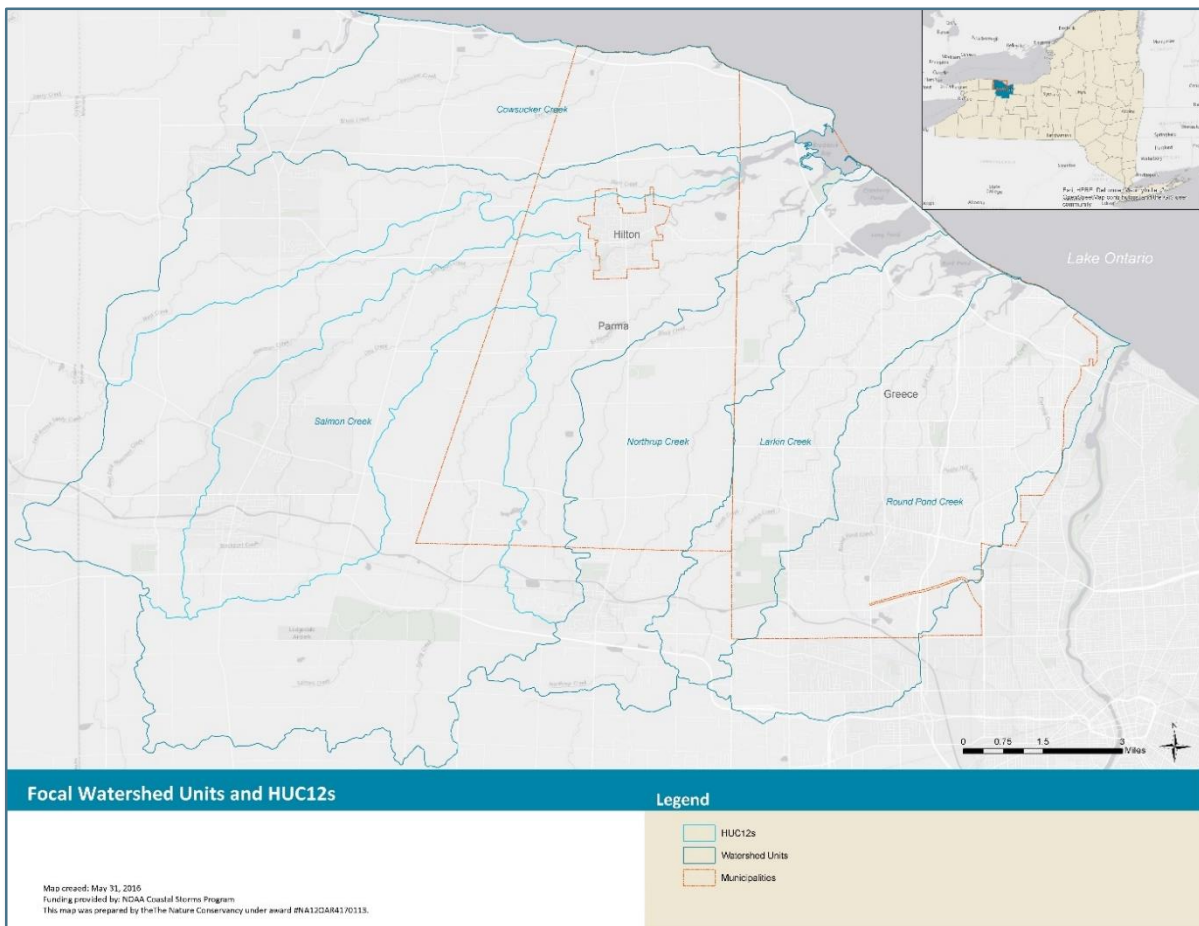


Figure 2. Location of the municipalities of the Town of Greece, Town of Parma and Village of Hilton, and the watersheds that flow through them.

Representatives from each municipality, The Nature Conservancy (TNC), Genesee/Finger Lakes Regional Planning Council (G/FLRPC), and University of Buffalo (UB) formed a project team to work through a formal process to develop an action plan that would address flooding in the communities. Municipal representatives participated in a number of meetings to work through the steps of the *Flood Smart Communities* approach, and were instrumental in researching and collecting data. TNC served as project manager and facilitator of the community engagement process, assessed the condition and function of natural infrastructure and reviewed agricultural best management practices for surface runoff reduction and water filtration services. G/FLRPC reviewed current standards in municipal plans and regulations; identified solutions to increase effectiveness of planning, land acquisition, or regulation; and helped prepare this Flood Action Plan. UB examined intermunicipal cooperation and regional service delivery, coordinated a property owner survey, conducted additional research to assess the communities' vulnerability to flooding, and identified recommendations for improved property protection and public awareness.

## The Project Team

### Municipal representatives:

- Scott Copey, Planner, Town of Greece
- Paul Czapranski, Technical Services Coordinator, Town of Greece
- John Gauthier, Engineer and MS4 Permit Manager, Town of Greece
- Sue Duggan, Assistant to the Building Inspector, Town of Greece
- Mike Lissow, Code Enforcement Officer, Building Inspector and Fire Marshall, Village of Hilton
- Mike McHenry, Public Works Superintendent, Village of Hilton
- Dennis Scibetta, Building and Development Coordinator, Town of Parma

### Study team:

- Stevie Adams, Freshwater Specialist, TNC
- Jayme Thomann, Senior Planner, G/FLRPC
- Dr. Kathryn Bryk Friedman, Research Associate Professor of Law and Policy, UB
- Ha Hwang, PhD Candidate, UB
- Sharon Entress, Associate Director of Research, Regional Institute, UB
- Brian Conley, GIS Research Analyst, Regional Institute, UB

A Project Advisory Committee (PAC) provided a diversity of perspectives about the project's process and goals, invaluable information and feedback, and review of documents. PAC members were:

- Jack Barton, Retired Code Enforcement Officer and Building Inspector, Town of Parma
- Kelly Emerick, Executive Director, Monroe County Soil and Water Conservation District
- Dan Kubit, Vice President, M&T Bank, President, Hilton-Parma Hamlin Chamber of Commerce
- Karis Manning, Environmental Engineer II, NYSDEC Region 8
- William Nechamen, Chief, Floodplain Management Section, NYSDEC
- Andy Sansone, Senior Industrial Waste Technician, Monroe County Department of Environmental Services.

### 3 WHAT WE DID

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Over the course of two years, the Project Team worked through the steps of the *Flood Smart Communities* approach, which incorporates a formal decision-making process with community-specific assessments and follow-up evaluation of success (Figure 3). The six steps are designed to be cyclical, in that they should be revisited periodically and the products updated. By working through this process, municipal representatives came to a shared understanding of their flooding problem, and identified proactive, forward-thinking actions that the municipal governments have the power to take.

From November 2014 through April 2016, municipal representatives from Greece, Parma, and Hilton were engaged through a series of in-person meetings to define a shared understanding of the flooding problems in their communities and collectively identify specific projects and activities to reduce risk and increase resiliency.

The municipal representatives have a combined 103 years of experience working for their communities. They have direct, on-the-ground interactions with the public, other municipal staff, and other levels of government on many different issues including flooding. Therefore, their participation in the process was essential to creating a *Flood Smart* Action Plan that would reflect the needs of the communities and the realities faced by local governments. While the Study Team facilitated discussions and provided information and expertise throughout the process, the products for each step of the process were developed by the municipal representatives and reflect their cumulative experience.

A full description of the approach and products generated by each step are presented in [Appendix C: Flood Smart Communities Approach](#). A summary of each follows. [Sections 4 through 8](#) describe the findings from the community study and build the case for the importance of implementing the final recommendations. Actions to achieve each of the final recommendations are described in [Section 9](#).

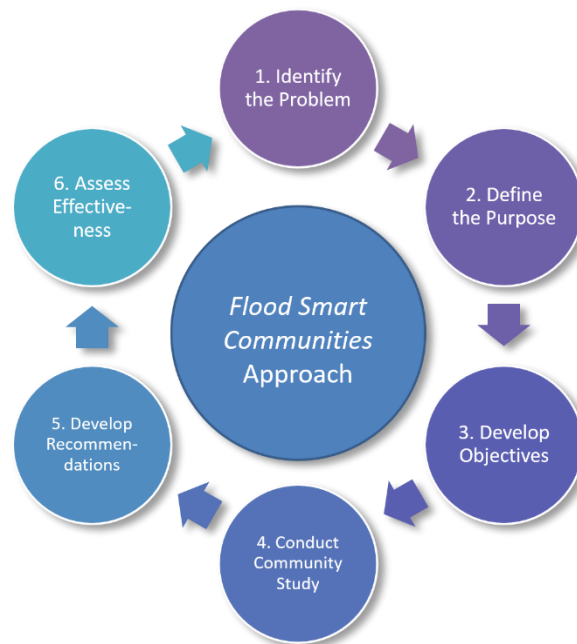


Figure 3. The six steps of the Flood Smart Communities approach.

### 3.1 DEFINE THE PURPOSE

After completing step 1 for which the causes and impacts of flooding were identified for their communities, the Project Team tackled step 2 to lay out what is driving their need to take action to address flooding, what they have the power to address, constraints that may limit their actions, and what they hope to achieve with the *Flood Smart Communities* project. They then captured this in a Statement of Purpose. Because the municipal representatives understand the upstream/downstream connection of water resources and flooding in their communities, particular emphasis was placed on collaborative planning and management of floodplains.

#### **PROJECT'S STATEMENT OF PURPOSE**

as stated by the Municipal Representatives

*A coordinated approach to floodplain management is desirable in the Village of Hilton, Town of Parma and Town of Greece to:*

- *protect life, health and property against flooding damage;*
- *minimize municipal costs related to flooding;*
- *reduce the financial burden of flood impacts and insurance on property owners;*
- *shorten business interruptions caused by flooding;*
- *keep an eye towards improving water quality with floodplain management strategies; and*
- *promote collaborative, strategic floodplain development and management.*

*Recently, leadership in our communities recognized that their capacity to jointly manage flood risk could be strengthened. This decision stems from dynamic hydrologic cycles in their shared watersheds, regulatory requirements, inadequate infrastructure, and traditional independent management practices, which do not adequately address new flooding challenges. A multi-jurisdictional template for collaborative floodplain management planning will be developed to operate within a legal and regulatory framework that includes Federal Emergency Management Agency (FEMA), National Flood Insurance Program (NFIP), and New York State Home Rule. Municipalities will work with public agencies and private sector interests to proactively address flooding impacts. A template Floodplain Management Plan will be proposed in 2016. It is intended to serve as the foundational document for future decisions, which will be cumulative and build upon each other. Although sustainable floodplain*

## 3.2 OBJECTIVES FOR RECOMMENDATIONS

Four priority objectives provided the basis for actions to improve the communities' resilience to flooding. These objectives describe what the prioritized recommendations hope to accomplish.

They will **minimize economic impacts to the local governments** from flooding by maximizing intermunicipal collaboration and shared services, minimizing the cost and maintenance of flood attenuation solutions, and minimizing unscheduled interruptions of staff time. By working together and sharing, more can be accomplished with fewer resources. By protecting natural infrastructure that is currently providing flood attenuation benefits and implementing small prioritized projects, they can reduce the need for expensive engineered solutions. By planning and taking proactive action, communities will be more prepared and resilient to flooding so that when those events occur staff will be better prepared and have the resources they need.

They will take action to **minimize damage to property owners** by improving flood-related development standards; appropriately siting development out of high risk areas; codifying existing decision making so that it can consistently be applied; protecting wetlands so they continue to provide flood attenuation benefits; increasing understanding of high risk areas, what causes them, and how they can be mitigated; and keeping people away from flooding by maintaining stream and wetland buffers.

They will **maximize multiple benefits of flood attenuation solutions** so that they reduce sediment and nutrient delivery to streams, reduce sediment delivery to Braddock Bay, and reduce impact of debris in streams.

They will **maximize long-term, collaborative floodplain management** by planning for the long-term and implementing those plans, finding or creating a sustainable funding stream to implement plans, measuring the effectiveness of both implementing the plans and implemented actions, and demonstrating the benefits of this type of floodplain management approach.

### 3.3 RECOMMENDATIONS FOR ACTION

Informed by the vulnerability assessment, findings from the residential property owner survey and local government interviews, and technical expertise of the Study Team, the municipal representatives developed recommendations for action. To reduce this list to a set of recommendations that would be compelling and more easily communicated to policy makers, the Study Team re-structured 63 possible recommendations into the following nine priorities. These prioritized recommendations were intentionally wide-ranging in order to address different approaches to reduce flooding and provide local decision-makers with real options and choices.

A detailed description of the Flood Smart Communities Approach and full list of recommendations for flood risk management can be found in [Appendix C: Flood Smart Approach](#).

#### 1. Convene intermunicipal work group

Establishing a group that meets regularly that is responsible for implementing the Flood Smart Action Plan is essential to its success. This group will provide the additional and needed benefits of building and maintaining partnership and collaboration between Greece, Parma, and Hilton and any other municipalities that would like to join, and providing a forum for communication and information sharing.

#### 2. Develop training requirements or program for municipal boards

Municipal boards are the decision makers with the power to protect development from the impacts of flooding. Giving them the information to do that well is an essential component of effective floodplain planning and management, particularly conveying the risks associated with decisions, the benefits that natural infrastructure provides, and how local governments can help their communities be more prepared.

#### 3. Adopt intermunicipal floodplain protection overlay district (POD)

Home rule gives local governments the authority to regulate land use. A floodplain POD that requires additional and intermunicipal review of site plans for building permits will go a long way in managing floodplains in a way that acknowledges the upstream-downstream connection of communities and keeps people away from flooding. Adopting a floodplain POD with a floating district has the additional benefit of regulating development in all floodplains, including those that have not been mapped by FEMA.

#### 4. Strengthen local flood damage prevention laws

Local flood damage prevention laws are required for any municipality that participates in the National Flood Insurance Program. By strengthening each municipalities' local law using the model language suggested in [Appendix D](#), communities will commit to higher standards that will better protect people and assets. Going above and beyond the minimum standards can also secure more Community Rating System points which benefits community resilience as well as flood insurance policy holders.



## 5. Convene agricultural interests

Agricultural land occupies 40% of the total focal watersheds, provides jobs for the area, and supplies the food production industry. It is important to strengthen relationships with agricultural interests to protect this important component of the local economy and reduce flooding contributions from these lands.

## 6. Educate at-risk property owners

Residential properties comprise a very high percentage of the number of structures and the dollar value of properties within FEMA mapped floodplains. Conveying flooding risk for their property and educating on the National Flood Insurance Program, Biggert Waters Flood Insurance Reform Act of 2012 and subsequent legislation, mitigation options and resources, and FEMA mitigation programs will greatly help residents be more prepared so that they can respond to and recover from flooding more effectively.

---

*Research has found that people are more effectively informed through direct, one-on-one communication with an expert, and are more likely to undertake activities to reduce the flood hazard to their property if they can get reliable information right in their own community.*

---

## 7. Prioritize and protect natural infrastructure

Natural infrastructure, like wetlands and natural floodplains, helps reduce impacts of flood events by storing water and releasing it more slowly to the stream network and groundwater. Much of the remaining natural infrastructure in the focal watersheds lies at the downstream-most end of these watersheds along the Lake Ontario coast where it can only provide minimal flood attenuation services. Floodplains and wetlands that lie upstream of population centers should be protected so they continue to provide flood attenuation services.

## 8. Share data with municipalities and the public

A lot of flooding information is collected by the municipalities and has been collected or generated by this project. Compiling this information and making it available to the public will enable multiple stakeholder groups to utilize that information in decision making. By having the same information, communication between municipalities, boards, and departments will be improved.

## 9. Utilize the Community Rating System

The National Flood Insurance Program's Community Rating System is a voluntary incentive program that recognizes communities for enforcing floodplain management activities that exceed the minimum NFIP requirements. There are many benefits to enhanced floodplain management such as improved public safety, property loss reduction, open space and natural resource protection, and better post-disaster recovery. A discount of up to 45% off flood insurance premiums is also available to policyholders in participating communities. Greece is currently the only member within Monroe County.

# UNDERSTANDING FLOODING

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## 4 WHAT IS FLOODING?

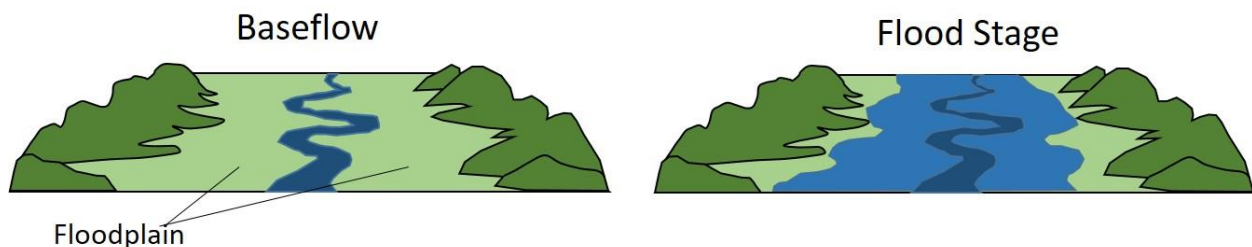
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A flood in a river is generated by heavy rainfall, snowmelt or a combination of these sources of runoff in the upstream watershed (all the land that eventually drains into that river). Characteristics of a watershed, including geology, topography, and land cover, influence how rainfall and/or snowmelt become runoff that generates a flood. For example, certain features—such as forests, deep soils, and wetlands—tend to retain water and slow runoff, resulting in lower flood peaks. Conversely, impermeable surfaces, such as pavement, prevent infiltration of water in the soil, producing rapid and high levels of runoff and thus higher flood peaks.<sup>3</sup> Other features that hasten runoff include channel straightening and drainage systems for farm fields.

Floodplains convey water when floods exceed the ability of the river channel to transport the flood between its banks (the “channel capacity”). While most people view the river as “water” and the floodplain as “land,” in reality the river and floodplain are one integrated system for conveying water and sediment downstream, with the floodplain being the component that only carries water during floods.

During floods, floodplains essentially increase the ability of a river to move or convey floodwaters. Initially during a flood, the flood height rises with increasing flood volume. When the flood exceeds the channel capacity and spills out onto the floodplain, flood height increases much more slowly with flood volume because the additional volume of water moves out onto the floodplain. Floodwaters move much more slowly on floodplains, because they tend to be flat and vegetated, and so very extensive floodplains can act something like a reservoir that temporarily stores water, slowly releasing it back to the river as the flood recedes.

Although people often think of floods as rare events, the channel capacity of natural rivers is exceeded fairly frequently, from approximately every year to once every few years, depending on the river. Thus, water on the floodplain is not an unusual event but something that can be expected on a fairly regular basis.<sup>3</sup>



*Figure 4. Illustration of the connection of a river to its floodplain during flood flows.*

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<sup>3</sup> Excerpted from: Opperman, J.J. 2014. A Flood of Benefits: Using Green Infrastructure to Reduce Flood Risks. The Nature Conservancy, Arlington, Virginia.

## 5 WHY DOES FLOODING HAPPEN IN OUR COMMUNITIES?

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Flooding occurs due to a number of factors that reflect both the natural and built environment. In Greece, Parma, and Hilton precipitation patterns, topography and soils, and development were identified as flooding's main drivers.

The climate of the region and weather patterns due to the position of Greece, Parma, and Hilton on the shore of Lake Ontario leave these communities susceptible to flooding at any time of year. As more long-term datasets are captured and long-term trends become better understood, precipitation and stream flows for Monroe County are estimated to increase in volume by 10% to 20% over the next 30 years and extreme precipitation events (i.e. storms likely to produce flooding) are projected to double in occurrence.

Because these communities and their watersheds lie on the lake plain of post-glacial Lake Iroquois, they are very flat. Many of the soils across the study area poorly absorb water, thus have a high potential to produce runoff that flows over the land surface. Consequently, flooding in the area tends to result in pooling and ponding, low energy overbank flooding, and urban drainage issues such as stormwater flooding.

Development within a watershed also has measurable effects on how precipitation infiltrates to groundwater or runs across the land surface and deposits into stormwater systems and streams. Impervious surfaces created by human development, such as roads, parking lots, and rooftops, prevent natural infiltration of precipitation. This results in less groundwater and an increase in the amount of surface water entering the stream network. Impervious surfaces increase peak stream flows (the maximum amount of water in the stream due to the event) during storms because water runs off pavement and rooftops very quickly. Additionally, soils compacted by construction are less capable of infiltration. Stormwater drainage systems, such as curbs, gutters, and storm drain pipes, increase the efficiency with which runoff is delivered to the stream. For a complete discussion of the influence of the natural and built environments on flooding see [Appendix A: Existing Conditions](#).

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*Development in a watershed increases the amount of runoff produced by a storm and how quickly it gets to the stream network.*

*The watersheds of Round Pond and Fleming Creeks stand out as having enough development that the mean annual flood may have doubled.*

---

Flooding is a natural process but the decisions people make can make its impacts more damaging. Allowing development in flood-prone areas puts people and property at risk. Furthermore, it alters the way floodplains function by reducing their capacity to temporarily store water, which puts downstream areas at greater risk.



*Photo by: David Belaskas*

*Figure 5. Flooding of Brush Creek, September of 2004.*

## 6 WHAT IS AT RISK?

Understanding what lies in the floodplain can help communities better assess what is at risk, how sensitive their communities might be to damage or loss of those assets, and what they might be able to do to help those assets more effectively respond to and recover from flooding.

Flood risk zones are delineated by the Federal Emergency Management Agency (FEMA) to determine insurance rates for the National Flood Insurance Program (NFIP). “A Zones” are high-risk flood areas that are subject to inundation during a 100-year flood, which is the flood elevation that has a 1-percent chance of being equaled or exceeded each year. Along with “V Zones”—which apply in coastal situations with additional hazards associated with storm-induced waves— “A Zones” are defined as the Special Flood Hazard Area (SFHA) on a community’s Flood Insurance Rate Map (FIRM). Low-to-moderate flood risk areas are subject to the 500-year flood, which means a flood of that size or greater has a 0.2-percent chance (or 1 in 500 chance) of occurring in a given year. They are shown on the FIRM as B, C, or X Zones (or a shaded X).

### Structures

For this project, all structures within FEMA’s 100-year and 500-year floodplains were digitized. The total number of structures and their property type within the 100-year floodplain or SFHA were summed for each municipality. Greece has 291 total structures in the SFHA, 94% of which are residential. Of Parma’s 258 structures in the SFHA, 98% are residential. Although Hilton has only 28 structures in the 100-year floodplain, 64% are classified as either commercial or providing a community service.

Tax data were combined with the digitized structure data to paint a picture of what is at risk for each of the three communities. In Greece, Parma, and Hilton approximately 4,630 acres (Table 1) and 577 structures lie within the SFHA. The highest percentage of those acres lies in conservation/public land ownership, agriculture or vacant lands (63% total). Based on the numbers of acres within the SFHA that are owned by the Town of Greece, it would seem that Greece in particular has made a strong effort to protect these risky areas from incompatible land uses.

Table 1. Acreage in the SFHA.

New York State Property Type Classification Code	Town of Greece	Village of Hilton	Town of Parma	Project Area
Agriculture	38.65	0	205.32	243.97
Commercial	28.80	23.43	19.91	72.14
Community Services	134.42	17.03	26.52	177.97
Conservation/Public Lands	1,980.76	24.89	78.47	2,084.12
Industrial	2.35	0	2.21	4.56
Public Services	166.14	0.44	0.01	166.59
Recreation/Entertainment	39.94	0	40.09	80.04
Residential	349.31	9.81	840.25	1,199.36
Vacant	184.06	10.12	391.01	585.19
<b>Total Acres</b>	<b>2,924.44</b>	<b>85.71</b>	<b>1,603.79</b>	<b>4,630.12</b>

The approximate value of existing structures that are in the SFHA is \$66 million, with the highest proportion of the number of structures and value being residential (Table 2). A majority of these structures (93%) are residential with basements. Structures with a basement (subgrade area) adjacent to or near a floodplain are at an added risk of flooding. Of those with basements, nearly 40% have a full basement and are valued at more than \$24 million. The Village of Hilton has the largest value of commercial properties (roughly \$3.3 million) while the Towns of Greece and Parma have the largest residential structure value (\$29 million and \$27 million, respectively).

Table 2. Value of All Structures in the SFHA.

Property Type	Town of Greece	Village of Hilton	Town of Parma	Project Area
Commercial	\$776,686	\$3,384,576	0	\$4,161,262
Community Services	\$1,439,700	\$131,100	0	\$1,570,800
Public Services	\$2,527,000	0	0	\$2,527,000
Recreation/Entertainment	\$210,000	0	0	\$210,000
Residential	\$29,255,213	\$614,200	\$27,821,567	\$7,690,980
Vacant	\$35,588	0	\$52,500	\$88,088
<b>Total</b>	<b>\$34,244,187</b>	<b>\$4,129,876</b>	<b>\$27,874,067</b>	<b>\$66,248,130</b>

Structures that are located outside of the SFHA are also at risk of flooding. Structures that are within the boundaries of FEMA’s 500-year floodplain, which are low-to-moderate flood risk areas, total almost \$47 million (relating to 274 structures across all three communities, of which 88% are residential). The Village of Hilton has the most commercial structures (17) that intersect the 500-year floodplain, with a value of \$4.8 million. When analyzed by basement type—of the 274 structures intersecting the 500-year floodplain across all three communities—178 of these structures have full basements; most of these structures are located in the Town of Greece (111), followed by the Town of Parma (55) and the Village of Hilton (12).

The number and value of structures that are located on parcels situated in the SFHA or the 500-year floodplain, but where the structure is not actually within either bound are presented in Table 3. The total value of structures is a steep \$610 million. Even though these structures do not fall within the boundaries of FEMA’s mapped floodplains, these structures may still be at risk of flooding.

With digitized structure information, communities can get a much more accurate picture of their assets at risk. With actual structure location data, the approximate value of assets in FEMA mapped floodplains dropped from roughly \$700,000 to \$100,000. This demonstrates the inadequacies of using parcel data as a proxy for at-risk structures.

Table 3. Structures and Values Proximate to the SFHA and 500-Year Floodplain.

	Town of Greece	Village of Hilton	Town of Parma	Project Area
Total Structures	1,959	229	506	2,694
<b>Total Value</b>	<b>\$488,545,149</b>	<b>\$53,516,665</b>	<b>\$68,587,150</b>	<b>\$610,648,964</b>

Further analysis of the demographics, description of community land uses and plans, and environmental assets and natural resources that broadly define the project area is provided in [Appendix A.1.: Existing Conditions](#).

## Agriculture

To assess agricultural assets that lie in areas susceptible to flooding, recent (2015) cropland data from the US Department of Agriculture (USDA) –National Agricultural Statistics Service were overlaid with flood prone areas from the Vulnerability Assessment ([Section 7.4](#) and [Appendix B.4.: Assess the Problem](#)) within the three communities. Approximately 1,459 acres of 8,144 total acres of agricultural land are within a high susceptibility area, while 696 acres are within a moderate susceptibility area. Nearly all crop types have one-fifth to one-quarter of their acreage in susceptible areas while row crops (corn silage/soybeans) have the highest number of susceptible acres of all crop types.

A University of Buffalo Regional Institute (UBRI) analysis of food production and food industries in the towns of Greece, Parma and Hilton was conducted using data derived from IMPLAN.<sup>4</sup> The analysis estimates that within this three-town region, farming contributes \$7.7 million in income to workers (includes wages, salaries and benefits paid to employees and proprietors), with the largest share (\$5.3 million) derived from fruit and vegetable production (Table 4). Agricultural production generates 238 jobs and over \$21 million in annual economic output. Output reflects the value of what is being produced by the industry and is estimated using producer prices. The region also supports a large food production sector (e.g. beverage & cereal production, meat, dairy and fruit processing) with approximately \$89 million of income and an annual output of \$1.3 billion. Of the 967 jobs supported by food production in this sector, beverage and beverage product production accounts for 602 of them. Assuming these industries are interconnected, agricultural production is a critical component of the supply chain for the food production industry.

Table 4. Agricultural Economics.

	Employment	Income	Output
Fruit and Vegetable Production	159	5,393,914	10,679,144
Grain Production	45	638,443	7,336,245
Animal Production	36	1,059,194	9,152,044
Tobacco, Cotton, Greenhouse, and Forestry	35	1,679,688	3,108,432
<b>Total</b>	<b>238</b>	<b>7,712,045</b>	<b>21,123,821</b>

Based on this assessment, agriculture and food production are important contributors to the economic and social well-being of the Greece, Parma and Hilton communities. Mitigating the risk of flooding, which has the potential to destroy crops and cropland, will protect a multimillion dollar industry that supports hundreds of local jobs and the supply chain for other important industries.

## Other Businesses

The Study Team reached out to a few local businesses that have been impacted by flooding in the past to better understand their vulnerability. We were specifically interested in knowing what assets are at risk and what they have in place to help them respond to and recover from flooding. We were unable to track anyone down who could speak to either of these primarily because the last damaging flood event occurred more than 10 years ago and staff has turned over.

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<sup>4</sup> IMPLAN (IMPact analysis for PLANning) software uses classic input-output analysis in combination with regional specific data to create economic consequence scenarios of various direct and indirect activities or events on a regional economy. Greece, Parma and Hilton were defined as the eight zip codes that are fully or partially in these municipalities: 14420, 14468, 14559, 14606, 14612, 14615, 14616, 14626.



## 7 WHAT EXACERBATES FLOODING AND ITS IMPACTS?

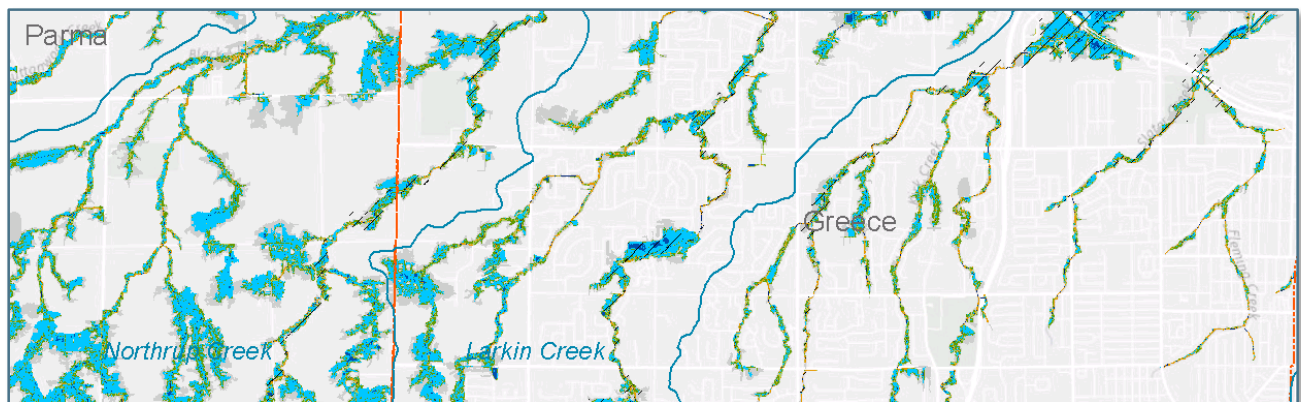
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Over the last several decades, our understanding of floodplain processes and the influence of development on streams, floodplains, and streamflow has greatly improved so that we might plan and manage floodplains in a way that will result in less impacts to people. While this is good news for the way communities make land use decisions now and into the future, there are a number of barriers and challenges to overcome related to a loss of natural infrastructure with already altered stream channels and floodplains, availability and understanding of highly technical data about flood risk, public perceptions of risk, characteristics of structures and people that already lie within risky or flood prone areas, and government structures that are not setup for collaborative planning and management.

### 7.1 ALTERED STREAMS

The more developed watersheds, like Round Pond Creek and Larkin Creek, have high proportions of land area as impervious surfaces and high amounts of developed floodplains and wetlands indicating that the hydrology in these watersheds is highly altered (Fig. 6). Stream channels in these areas have likely been modified to have greater depths and widths, but have disconnected flows from their floodplains to maximize space for development. While these channels may be successfully carrying smaller, more frequent flow events, it is quite likely that capacity will be reached for larger events and that stormwater systems that were installed at the early stages of development will likely be overwhelmed frequently.

The four upper subwatersheds of Salmon Creek's watershed, Upper Salmon Creek, Brockport/Otis Creeks, Moorman Creek, and West Creek, are largely outside of the jurisdiction of Greece, Parma, or Hilton but because they are located upstream of these three communities, their land use decisions could impact flooding in these communities. These watersheds have very little Federal or State protection of wetlands and floodplains, and have a large proportion of soils with high runoff potential.



*Figure 6. Streams with more developed watersheds, like those in eastern Greece, have very narrow floodplains indicating altered hydrology and reduced flood flow capacity compared to those in western Greece and Parma.*



## 7.2 LACK OF A COMPLETE PICTURE OF FLOOD RISK

While flood risk is very real, it is difficult and expensive to determine where it lies geographically and just as difficult to communicate the probability that it will occur.

While Flood Insurance Rate Maps (FIRMs) and Flood Insurance Study (FIS) reports provide readily available, baseline information, they have limitations for use as the sole means of estimating risk.

1. FIRMs can become outdated due to land use changes within the watershed, and updated methods based on new science and technology.
2. Generation of FIRMs relies on models that are simulating incredibly complex storm events, the impacts of which are impossible to precisely predict with available models.
3. FIRMs do not show worst case scenarios, account for storm drain systems, or cover all streams. **Consequently, one-third of flooding damage nationwide occurs outside of mapped FEMA floodplains, and in Vermont has been shown to be closer to two-thirds.**

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*For Greece, Parma and Hilton, 51%, 20% and 30% of flood insurance policies, respectively, are held by properties located outside of the SFHA, indicating that many properties actually at risk may not be shown as having flood risk by FEMA's FIRMs.*

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Additionally, the terms “100-year storm” or “100-year flood” are commonly used in the United States, but these terms can be confusing because they do not adequately convey that they are probabilities of a particular rain or flood event occurring. These probabilities are based on statistical methods that analyze storm or flood frequency using historical data. Rather than indicating that a particular storm event will only occur once per century, these terms mean that a particular storm event has a one in one-hundred (1%) chance of occurring each year – so a 100-year storm could happen two years in a row or five times in a century and therefore could occur in consecutive years. Expressed a different way, a 100-year event has a 26% chance (one in four) of occurring over the course of a 30-year mortgage.<sup>5</sup> Adding to the confusion is that a 100-year storm will not necessarily produce a 100-year flood, because factors like the level of the water table, soil saturation, and streamflow prior to the event can all influence whether a precipitation event will cause a waterbody to overtop its banks.

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<sup>5</sup> Holmes, R.R. and K. Dinicola. 2010. 100-year flood: It's all about chance. US Department of the Interior, US Geological Survey, General Information Product 106.

### 7.3 PERCEPTIONS OF RISK

Understanding risk can help property owners, emergency responders, planning and zoning boards, insurance and mortgage companies, and other stakeholders make decisions that will help themselves and their community better prepare for and recover from flooding—to be more resilient. We assessed the perception of risk in Greece, Parma, and Hilton using National Flood Insurance Program (NFIP) statistics supplemented with responses from the public.

The NFIP was created in 1968 by Congress to help people financially protect themselves from flooding. The NFIP offers flood insurance to homeowners, renters, and business owners if their community participates in the NFIP and enforces floodplain management regulations. These regulations include minimum construction requirements in the Special Flood Hazard Area (SFHA) (or the mapped 100-year flood inundation area), which are shown on a community's FIRM. Structures in the SFHA with mortgages from federally regulated or insured lenders are required to have flood insurance. Flood insurance is not typically required in low-to-moderate flood risk areas (outside of the SFHA). **However, people outside of mapped high-risk flood areas file over 20% of all NFIP flood insurance claims and receive one-third of Federal Disaster Assistance for flooding.**<sup>6</sup>

The percentage of properties within the Federal Emergency Management Agency (FEMA) mapped floodplains that carry flood insurance can be an indicator of perception of risk. While flood insurance is required for properties within the SFHA *if* they have mortgages from federally regulated or insured lenders, properties that are owned outright or that are financed by lenders or servicers that are not federally regulated and that do not sell loans to the Federal National Mortgage Association (Fannie Mae) and the Federal Home Loan Mortgage Corporation (Freddie Mac) and other Government-Sponsored Enterprises (GSEs) are **not** required to have flood insurance, even though they are at high risk.<sup>7</sup> For Greece, Parma, and Hilton, 69%, 70% and 46% of properties in FEMA mapped floodplains (100- or 500-year), respectively, do not have flood insurance. Such high percentages of properties without insurance indicate that property owners might not understand their risk.

Consequently, to provide a richer picture of the communities' perceptions of flooding risk, we conducted a survey of residents of the three communities with a higher proportion of invitations sent to residents of parcels that intersected FEMA mapped floodplains (for a complete description of the survey see [Appendix B.3.: Assess the Problem](#)). Nearly one-third of survey respondents said they have experienced flooding at some point over the past 10 years at their current residence. For purposes of this survey, flooding was defined to mean “when a waterbody overflows its ‘normal’ banks, potentially resulting in erosion, unusual or rapid accumulation, or water inundation that causes damage to your home, infrastructure and/or property.” The definition excluded nuisance flooding, or the presence of water that is troublesome but not threatening or damaging. Floods affecting exterior property were most commonly reported by 28% of respondents, followed by floods affecting their routine (16%) and basement (10%).

We identified an important gap in risk perception: residents were concerned about flooding and its impacts, but at the same time they did not feel vulnerable to flooding even though they recognize it's impacts could extend to the whole community. About two out of three respondents (68%) said they are at least somewhat concerned about the effects of flooding. Over half (54%) said the consequences would be

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<sup>6</sup> “When Insurance is Required,” The Official Site of the NFIP, accessed 2 May 2016, [https://www.floodsmart.gov/floodsmart/pages/about/when\\_insurance\\_is\\_required.jsp](https://www.floodsmart.gov/floodsmart/pages/about/when_insurance_is_required.jsp)

<sup>7</sup> Federal Emergency Management Agency, *Mandatory Purchase of Flood Insurance Guidelines* (August 2008), 4.

serious for them, as flooding threatens the supply of food, water and power. In describing the feelings that come to mind in thinking about the community being affected by flooding, “sadness,” “very devastating,” “cost of rebuilding,” “frustration,” “helplessness,” “a very scary proposition,” and “personal losses” are some of the thoughts respondents shared. **Yet the majority of respondents (57%) indicated that they do not feel vulnerable about the possibility of flooding affecting them or their family.**

Furthermore, we identified a second gap between perceptions of preparedness and actually taking actions to prepare by implementing some kind of flood mitigation measure. With respect to flood preparedness, the majority of survey respondents agreed that personally preparing for floods will improve the value of their house and property; improve their quality of life; and improve their ability to deal with disruptions to everyday routines. Yet the majority (63%) have not taken even one mitigation and prevention measure. Only one out of four property owners responding to the survey (27%) say they keep ditches and drains around their property clean, and even smaller numbers (21%) say that they have purchased flood insurance. Lesser percentages have prepared an emergency kit (18%); sought out information about flooding (16%); or prepared sandbags and/or plywood (10%) for redirecting water away from their home.

Greater flood preparedness should leverage existing assets and resources, involving those who are most prepared, to ensure the entire community ultimately becomes highly prepared to deal with flood related emergencies when they happen. For this reason, property owners were asked about their perceptions about who is prepared and who is not, for future floods affecting the community. Not surprisingly, emergency responders earned the highest marks from survey respondents (89%). Somewhat surprisingly, the next highest percentage of survey respondents – 77% altogether – believe their own household is at least somewhat prepared, if not very prepared. This is true even though the majority of respondents report they have not taken one of several selected measures to mitigate damages or prepare to deal with the effects of flooding.

Two factors could be contributing to these gaps: one, a high proportion of respondents have not experienced flooding, and two, not having enacted a mitigation measure may be reflective of not having the capacity to do so rather than a lack of a perception of risk. Survey respondents indicated that they need financial help implementing mitigation measures such as purchasing flood insurance or increasing coverage; physical help keeping drains and ditches clean (a high proportion of these communities are retirees); and information about flood consequences, aid availability, fair repair estimates, and preparing an emergency kit.

## 7.4 VULNERABLE PEOPLE AND ASSETS ALREADY IN THE FLOODPLAIN

Prior to the production of FIRMs by FEMA in the late 1970s and early 1980s, communities had no tools for delineating flood prone areas unless they independently commissioned drainage studies. Because much of Greece and Hilton were built post-World War II, much of their existing development has not been built in a way that takes flooding into account. The consequences can be considerable: for example, 93% of structures damaged by Hurricane Sandy were built prior to the generation of FIRMs for New York City and surrounding areas. More recent building standards can be very effective at protecting structures that have been built in high risk areas.

Leadership in these communities know from first-hand experience that an understanding of the areas that are most physically at-risk to flooding is critical; however, an understanding of the vulnerabilities of the built environment, the local economy, and residents themselves is also essential to crafting effective flood mitigation strategies. While the description in [Section 6](#) of the numbers and values of structures in the floodplain provide a sense of how much development might be exposed to flooding risk, a geospatial assessment of vulnerability visually represents locations of particularly vulnerable areas, where the consequences of flooding could be greater. To provide a mapped representation of overall flooding vulnerability in the project area, a comprehensive assessment was undertaken that includes the basic physical exposure to flooding risk as well as the economic, social, and structural factors that contribute to the consequences of that flooding. Together these categories of exposure and susceptibility add up to a more complete picture of each communities' vulnerability to flooding. A complete description of the assessment can be found in [Appendix B.1.: Assess the Problem](#) along with detailed maps.

**Physical exposure:** Assessing the physical exposure of the Towns of Greece and Parma and the Village of Hilton essentially requires determining the locations where hydrological, topographic, and soil conditions make a location more physically prone to flooding. Not surprisingly, areas closest to the Lake Ontario shoreline rank high with respect to physical exposure to flooding risk as are locations in close proximity to Salmon Creek in the Village of Hilton and the Town of Parma. Areas just north of New York State Route 104 (NY 104)/Ridge Road in the Towns of Parma and Greece are also physically exposed to flooding risk.

**Economic susceptibility:** Locations within each community with high concentrations of valuable buildings and material contents, as well as high business output and a strong labor force could be highly susceptible to flooding events. In these areas, flooding would result in broadly-felt negative economic impacts that would extend beyond areas directly damaged by flooding. The assessment illustrates that the Town of Greece and the Village of Hilton have high values in both structures and contents. It should be noted, however, that while these communities did not have a significant concentration of structures with high value, there was a concentration of structures with high values of inventory, equipment and personal belongings. Specifically, the central business district in the Village of Hilton, areas along NY 104/Ridge Road in the Town of Greece, and the intersection of New York State Route 259 (NY 259) and NY 104 in the Town of Parma are the most economically susceptible to flooding risk.

**Social susceptibility:** Social susceptibility is a critical element in assessing the overall vulnerability of these three communities to flooding. A better understanding of the capacity of a person, neighborhood or community to anticipate, cope with, resist, or recover from flooding impacts can lead to better strategies for assisting these vulnerable populations. The Village of Hilton and the eastern-most areas in the Town of Greece neighboring the City of Rochester are highly vulnerable to flooding from a social perspective. This

vulnerability is derived from several factors, including the fact that these areas generally have lower income and educational attainment levels, coupled with higher rates of unemployment; households typically are headed by a single-parent persons of color who tend to rent, not own, their home; and/or comprise persons living in households who have “special needs” (e.g., a child, a senior citizen, a person with a disability, a person who does not own an automobile, or a person with other special needs), which makes them more vulnerable to a flooding hazard.

**Structural susceptibility:** Community leaders must also understand how susceptible structures are to flooding risk, as key structural characteristics and dense development in locations prone to flooding increase the vulnerability of built structures to flooding impacts. The Town of Greece and Village of Hilton have built environments that are highly vulnerable to flooding risk. This is due to three reasons: 1) these communities have the highest concentration of primary structures in the floodplain; 2) an older housing stock with structures built prior to flood damage prevention standards; and 3) a large number of residences with basements. Interestingly, secondary structures, such as detached garages, are not as susceptible to flooding in any of the communities.

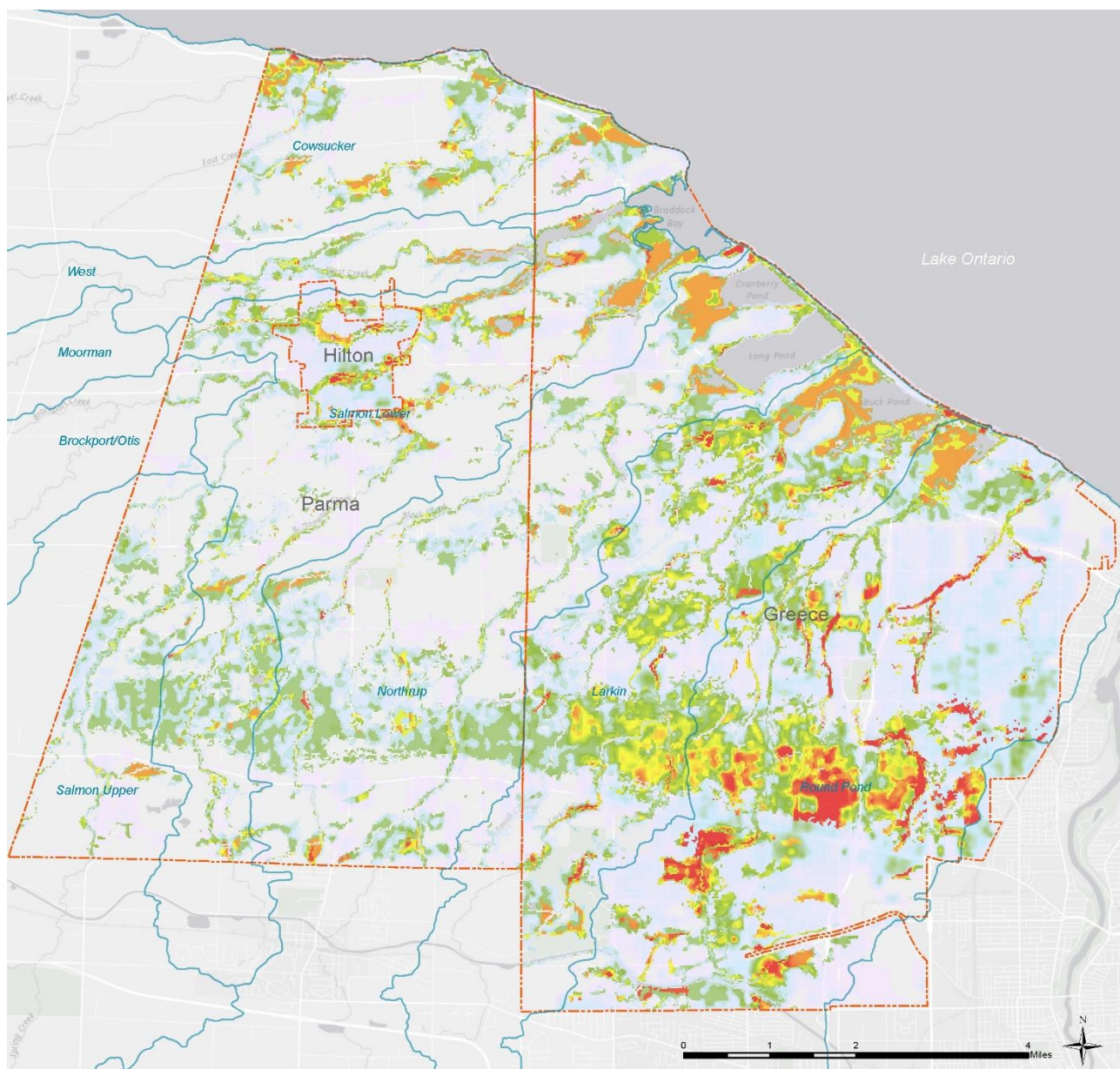
**Overall vulnerability and hot spots:** Areas with the highest overall vulnerability score (taking physical, economic, social and structural indicators altogether) are illustrated in Figure 7. The Village of Hilton near Salmon Creek and neighborhoods located in the eastern end of the Town of Greece are most vulnerable to flooding risk. Also, several neighborhoods on the Lake Ontario shoreline (notably along Edgemere Drive) are vulnerable to flooding risk. Drilling down a bit further, Figure 8 illustrates more specific areas in the Village of Hilton and the Town of Greece where all four components of vulnerability scored high (“hot spots”). This figure suggests that residents in these areas are especially vulnerable to flooding events because they are physically exposed to flooding risk, potentially live in old housing stock not built to withstand flooding, and are more vulnerable to the consequences of flooding due to social and economic factors.

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*Municipalities could target these vulnerable areas, particularly those with dense and older development, for green-infrastructure stormwater management projects. They could also work with organizations to incorporate home improvements that reduce flooding impacts into low interest loan or grant programs.*

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## Vulnerable Areas

## Legend

To represent areas vulnerable to flooding, component scores of physical exposure and social, economic and structural susceptibility were normalized and added to calculate composite scores.

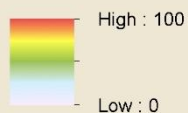
Map created: May 31, 2016

Funding provided by: NOAA Coastal Storms Program

This map was prepared by University of Buffalo, Regional Institute under award #NA12OAR4170113.

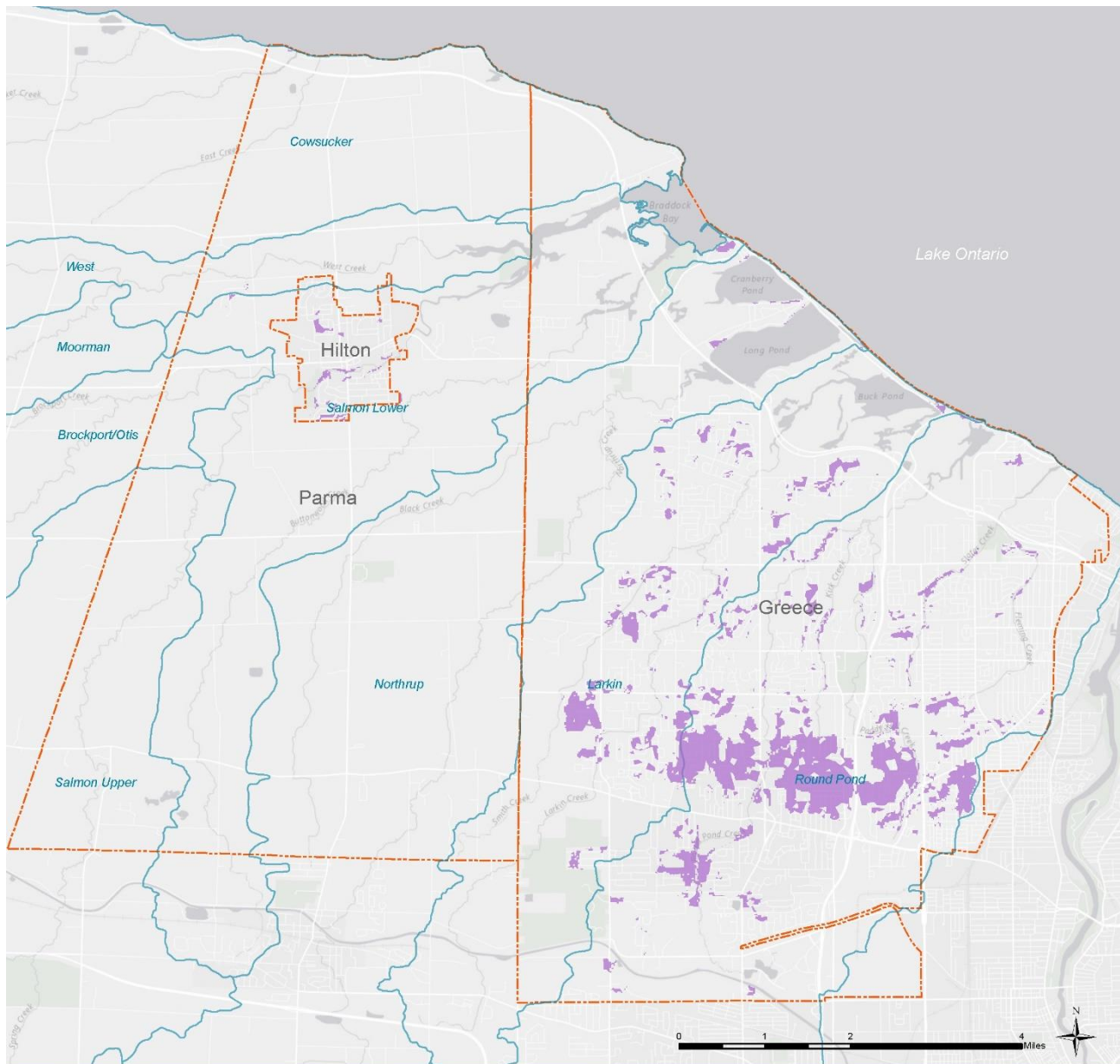
Source: See Appendix B.1. of the Flood Smart Action Plan 2016 for method and data source details.

### Composite Flood Vulnerability Score



- Subwatersheds (HUC12s)
- Municipalities

*Figure 7. Areas vulnerable to flooding in Greece, Parma and Hilton based on economic, social, structural and physical indicators. Areas depicted in green, yellow, orange, and red have overall scores of vulnerability that are above the average.*



## Vulnerable Hot Spots

## Legend

Hot spots represent areas where all four component scores (physical exposure and social, economic, and structural susceptibility) were high (in the top 40%).  
 Map created: May 31, 2016  
 Funding provided by: NOAA Coastal Storms Program  
 This map was prepared by University of Buffalo, Regional Institute under award #NA12OAR4170113.  
 Source: See Appendix B.1. of the Flood Smart Action Plan 2016 for method and data source details.

- All four components scored high
- Subwatersheds (HUC12s)
- Municipalities

Figure 8. Hot spots of vulnerability to flooding in Greece, Parma, and Hilton based on economic, social, structural and physical indicators. In areas depicted in purple, all four components of vulnerability scored high.



## 7.5 CROSS-BOUNDARY PLANNING AND MANAGEMENT

Flowing water does not respect municipal boundaries. Thus effective planning and management of water resources requires that all municipalities in a watershed work together. Collaboration can take a variety of forms, ranging from informal arrangements, such as sharing information and bartering equipment, to more formalized cooperation through mechanisms such as shared services agreements. There is no “one size fits all” solution. Each approach has merit and should be considered in light of the communities’ needs, interests and history. Since flooding events are an identified common concern to residents in Greece, Parma, and Hilton, planning for and managing these events requires that these local governments work together on some level, as the municipal representatives recognized prior to this project as well as emphasizing in the way they defined the problem they wanted this project and flood action plan to address (Section 3).

Furthermore, these communities are located at the downstream ends of the many watersheds that flow through them to Lake Ontario. Only approximately half of all floodplains within these five watersheds are within the municipal bounds of the three participating municipalities Greece, Parma, and Hilton, though the proportion varies greatly by watershed. For Larkin, Northrup, Round Pond, and Salmon Lower, the three municipalities have jurisdiction over large portions of the watershed and floodplains. However, all or nearly all of the watersheds of Brockport/Otis and Moorman are out of their jurisdiction. Consequently, flooding impacts in these three communities may be exacerbated by the management challenges of interacting with even more municipalities upstream.

However, despite the need for collaboration, barriers to doing so exist. The following seven barriers were identified through interviews with municipal representatives.

**Home Rule.** The proposition that local affairs should be determined locally (“home rule”) is the foundation of state-local governmental relations in New York State. Home rule is rooted in Article IX of the State Constitution, which states that effective local self-government and intergovernmental cooperation are purposes of the people of this State, and it directs the Legislature to provide for the creation and organization of local governments in order to secure the rights, powers, privileges and immunities granted by the Constitution (see, N.Y. Const., art. IX, § 1). To implement this Constitutional mandate, the state Legislature enacted a variety of laws, including the Municipal Home Rule Law, which empowers local governments to pass laws both for the “protection and enhancement of [their] physical and visual environment” (Municipal Home Rule Law § 10[1][ii][a][11] ) and for the “government, protection, order, conduct, safety, health and well-being of persons or property therein” (Municipal Home Rule Law § 10[1][ii][a][12] ). However, as a political subdivision of the State, a municipality may not enact ordinances that conflict with the State Constitution or any general law (see Municipal Home Rule Law § 10 [1][i], [ii] ). **Although furthering strong local government and identity, home rule’s deference to local authority leads to tension on issues like floodplain management because solutions require an approach that transcends local boundaries, interests and motivations.**

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*Shared Service Agreements  
are supported by the Public.*

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**Lack of capacity.** Local stakeholders identified the lack of staff and funding as a barrier to regional floodplain management. **Local governments are swamped with increasing demands and shrinking revenue, so capacity (both staffing and revenue) is limited. Local governments must balance resident demand for service delivery, as well as federal and state mandates, on the one hand, with the reality that there is little appetite for additional taxation to support those increased levels of service.** The prospect of adding another level of government, such as a special district, with possible duplication of services and more expense, also is not appealing. Moreover, staff currently wear several hats at once (code enforcement officer, emergency management officer, etc.), with little additional time to devote to proactive planning capacity. This, in turn, affects residents, who may not be aware of flooding dangers in the region.

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*The majority of survey respondents feel that government is responsible for preparing for flooding, but don't have high confidence that local government is prepared.*

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**FEMA's National Flood Insurance Program.** The goal of the National Flood Insurance Program (NFIP) is to reduce the impact of flooding by providing affordable insurance to property owners. However, several flaws in this program impede the ability of municipalities to engage in regional floodplain management. **Notably, NFIP mapping techniques are out of date and out of synch with the reality of floodplain boundaries in the region. Maps do not reflect the reality of flooding potential in Greece, Parma, and Hilton and thus do not incentivize regional planning. The maps fail to take into account the reality that "water knows no boundaries." Municipal officials are charged with enforcing these maps, which incentivizes them to "go solo" and think about planning, programming and funding using parameters that are not accurate. Lack of capacity also comes into play here, as staff and funding to create new, accurate maps does not exist.**

**Zoning and land use law.** Reflecting and reinforcing the deep tradition in New York of deference to local authority, the Legislature recognizes zoning and land use as inherent to home rule. The Legislature authorizes towns to enact zoning laws for the purpose of fostering "the health, safety, morals, or the general welfare of the community" (Town Law § 261; see also Statute of Local Governments § 10[6] [granting towns "the power to adopt, amend and repeal zoning regulations"] ). Also, as a fundamental precept, the legislature has recognized that the local regulation of land use is "[a]mong the most important powers and duties granted ... to a town government" (Town Law § 272–a [1][b]). This model may no longer reflect ecological needs or the transboundary reality of flooding events.

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*Survey results indicate support for a permitting process that regulates development in high risk areas.*

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**Communication and knowledge barriers.** Regular communication among municipal counterparts who have an interest in floodplain management is scant. Interviews suggest that officials don't know who has "what" information – as one official put it, "we don't know what we don't know." When information is available, such as FEMA mapping tools, it is highly technical and difficult to understand and use. As one official put it, "knowledge and information empower local officials to make good decisions – we can't implement better floodplain management strategies when we don't have appropriate data."

**Water regulation.** Municipalities in New York State have power and responsibility not only for decisions that determine how a community uses its land, but also its water. The Stormwater Phase II program, a federal regulation, requires regulated Municipal Separate Storm Sewer Systems (MS4s) to incorporate stormwater management into the local code. Also, New York State recommends that every community, whether or not it is regulated under Phase II, adopt a Stormwater Management Local Law. **Thus, like zoning and land use regulation, local emphasis with respect to stormwater management presumably supports a good quality of life in each municipality, yet it nonetheless produces tension with the need for an intermunicipal approach to flooding.**

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*The Public strongly supports cross-boundary projects.*

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**A “smaller is better” outlook.** This perspective heightens tension with the need for intermunicipal floodplain management. **Presumably local control allows for strong citizen involvement because of small scale, low expense and inherent interest in local issues. However, action in one community may adversely impact another (the upstream-downstream problem) but incentives to collectively address flooding are few.**

## APPROACHES FOR REDUCING IMPACTS

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### 8 CURRENT APPROACHES

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While flooding does occur in Greece, Parma, and Hilton, its impacts are not as bad as they could be largely due to existing land use regulations, experienced and knowledgeable staff, and natural infrastructure that acts to attenuate or dampen the effects of flood flows.

#### 8.1 EXISTING LAND USE REGULATIONS AND AREAS TO IMPROVE

Federal regulation of activities in floodplains is limited to two primary agencies, the Federal Emergency Management Agency (FEMA) through the National Flood Insurance Program (NFIP), and the US Environmental Protection Agency (USEPA) and Army Corps of Engineers (ACOE) jointly through Section 404 of the Clean Water Act. Once FEMA provides a community with the flood hazard information upon which floodplain management regulations are based, the community is required to adopt a floodplain management ordinance that meets or exceeds the minimum NFIP requirements. FEMA's flood maps determine the regulatory boundary. The overriding purpose of floodplain management regulations is to ensure that participating communities take into account flood hazards, to the extent that they are known, in all official actions relating to land management and use. Enforcement of compliance is the responsibility of the community. Section 404 regulates dredging of material or filling of certain waterbodies which can include floodplains. The basic premise of the program is that no discharge of dredged or fill material may be permitted if: (1) a practicable alternative exists that is less damaging to the aquatic environment or (2) the nation's waters would be significantly degraded. In other words, a permit applicant must demonstrate that steps have been taken to avoid impacts to wetlands, streams and other aquatic resources, that potential impacts have been minimized, and that compensation will be provided for all remaining unavoidable impacts.

To comply with the floodplain management requirements of the NFIP, communities must adopt a local flood damage prevention law (FDPL) in order to participate in the NFIP program. **FEMA has calculated that buildings built to these standards suffer 70% less flood related damage than unprotected buildings. However, they can still suffer damage, so higher protection levels are warranted in most instances.** For example, floods can be higher than the base flood elevation (the water surface elevation of a 100-year flood) for various reasons, including larger storms, downstream obstructions, increased watershed development and floodplain filling. Setting higher standards protects against these risks. New York State has gone above and beyond the minimum standards by requiring two-ft of freeboard which means rather than the lowest occupied floor of development having to be at or above the base flood elevation, it has to be two-ft above base flood elevation.

The Flood Damage Prevention Laws of Greece, Parma and Hilton are based on the State's Model Local Law for Flood Damage Prevention, which sets higher standards than many areas of the country. This helps reduce flood risk, as well as earn the community credits in the NFIP's Community Rating System (CRS), which reduces flood insurance rates. There are updates proposed that could further reduce risk (see [Appendix D.1.: Action Items](#) (Land Use Management Tools)) that are based on Activity 430 (Higher Regulatory Standards) of CRS. Some of the proposed updates include additional requirements that increase the level of protection provided to floodplain development.

Additional general zoning recommendations that will restrict floodplain development and further reduce risk for the three municipalities include:

#### Town of Greece

- Create an overlay district for the lakeshore area that enforces V Zone requirements, or declares all of its coastal Special Flood Hazard Area (SFHA) as coastal A Zone that must meet the requirements for buildings in V Zones.
- Update the Town of Greece Specifications for Construction to include certain green infrastructure practices identified in the *Green Infrastructure Code and Ordinance report* conducted by the Stormwater Coalition of Monroe County.
- Expand the scope of the Town's Freshwater Wetlands local law by including additional wetlands to NYSDEC's Freshwater Wetlands Map and/or have an unbiased third party delineate wetlands, or create a new wetland protection overlay district.
- Create a stream/wetland buffers local law or include riparian setbacks in zoning.

#### Town of Parma

- Adopt new versions of data sources for Environmental Protection Overlay Districts (EPODs).
- Update incentive zoning provision to include the preservation of open space in its undeveloped natural state (with documentation that the owner will keep the parcel open) or the restoration of parcels to their natural, pre-development conditions in exchange for density bonuses, tax incentives, planned unit developments (PUDs), or cluster development (e.g., conservation design or open space design).

#### Village of Hilton

- Update zoning and other land-use policies to provide opportunities to change previous development decisions that may no longer be desired and increase the community's sustainability and flood disaster resilience.

## 8.2 TRAINED STAFF

Just as trained staff are essential to effective emergency response, in the arena of land use planning and management they can make a big difference in how well land use management strategies are implemented and enforced. While emergency responders can save lives with search and rescue techniques, land use planners, town engineers, code enforcement officers, and building inspectors all contribute to reducing vulnerability by understanding building regulations, stormwater management strategies, and information technologies like geographic information systems.

In Greece, Parma, and Hilton, three critical elements have created a team of well-trained staff. First, training is culturally and financially supported by the local governments. Second, in order for busy staff to be able to leave their posts for as many as five days to receive training, staff are shared between municipalities. Third, many training opportunities (including accommodations) are provided free of charge by federal and state governments.

### 8.3 CONDITION AND PROTECTION OF NATURAL INFRASTRUCTURE

Natural ecosystems like floodplains, wetlands, and forests provide essential services to water utilities, businesses, and communities such as flood abatement and water purification. To ensure these ecosystem services and associated benefits continue, networks of natural lands and other open spaces can be secured as “natural infrastructure.” While concrete-and-steel built infrastructure or “gray infrastructure” has its place in our communities and its own benefits, investing in natural infrastructure can reduce or avoid costs and enhance water services as part of an integrated system to cost-effectively mitigate flood risk and improve water quality.<sup>8</sup>

**Floodplains.** As described in [Section 4](#), Floodplains convey water when floods exceed the ability of the river channel to transport the flood between its banks. They increase the ability of a river to move or convey floodwaters and decrease peak flood flows by acting as temporary reservoirs. They also slow moving water which allows sediment and nutrients to drop out onto the floodplain, where both are filtered from the water by plants.

**Wetlands.** Wetlands can act as sponges that soak up storm water, storing high flows and releasing the water slowly to the stream or groundwater system. A one-acre wetland can typically store about three-acre feet of water, or one million gallons.<sup>9</sup> Wetlands often overlap with floodplains. Floodplain or riparian wetlands maintain saturated soils generally due to groundwater while other parts of the floodplain are only wet when inundated by flood flows. Wetlands can also be isolated from floodplains but continue to provide a flood abatement service by storing water until it can infiltrate to ground water or by intercepting surface water runoff before it reaches a stream network. Wetlands also filter water by slowing flows and allowing sediment and nutrients to drop out.

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*Two-thirds of survey respondents strongly value the natural environment for reasons ranging from the role it plays in agriculture, tourism, and for fish and wildlife to protecting it as it is for future generations to enjoy.*

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The Town of Greece does not have a lot of natural infrastructure left except what is in the Braddock Bay Wildlife Management Area. However, it has done a good job of protecting FEMA floodplains since they were mapped. The Town of Parma has natural infrastructure left that is distributed throughout the community, and is in a good place to determine which areas they want to preserve before development intensifies. Environmental Protection

Overlay Districts (EPODs) are a good way to protect these lands. The Village of Hilton is fully developed and is small geographically so that it is limited in how much benefit it can provide within its municipal boundaries. Consequently, this community is largely at the mercy of upstream communities.

Only about one-half of all mapped wetlands in our nine subwatersheds are protected to some degree by the State and only one-fifth to one-quarter receive the highest level of State protection. Federal regulation provides some protection but its jurisdiction is not delineated geospatially so it is difficult to estimate the proportion of wetlands that receive the benefit of that protection.

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<sup>8</sup> Gartner, T., J. Mulligan, R. Schmidt, and J. Gunn. 2013. Natural Infrastructure: Investing in Forested Landscapes for Source Water Protection in the United States. World Resources Institute, Washington.

<sup>9</sup> US Environmental Protection Agency. 2006. Wetlands: Protecting life and property from flooding. US EPA, Office of Water, EPA843-F-06-001.

- NYS Department of Environmental Conservation (NYSDEC) regulatory wetlands are classified as Class I through IV based on the benefits they provide and the protection level presumed required to maintain those benefits, with Class I receiving the highest degree of regulatory protection. In the focal watersheds, only 45% of NYSDEC mapped wetlands receive this highest degree of protection, while 34% receive Class II protections and the remaining 21% receive Class III protections.
- National Wetlands Inventory (NWI) wetlands mapped by the US Fish and Wildlife Service (USFWS) receive no official regulatory protection. They are typically used only as a coarse screen by the Army Corps of Engineers as part of its review under Section 404 of the Clean Water Act.<sup>10</sup> They *may* be used by NYSDEC as part of their review under Section 401 of the Clean Water Act.

A large proportion of wetlands that might be providing flood abatement benefits to Greece, Parma, and Hilton is not protected by State regulations and are out of the regulatory jurisdiction of the local governments. **The majority of mapped wetlands that are in their jurisdiction are at the downstream-most ends of these watersheds and while they are likely providing water quality benefits to Lake Ontario they are not ideally situated to provide flood abatement benefits to Greece, Parma, and Hilton.**

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*The Public supports tax dollars going to projects outside of municipal boundaries for the benefit of water quality (98%), flood prevention (87%), public safety (85%), or recreational opportunities (72%).*

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An additional form of protection for wetlands aside from regulation, would be to hold them in conservation ownership. Wetlands in the area with this form of protection overlap greatly with those mapped and protected by NYSDEC, and largely lie at the downstream-most end of the watersheds in the Braddock Bay Wildlife Management Area. Consequently, while conservation lands are likely providing benefit to the water quality of Lake Ontario and habitat for a diversity of aquatic and terrestrial species, they are not located higher in the watershed or upstream of population centers where they might provide water filtration and flood abatement benefits.

For the full description of natural infrastructure, its condition and degree of protection see [Appendix A.2.: Existing Conditions](#).

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<sup>10</sup> Floodplains and wetlands are afforded some protection under Section 404 of the Clean Water Act. Water quality evaluations must be prepared for all projects in which dredged or fill material will be discharged into waters of the United States. The term “waters of the United States” is defined in the Environmental Protection Agency Guidelines for Specification of Disposal Sites for Dredged or Fill Material, Federal Register, December 24, 1980. The definition is complex and can be difficult to apply.



## 9 NEW APPROACHES – ACTION STEPS TO A FLOOD SMART COMMUNITY

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To ensure that the desired outcomes described in this Flood Smart Action Plan are achieved, specific actions and measures of effectiveness are described for each of the priority recommendations, as well as short (1 to 5 years) and long-term (5 to 10 years) timeframes for completion. Several products were developed by the Study Team to assist the municipalities in successfully implementing this Plan and are described where they may be useful or relevant. The effectiveness measures and completion dates have been laid out in table form at the end of this section (Table 5) for easier reference.

### Recommendation 1.

*Convene intermunicipal work group that is responsible for progress towards implementation of Flood Smart Action Plan, and works to build and maintain intermunicipal partnership and collaboration.*

The municipal representatives identified a real need to meet regularly to maintain forward momentum with the Flood Smart Action Plan. They will meet twice per year to implement actions identified in the recommendations and document effectiveness. While developing the recommendations, several suggested topics for this group to tackle were identified and are listed below.

### Actions and Measures

- Short-term: The Flood Work Group has held its first meeting by end of 2016, and has completed the other priorities in this list within the assigned timeframes.
- Long-term: The Work Group has continued to meet twice per year, has developed new priority recommendations for implementation, and has measured long-term outcomes of actions completed.

### Participants

- Scott Copey, Planner, Town of Greece
- John Gauthier, Engineer and MS4 permit manager, Town of Greece
- Sue Duggan, Assistant to the Building Inspector, Town of Greece
- Mike Lissow, Code Enforcement Officer, Building Inspector and Fire Marshall, Village of Hilton
- Mike McHenry, Public Works Superintendent, Village of Hilton
- Dennis Scibetta, Building and Development Coordinator, Town of Parma
- Town of Parma Highway Department representative
- A representative from each Town or Village Board
- A representative from each Planning Board
- Representatives from upstream municipalities

### Topics that the group can work on:

- Identify priority topics for Board training. Organize and hold the trainings.
- Identify a role for the municipalities in convening agricultural interests.
- Identify priority shared projects.

- Work with local land trusts to acquire highest priority floodplains/wetlands.
- Research mapping options, select one, and find a funding source to complete.
- Determine best host for online mapper that will make geospatial data available to each municipality and the public. Determine plan for regularly updating the data.
- Work together to educate residents of flood-prone neighborhoods in NFIP, Biggert Waters Flood Insurance Reform Act of 2012, mitigation options and FEMA mitigation programs.
- Collaboratively develop mailings to floodplain residents regarding location in floodplain, flood insurance and keeping debris out of streams.
- Get actions incorporated into Monroe County Hazard Mitigation Plan.
- Assess need for revised roadside ditch best management practices and other training for road crews like the Emergency Stream Intervention Training.
- Reach out to human health, social justice and/or disadvantaged community organizations to develop effective emergency planning and response

## Recommendation 2.

*Develop training requirement and/or program for municipal boards to ensure members are aware of the flood-related risks of land use decisions.*

### Actions and Measures

- Short-term: Complete trainings so that 50% of Board members are trained. Complete additional trainings so that 100% of Board members are trained and 25% of Board have taken second training.
- Long-term: Trainings on flood information have been integrated into Continuing Education Credit program and are offered twice per year.

### Participants

- Planning Boards
- Zoning Boards
- Town or Village Boards

### Training Topics

- The Flood Smart Action Plan, process, and recommendations
- Information on the National Flood Insurance Program (NFIP), NFIP statistics, building regulations, and resources
- Updates on Biggert Waters and how it will impact NFIP policy holders
- Local land use authority for regulation of floodplains and possible land use tools
- Benefits and activities of the Community Rating System

### Recommendation 3.

*Adopt intermunicipal floodplain protection overlay district (POD) to require additional and intermunicipal review of site plans for building permits.*

#### Actions and Measures

- Short-term: Develop local law language and adopt the floodplain POD.
- Long-term: A method has been developed to track development, particularly where it was initially proposed, how local land use authority altered where it wound up, and how it is being constructed.

#### Participants

- Town of Greece
- Town of Parma
- Village of Hilton

#### Useful Project Products

- Model Intermunicipal Agreement language has been prepared by University of Buffalo and is provided in [Appendix D.2](#).
- Outputs from the Flood Mitigation Assessment in [Appendix B.2](#) could be used to demonstrate the need for codifying floodplain management decisions by pointing out costs that could have potentially been avoided if development had not been allowed in risky areas.
- G/FLRPC could work with participating municipalities to determine a path forward for development and adoption of the local law.

### Recommendation 4.

*Each municipality strengthens their Local Flood Damage Prevention Law (LFDPL).*

#### Actions and Measures

- Short-term: Adopt LFDPL changes.
- Long-term: Re-assess LFDPL language for areas to update and strengthen.

#### Participants

- Town of Greece
- Town of Parma
- Village of Hilton

#### Useful Project Products

- G/FLRPC completed a review of each municipality's LFDPL, highlighted areas to strengthen and provided model language ([Appendix D.1.: Action Items](#)).

## Recommendation 5.

*Municipalities convene agricultural interests to build relationships with farmers.*

### Actions and Measures

- Short-term: Hold meetings with Monroe County Soil & Water Conservation District (SWCD) and one other agricultural stakeholder group, and determine role for municipalities.
- Long-term: Municipalities will regularly convene or engage with farmers and agricultural stakeholder groups as measured by the number of meetings attended and the number of attendees. Best Management Practices on farmland will have been implemented with the SWCD as measured by the number of projects facilitated by municipal staff, and ideally by the reduction in surface water runoff from farmlands and sediment and nutrient delivery to streams.

### Participants

- Town of Greece
- Town of Parma
- Village of Hilton

### Useful Project Products

- Contributions of agriculture to the local economy are described in **Appendix B.4.: Assess the Problem** as well as the amount and type of farmland that may be susceptible to flooding impacts.
- Also in Appendix B.4. is a review of best management practices that provide flood attenuation and water quality benefits and could be encouraged for implementation on farms.
- The following recommendation resulted from the full assessment. Local governments should convene agricultural interests to work towards:
  1. Organizing peer to peer learning networks to unearth concerns and limitations on BMP implementation.
  2. Strengthen collaborative efforts among SWCDs, farmers and other ag agencies particularly focusing on helping to leverage funding.

## Recommendation 6.

*Use residential property owner survey results to formulate key messages for at risk property owners, develop outreach materials and send annually to property owners.*

### Actions and Measures

- **Short-term:** Send one round of mailings, followed by annual mailings. Include self-addressed stamped postcard with a few survey questions devised to measure how perception of risk and understanding of NFIP change overtime.
- **Long-term:** Annual mailings are modified based on effectiveness as measured by postcard survey.

### Participants

- Town of Greece
- Town of Parma
- Village of Hilton

### Useful Project Products

- Messages from residential property owner survey (**Appendix B.3.: Assess the Problem**).
  - Improve perceptions of risk by letting property owners know if they are likely in or within a certain distance of a FEMA mapped floodplain (either 1% or 0.2% chance of occurrence). Explain what the probability of particular flooding events means. Emphasize that flooding can occur at any time of year.
  - Improve understanding of mitigation options by describing the possibilities and resources for implementing them.
- Use digitized structure data to focus mailings for particularly high risk messages.
- Use outputs from Flood Mitigation Assessment (**Appendix B.2.: Assess the Problem**) to describe options for mitigation measures for flood-prone property owners.
- Use decision trees (**Appendix D.4.: Action Items**) to help property owners better understand risk and resources. Two trees have been developed to help property owners 1) determine if their structure is in the floodplain, and 2) what to do if their structure has sustained flood damage.
- Use the vulnerability assessment (**Appendix B.1.: Assess the Problem**) to identify places where the municipalities could implement on the ground projects, and distribute financial aid for upgrading residential structures. Review the maps from the assessment with emergency responders looking for areas to consider or focus on in emergency planning and response.

## Recommendation 7.

*Prioritize and protect existing natural infrastructure within the nine subwatersheds described in Appendix A.*

### Actions and Measures

- **Short-term:** Complete wetland and floodplain prioritization for protection. Develop a mechanism for acquiring land outside of municipal jurisdictions, and work with upstream municipalities to build support for protection.
- **Long-term:** Acquire 50 acres of priority wetlands and floodplains. Work to acquire an additional 20 acres per year, towards a goal of protecting 90% of floodplains and 100% of NYSDEC Freshwater Wetlands Class 1-3 within the jurisdictions of Greece, Parma, and Hilton either through acquisition or adoption of EPOD, and a minimum of 50% of floodplains and 25% of wetlands in watershed areas outside these jurisdictions.

### Participants

- Town of Greece
- Town of Parma
- Village of Hilton
- Upstream municipalities
- Land trusts

### Useful Project Products

- The Nature Conservancy completed an assessment of flood abatement services of floodplains and wetlands within the nine subwatersheds that either flow through Greece, Parma, and Hilton or that lie upstream (**Appendix D.5.: Action Items**). It is highly recommended that these results be supplemented with assessment of water quality and habitat services as well. The results could be used to prioritize existing wetlands or natural floodplains for protection and areas that could be restored.
- Greece, Parma and Hilton could use the information contained in **Appendix A.2.: Baseline Conditions** to determine subwatersheds where relationship building with upstream communities might be more urgent based on the amount of those subwatersheds that lie outside of their jurisdiction, upstream of their population centers and how much of existing natural infrastructure is protected by either regulation or land conservation.



## Recommendation 8.

*Share data with municipalities and the public via an online web mapper so that all parties are making decisions with the same information.*

### Actions and Measures

- **Short-term:** Develop online mapper and make it available to the public. Municipal staff and boards have been trained in use of the online mapper.
- **Long-term:** Municipal staff and boards rely on online mapper for provision of data used in decision making. Both have been surveyed for their perceptions of whether the availability of data has helped inform their decisions and improved consistent application of regulations.

### Participants

- Town of Greece
- Town of Parma
- Village of Hilton
- Monroe County
- Upstream municipalities

### Useful Project Products

Below is a list of data sources that could be included and their file types and file sizes. These will be provided to each municipality in a geodatabase.

	File Type	File Size 9 HUC12s		File Size GPH Only	
FEMA DFIRMs	polygon	13	MB		
Active River Area	raster	4	MB		
Ecohydrologically Active Areas	raster	1.4	GB		
Vulnerable areas	raster			1.62	MB
Vulnerable areas clipped to FIRMs	raster			1.62	MB
Vulnerable hot spots	raster			194	KB
Physical exposure	raster			1.7	MB
Economic susceptibility	raster			1.7	MB
Social susceptibility	raster			1.7	MB
Structural susceptibility	raster			1.7	MB
NHD streams, high resolution	polygon	1	MB		
DEC wetlands	polygon	93	KB		
NWI wetlands	polygon	1.2	MB		
Protected lands	polygon	155	KB		
Digitized structures (without tax attributes)	polygon			200	KB
HUC12 boundaries	polygon	235	KB		
National Land Cover Dataset 2011	raster	931	KB		
Impervious surfaces 2011	raster	3.3	MB		
Land use, zoning	polygon			2.6	MB

## Recommendation 9.

*Utilize the Community Rating System (CRS) to improve public safety, reduce property loss, protect open space and natural resources, and recover more effectively post-disaster.*

### Actions and Measures

- Short-term: Parma has submitted an application to the CRS, Greece has identified three new or improved creditable activities, and Hilton has evaluated the benefits of membership.
- Long-term: Greece has moved up one CRS class and Parma has become a CRS class 8.

### Participants

- Town of Greece
- Town of Parma
- Village of Hilton
- Monroe County
- Upstream municipalities

### Useful Project Products

- G/FLRPC completed a review of creditable CRS activities. [Appendix D.3.: Action Items](#) describes activities that the municipalities could receive credit for by implementing New York State mandates as well as the results of a survey that was used to identify activities the Town of Parma and Village of Hilton are already doing that could earn CRS points and those that could earn the Town of Greece additional CRS-credited action.

Table 5. Measures of effectiveness for both progress towards implementing the recommendations and progress towards reducing vulnerability. R = effectiveness of implementing recommendations, V = effectiveness of reducing vulnerability.

Suggested Completion	Type	Measure of Effectiveness
<b>Greece, Parma and Hilton Together</b>		
End of 2016	R	Intermunicipal work group has had its first meeting.
June of 2017	R	Two trainings have been completed and 50% of board members have been trained.
	R	Parma has submitted an application to CRS, Greece has identified three new or improved creditable activities, and Hilton has evaluated the benefits of membership.
End of 2017	R	Local flood damage prevention laws have been strengthened by adopting standards above and beyond the minimum.
	R	Complete wetland and floodplain prioritization for protection by end of 2017 that includes assessment of flood attenuation, water quality and habitat benefits.
	R	Online mapper is operational.
June of 2018	R	Two additional trainings have been completed, 100% of board members have been trained and 25% of members have received second training.
	R	Municipal staff and boards have been trained in use of the online mapper.
End of 2018	R	The floodplain Protection Overlay District has been adopted.
	R	Meeting held with Monroe County SWCD and one other agricultural stakeholder group, and role for municipalities determined.
	R	One round of mailing to residential property owners has been sent that included self-addressed stamped postcard with a few survey questions devised to measure how perception of risk and understanding of NFIP change overtime.
End of 2019	R	Develop a mechanism for acquiring land outside of municipal jurisdictions, and work with upstream municipalities to build support for protection.
2021	R	Work Group has met each year two times per year.
	R	Work group has developed new priority recommendations for implementation.
	R	Work group has measured long-term outcomes for actions already completed as listed in the "Completed By 2021" section in this table.
	V	Trainings on flooding have been integrated into Continuing Education Credit program and are offered twice per year.
	V	A method has been developed and implemented to track development, particularly where it was initially proposed and how local land use authority altered where it wound up, and where and/or how it was ultimately constructed.
	R	Local flood damage prevention law language has been re-assessed for areas to update and strengthen.

Suggested Completion	Type	Measure of Effectiveness
	R	Municipalities regularly convene or engage with farmers and agricultural stakeholder groups as measured by the number of meetings attended and the numbers of attendees.
	V	Best Management Practices on farmland have been implemented with the SWCD as measured by the number of projects facilitated by municipal staff, and ideally by the reduction in surface water runoff from farmlands and sediment and nutrient delivery to streams.
	V	Change in perception of residential property owners has been tracked and annual mailings are modified based on effectiveness as measured by postcard survey.
	V	20 acres of priority wetlands and floodplains have been acquired, and work is occurring to acquire an additional 20 acres per year. With a goal of protecting 90% of floodplains and 100% of DEC Freshwater Wetlands Class 1-3 within the jurisdictions of Greece, Parma and Hilton either through acquisition or adoption of EPOD, and a minimum of 50% of floodplains and 25% of wetlands in watershed areas outside these jurisdictions.
	V	Municipal staff and boards rely on online mapper for provision of data used in decision making. Both have been surveyed for their perceptions of whether the availability of data has helped inform their decisions and improved consistent application of regulations
	V	Greece has moved up one CRS class and Parma has become a CRS class 8.
<b>Greece</b>		
End of 2019	R	Work with the Storm Water Coalition to determine flood messages and work with H <sub>2</sub> O Hero program to incorporate them into outreach materials (ex. turn around, don't drown; emergency plan at home; remove or secure yard items so they don't become stream debris).
	V	Acquire and document flood easements to remove development rights from 100-year floodplains. Develop a system to store geospatial location data.
	R	Require developers to submit shapefiles of delineated floodplains and wetlands and develop a system to store these data.
<b>Parma</b>		
End of 2016	R	Work with G/FLRPC to assess activities that are eligible for Community Rating System credit.
End of 2017	V	Strengthen existing Environmental Protection Overlay Districts by adopting New York State Department of Environmental Conservation Freshwater Wetland maps and/or National Wetland Inventory mapped wetlands, and the National Hydrography Dataset of high resolution streams.
End of 2018	R	Develop a sustainable method to enroll and maintain membership in the CRS program.

Suggested Completion	Type	Measure of Effectiveness
<b>Hilton</b>		
End of 2017	R	Develop a stream maintenance program that is approved by NYSDEC and assess areas of collaboration with Parma.
	R	Allocate a portion of soon-to-be drainage district fee to the stream maintenance program, and protection and restoration of wetlands and floodplains (could be located outside of jurisdictional boundaries).
2021	V	XX amount of revenue will have gone to the stream maintenance program and to implement one wetland or floodplain restoration or protection project.