

Discovery Report

Lake Erie Chautauqua-Conneaut Watershed, HUC 04120101

Cattaraugus and Chautauqua Counties, New York*

**These counties span more than one watershed; please see following page for a list of communities fully or partially located in the watershed. This report covers only the Chautauqua-Conneaut Watershed in the State of New York.*

*Report Number 02
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FEMA

Federal Emergency Management Agency
Department of Homeland Security
FEMA Region II
One World Trade Center
New York, NY 10007

Project Area Community List

This list includes all communities located fully or partially within the Chautauqua-Conneaut Watershed. While all communities may be under consideration for a revised Federal Emergency Management Agency (FEMA) Flood Insurance Study (FIS) and/or Flood Insurance Rate Map (FIRM), it is important to note that not all communities will receive new/updated FEMA FISs or FIRMs as a result of this study.

Cattaraugus County

Perrysburg, Town of*

Chautauqua County

Arkwright, Town of*

Brocton, Village of

*Charlotte, Town of***

Chautauqua, Town of*

Dunkirk, City of

Dunkirk, Town of

Forestville, Village of

Fredonia, Village of

Hanover, Town of*

*Mina, Town of***

Pomfret, Town of*

Portland, Town of*

Ripley, Town of*

Sheridan, Town of

*Sherman, Town of***

Silver Creek, Village of

*Stockton, Town of***

*Villanova, Town of***

Westfield, Town of*

Westfield, Village of

**Partially within the Chautauqua-Conneaut Watershed*

***Partially within the Chautauqua-Conneaut Watershed, but not included in this Discovery Report due to inclusion within other Discovery processes, lack of flooding sources, and/or due to unpopulated area or development.*

Study Date

The information and data presented in this report is static and was current as October 2014, the date of initial submission.

For the Chautauqua-Conneaut Watershed, the Discovery process began in the spring of 2014. Data collection, as detailed in Section V, was completed in August 2014. The in-person meetings were held on June 10 and 11, 2014. Additional details on meetings and stakeholder involvement can be found in Section IV of this report. Data collected in this report was available prior to August 2014. As applicable, dates of data creation are noted throughout the report.

Executive Summary

The Federal Emergency Management Agency (FEMA) Risk Mapping, Assessment, and Planning (Risk MAP) program helps communities identify, evaluate, and reduce their flood risk. FEMA, in coordination with the New York State Department of Environmental Conservation (NYSDEC), has completed Discovery, the first step in the Risk MAP process, for three Lake Erie watersheds. This report describes the Discovery process and results for the Chautauqua-Conneaut Watershed.

Discovery is a process that helps communities identify risks and sustainable development methods and provides participants with an in-depth understanding of their watershed. The process involves conducting an assessment of existing flood hazard mapping needs throughout a watershed, and researching available information that may be of use to update Flood Insurance Rate Maps (FIRMs). In partnership with state and local officials, FEMA uses recommendations identified through the Discovery process to refine existing Risk MAP and FIRM products, as needed.

The basic structure of the Discovery Report follows a standard template to allow comparison between watersheds. This Discovery Report also summarizes FEMA's ongoing Great Lakes Coastal Flood Study (GLCFS). The GLCFS is a comprehensive study of coastal flood hazards for the shoreline along the Great Lakes Basin. The study is being performed by FEMA in cooperation with the U.S. Army Corps of Engineers (USACE), the Association of State Floodplain Managers, and other partners.

The Discovery process for the Lake Erie watersheds involved extensive basin-wide data collection and outreach efforts with stakeholders in each project area. The stakeholder group included representatives from FEMA, other Federal agencies, state agencies, county and local governments, as well as watershed-based groups. A full list of stakeholders invited to participate in the Discovery process is available in Appendix H: *Pre-Discovery Mailing List and Invitation Letter*. Discovery stakeholder coordination in this watershed was achieved by several methods, including individual phone calls with local stakeholders, as well as pre-Discovery webinars. The pre-Discovery webinars held in August and September 2013 provided information about the Discovery process and discussed the flood mapping, mitigation, and planning needs of communities within the Chautauqua-Conneaut Watershed. A record of meeting participants can be found in Appendix I: *Pre-Discovery Stakeholder Meetings* and a summary of the information collected can be found in Appendix J: *Kickoff Meeting Notes*.

Watershed stakeholders were encouraged to attend Discovery meetings to become engaged in the process. Discovery meetings were held on June 10, 2014 in Blasdell, New York for Erie and Genesee counties and on June 11, 2014 in Springville, New York for Wyoming County. All relevant flood-related information was reviewed during these meetings. The meetings also allowed participants to discuss the watershed's future, and learn about the importance of mitigation planning and community outreach.

As a result of the Chautauqua-Conneaut Discovery process, FEMA and NYSDEC, with the assistance of watershed stakeholders, identified needs (Table 26: *Summary of Community Floodplain Mapping Needs*) relating to specific flooding sources within the watershed. By obtaining a better understanding of existing local risk and mitigation actions already underway, FEMA was able to begin working with communities to identify new ways to take action to reduce flood risk and strengthen existing actions. During this project, multiple stakeholders noted a need for additional floodplain management and hazard mitigation training. Table 27 summarizes the training needs that were noted during Discovery. The Community Rating System (CRS) was also identified as a program that would benefit communities in the watershed. Training towards CRS objectives, and best practices about joining the program would serve to further flood risk mitigation within, and protection of the natural floodplain for watershed communities.

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- Attachment 2: *Floodplain Construction Requirements in New York State*, NYSDEC Information Sheet
- Attachment 3: *Levee Certification vs. Accreditation*, FEMA Fact Sheet
- Attachment 4: *LOMA-LOMR-F*, FEMA Fact Sheet
- Attachment 5: *Joining the CRS Program*, FEMA Fact Sheet
- Attachment 6: *Coordinated Needs Management Strategy (CNMS)*, FEMA Fact Sheet

Appendices

- Appendix A: *Acronyms and Abbreviations*
- Appendix B: *Glossary of Terms*
- Appendix C: *Other Stakeholders in the Chautauqua-Conneaut Watershed*
- Appendix D: *FEMA Hazus-MH Average Annualized Loss (AAL)*
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I. Lake Erie Watershed Discovery Project Overview

The Federal Emergency Management Agency (FEMA) Risk Mapping, Assessment, and Planning, or Risk MAP, program helps communities identify, assess, and reduce their flood risk. Through Risk MAP, FEMA provides information to enhance local hazard mitigation plans, improve community outreach, and increase local resilience to floods.

Discovery is the first phase of the Risk MAP process. Prior to Discovery, a watershed is selected based on risk, need, available topographic data, and other factors. The data that FEMA has readily available is gathered and prepared at the national and regional level. For a complete picture of a community's flood risk, FEMA relies heavily on information and data provided by the community itself.

Throughout the Risk MAP process, FEMA engages and partners with states, local communities, and stakeholders to communicate risk. One of the goals of Risk MAP is to build awareness and understanding of risk to empower communities to take action to reduce that risk.

During the Lake Erie Watershed Discovery project, FEMA, NYSDEC, and partners:

- Gathered information about local flood risk and flood hazards;
- Reviewed mitigation plans to understand local mitigation capabilities, hazard risk assessments, and current or future mitigation activities;
- Supported communities within the watershed to develop a vision for the watershed's future;
- Collected information from communities about their flooding history, effective Flood Insurance Rate Map (FIRM) usability, development plans, daily operations, and stormwater and floodplain management activities;
- Used all information gathered to determine which areas of the watershed might require revised mapping, risk assessment, or mitigation planning assistance through a Risk MAP project; and
- Developed Discovery Maps and a report that summarize and display the Discovery findings.

For definitions of terms and acronyms used throughout this Discovery report, refer to Appendix A: *Acronyms and Abbreviations* and Appendix B: *Glossary of Terms*.

Figure 1 provides an overview of the watersheds that have been included within the Lake Erie Discovery project. Three individual watershed Discovery reports have been concurrently developed and include six counties, one tribal community, and 81 individual communities. The Chautauqua-Conneaut Watershed is shown in red in Figure 1.

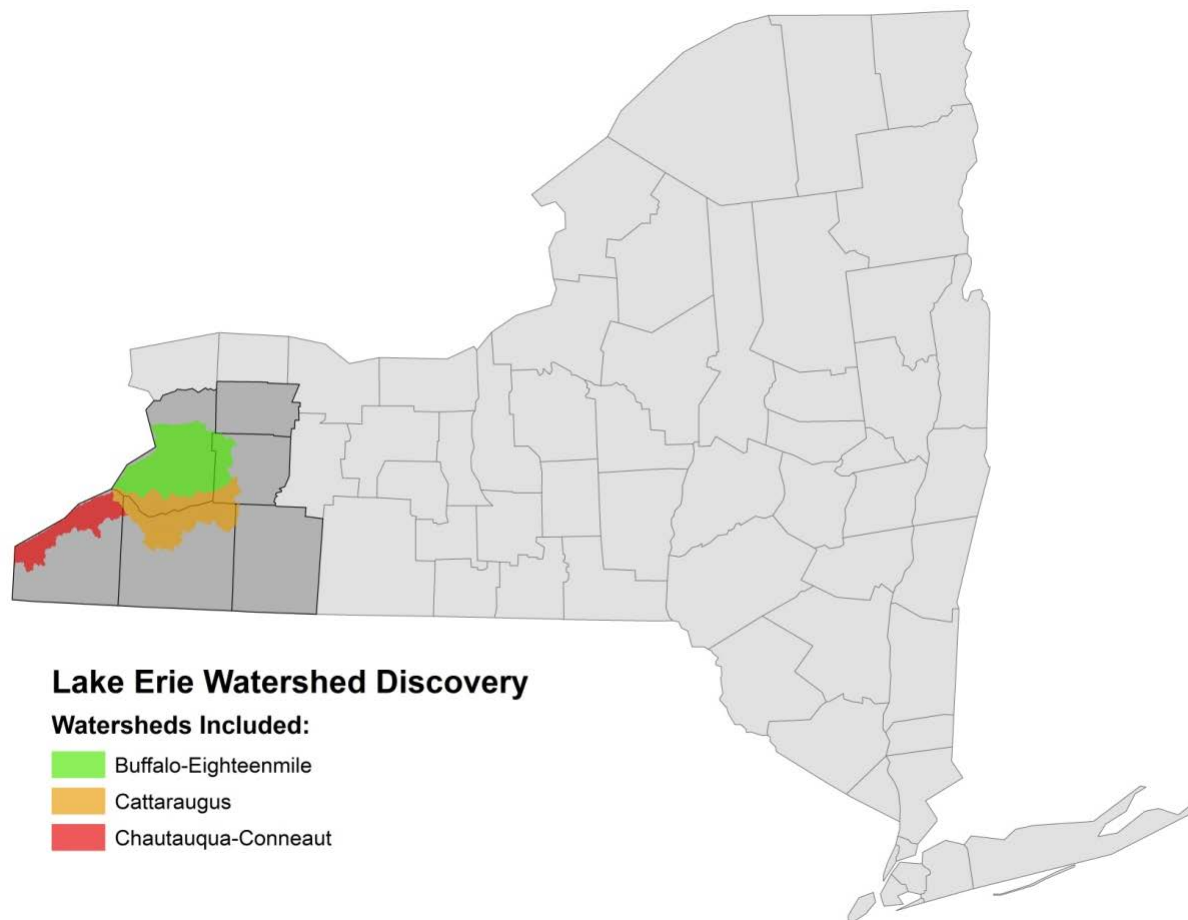


Figure 1: Lake Erie Watershed Discovery

Prior to the beginning of this Discovery project, FEMA had initiated a coastal analysis re-study for Lake Erie as part of a system-wide Great Lakes flood study. Additional details about that study are provided in the section below.

Great Lakes Coastal Flood Study

The current, effective FIRMs for the communities surrounding the Great Lakes are outdated in terms of age and the methodologies used in the coastal analysis used to produce them. There have been major changes in National Flood Insurance Program (NFIP) policies and updates to the FEMA guidelines and standards used to complete coastal flood studies since the effective date of many of the area's Flood Insurance Studies (FISs).

FEMA shows VE zones on FIRMs to designate areas that are at greater risk from high velocity wave action and/or wave runoff/overtopping. In such areas, significant damage to structures along the coastline can occur. These zones have been mapped nationwide in coastal regions bordering the Atlantic Ocean, Pacific Ocean and Gulf of Mexico, however to date, VE Zones have not been mapped along the Great Lakes shorelines. Because the types of major storm events that impact the Great Lakes region are different when compared to those that impact other U.S.

shorelines, an independent body was convened to evaluate whether VE Zones are appropriate in the Great Lakes. This study was completed in early 2015 and did conclude that VE Zones are appropriate along the Great Lakes shorelines.

FEMA initiated the Great Lakes Coastal Flood Study (GLCFS) to evaluate the surge and wave hazards, as well as evaluate the mapping needs. The goal of the GLCFS is to update the coastal flood hazard information for Great Lakes coastal communities and help elevate risk awareness and stimulate mitigation actions in the region. The GLCFS is funded through the FEMA Risk MAP program. FEMA, the Association of State Floodplain Managers, state partners, and FEMA contractors will collaborate in updating the coastal methodology and flood maps, as needed.

The Great Lakes is a hydraulic system best studied as an integrated system where related information is included in each separate lake study. As a result, the study will include a system-wide solution that provides a comprehensive analysis of past storm events. As part of the study, a revised coastal flood hazard analysis including a comprehensive storm surge study and overland wave analysis will be completed and coastal hazard work maps will be produced. The results of the study, along with the needs of the communities as identified during the Discovery process, will determine whether updated FIRMs will be produced as part of the GLCFS.

Stakeholder Coordination

To begin this effort, [NYSDEC](#)'s Floodplain Management Section along with Risk Assessment, Mapping, and Planning Partners [a joint venture between Dewberry, URS (now AECOM) and ESP] (RAMPP) compiled an extensive list of contact information for community officials within the watershed.

In an effort to gather as much feedback from as many public officials and jurisdictions as possible, local officials from individual communities and the counties were invited to online WebExTM-based discussions. The purpose of these WebExTM sessions was to introduce the planning team, request feedback from the municipalities, counties, and regional groups within the project area, determine what additional local floodplain and hazard risk data were available, and determine whom to include in the Discovery process. To further expand on this discussion, participants were asked to complete and return community data worksheets to supplement the discussion.

This initial contact was followed by in-person Discovery meetings held in the afternoon on June 10, 2014 in Dunkirk, New York for Chautauqua County, and on June 11, 2014 in Springville, New York for Cattaraugus County. All relevant flood-related information was reviewed during these meetings. The meetings also allowed participants to discuss the watershed's future, and learn about the importance of mitigation planning and community outreach. Detailed information about the Discovery meetings is provided in Section IV of this report.

Other Stakeholders

In addition to municipal officials, planning and emergency agencies, and local residents, there are others stakeholders with an interest in floodplain mapping and management. Major landowners, large employers, academic institutions, environmental, and sporting organizations all have a role to play. These entities have valuable information to provide when developing both pre-mapping data and final mapping products.

An attempt to identify all relevant stakeholders in the watershed was made. The resulting list is shown in Appendix C: *Other Stakeholders in the Chautauqua-Conneaut Watershed*.

Communication

Throughout this Discovery process, community representatives and local stakeholders indicated the need to be kept informed about the results of Discovery, the GLCFS, and opportunities for public input throughout the study process. As a result of communication during the Discovery process, several new stakeholders have been identified and added to the master contact database for this study.

II. Chautauqua-Conneaut Watershed Overview

Geography

The Chautauqua-Conneaut Watershed spans three states, New York, Pennsylvania, and Ohio, and has a total land area of 5,070 square miles. It contains 8,896 miles of freshwater rivers and streams and 76 significant freshwater lakes, ponds, and reservoirs.

The Chautauqua-Conneaut Watershed is one of the largest in New York State and includes the drainages of the Chautauqua-Conneaut, Oneida, Seneca, and Clyde Rivers. Its headwaters originate in the southwestern Adirondack Mountains in the east and along the northern edge of the Appalachian Plateau, and flow across the central lowlands before emptying into Lake Erie. As shown in Figure 2: *Chautauqua-Conneaut Watershed Communities*, the watershed is made up of a small portion of Cattaraugus County and areas of Chautauqua County bordering Lake Erie.

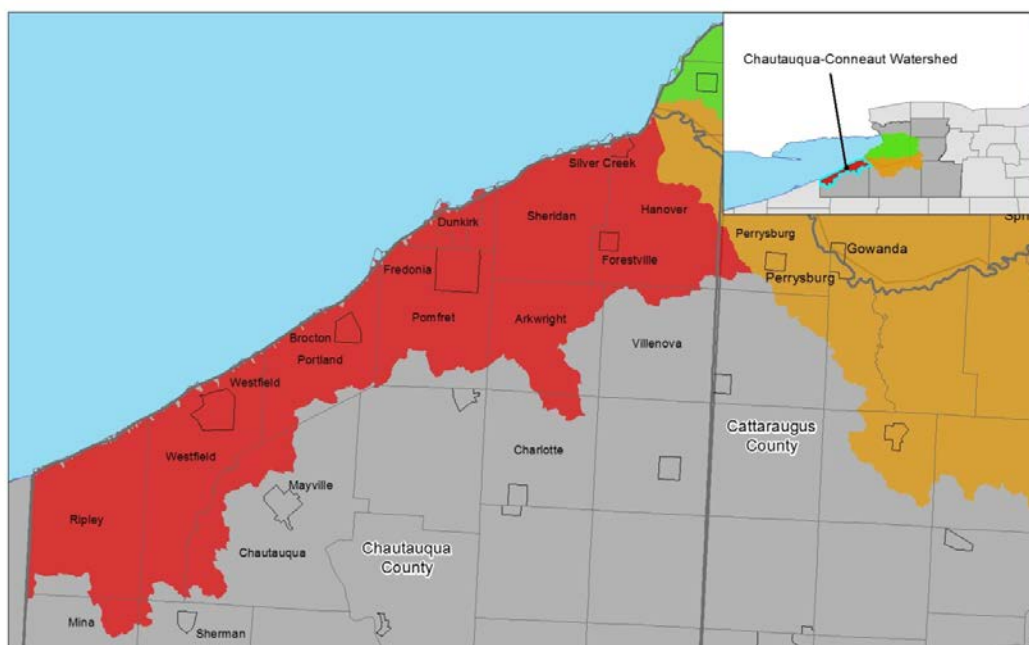


Figure 2: Chautauqua-Conneaut Watershed Communities

Property Ownership

Land ownership in the watershed is diverse. Cattaraugus County is in the southwestern part of New York State, immediately north of Pennsylvania. Southern parts of Cattaraugus County are the only areas of Western New York not covered by ice age glaciations. The northern border of the County is formed by Cattaraugus Creek. According to the U.S. Census Bureau, the county has a total area of 1,322 square miles, of which 1,310 square miles is land and 12 square miles is water. According to the U.S. Department of Agriculture (USDA) 2007 Census of Agriculture, there are approximately 1,122 farms throughout Cattaraugus County consisting of 183,439 acres of farmland.

Chautauqua County is located in the southwestern corner of New York. Chautauqua Lake is located in the center of the County, and Lake Erie forms part of its northern border. According to the U.S. Census Bureau, the County has a total area of 1,500 square miles of which 1,062 square miles is land and 438 square miles is water. According to the USDA 2007 Census of Agriculture, there are approximately 1,658 farms throughout Chautauqua County consisting of 235,858 acres of farmland.

More information on property ownership can be found on each county's Real Property website as noted in Table 1.

Table 1: Links to County Real Property Websites

County	Hyperlink to Real Property Website
Cattaraugus	http://www.cattco.org/real-property-and-gis
Chautauqua	http://chautauqua.ny.us/349/Real-Property-Tax

Demographics

The Chautauqua-Conneaut Watershed covers parts of 21 cities, towns, and villages, 16 of which are included in this Discovery Report. Cattaraugus County is part of the Jamestown-Dunkirk-Fredonia Metropolitan Statistical Area. Chautauqua County is part of the Olean Metropolitan Statistical Area. The distribution of population by county in the watershed can be seen in Table 2: *Approximate 2010 Population in the Chautauqua-Conneaut Watershed*.

During the in-person Discovery meetings, several communities noted current and future areas of population growth and development pressures near flooding sources. Specific details, where available, are included in Table 24: *Summary of Community Floodplain Mapping Needs*.

Table 2: Approximate 2010 Population in the Chautauqua-Conneaut Watershed

County	Total County Population (2010 data)	Percent of County Population in Chautauqua-Conneaut Watershed	2010 Estimated Population in the Chautauqua-Conneaut Watershed (Based on % in watershed * Total Population)	Square Miles in Chautauqua-Conneaut Watershed
Cattaraugus	80,317	0.2%	161	2.79
Chautauqua	134,905	36.7%	49,555	303.03

Table 2: Approximate 2010 Population in the Chautauqua-Conneaut Watershed

County	Total County Population (2010 data)	Percent of County Population in Chautauqua-Conneaut Watershed	2010 Estimated Population in the Chautauqua-Conneaut Watershed (Based on % in watershed * Total Population)	Square Miles in Chautauqua-Conneaut Watershed
TOTAL	215,222	23%	49,716	305.82

Land Use

A comprehensive plan is a land-use document providing framework and policy direction for land-use decisions. Comprehensive plans usually include chapters detailing policy direction affecting land use, transportation, housing capital facilities, utilities, and rural areas. Comprehensive plans identify where and how growth needs will be met. For the sake of floodplain management and hazard mitigation, a comprehensive land-use plan can be a powerful tool to guide the community to increased resilience.

While many of the communities in the watershed do not have comprehensive land-use plans, links to the county plans that have been developed are compiled in Table 3: *Links to County Land Use*.

Table 3: Links to County Land Use

County Name	Hyperlink to Land Use Webpage
Cattaraugus	http://www.cattco.org/planning
Chautauqua	http://www.planningchautauqua.com/index.html

Table 4: *U.S. Census 2010 and USDA Census of Agriculture 2007* summarizes the total population and land area based on the 2010 U.S. Census, and the number of farms and acres of farmland based on the USDA 2007 Census of Agriculture.

Table 4: U.S. Census 2010 and USDA Census of Agriculture 2007

County	Population	Land Area (Square Miles)	Farm Land (Acres)
Cattaraugus	80,317	1,310	183,439
Chautauqua	134,905	1,062	235,858

As was noted during the in-person Discovery meetings, growth in the watershed remains subdued for most communities. Construction of new homes and commercial properties continues at a slow pace and largely is in the form of the incremental conversion of summer cottages to year-round residences, and piecemeal, limited-scale housing developments. Despite the slow growth, continued vigilance must be maintained so that as development occurs, sound building practices are in place to protect lives and property within the watershed. Community specific information

provided during these meetings has been summarized in Table 25: *Summary of Community Floodplain Mapping* and Table 26: *Summary of Community Floodplain Mapping Needs*.

NFIP Floodplain Development Criteria

The FIRM, which participating communities must officially adopt as part of their floodplain management ordinance, identifies the Special Flood Hazard Areas (SFHAs) in the community. The SFHA represent the areas that will be inundated by a flood event having a 1-percent annual chance of being equaled or exceeded in any given year. The 1 percent-annual-chance flood is also referred to as the base flood or 100-year flood.

Development may take place within the SFHA provided that the development complies with local floodplain management ordinances, which must meet the minimum federal requirements. Communities participating in the NFIP must adopt legally enforceable floodplain management measures that are compliant with 44 CFR §60.3 of the NFIP regulations. Requirements in 44 CFR §60.3 are based on the level of mapping that FEMA has provided to the community, that is, whether FEMA has designated SFHAs, BFEs, a regulatory floodway, and/or coastal high hazards on the community's FIRM. The regulatory floodway is the area identified on a FIRM that represents the portion of the floodplain that carries the majority of the flood flow and often is associated with high velocity flows and debris impact.

When issuing building permits for upgrades to homes located in the SFHA, it is important that local building and code officers understand the NFIP and state building requirements including the substantial improvement clause. "Substantial improvement" means any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the "start of construction." Comprehensive guidance on building or rebuilding in an SFHA can be found in FEMA's *Substantial Improvement/Substantial Damage Desk Reference*. A summary of this publication and a link to where the publication can be found online is provided as Attachment 1 of this report.

The prevalence of smaller developments (often as small as two building sites) planned across the watershed may be a challenge to effective floodplain management, as these micro-developments can easily slip through regulatory cracks. Local officials need to be aware that minimum New York State building codes and NFIP building standards must be met for construction in the SFHA. The NFIP also has additional regulations for projects within the approximate A Zone involving 50 lots or 5 acres, whichever is smaller (44 CFR §60.3(b)(3)). Information on the NFIP's building requirements in the SFHA can be found in the NYSDEC's report *Floodplain Construction Requirements in New York State*. A copy of this brochure can be found [online](#) or as Attachment 2 in the digital version of this report.

Municipal Separate Storm Sewer Systems (MS4s)

As noted on NYSDEC's website, Federal Stormwater Phase II regulations require permits for stormwater discharges from Municipal Separate Storm Sewer Systems (MS4s) in urban areas, and for construction activities that disturb one or more acres of land. To implement the law, NYSDEC has developed two general permits, one for MS4s in urbanized areas and one for construction activities. The permits are part of the State Pollutant Discharge Elimination System (SPDES). Operators of regulated MS4s and operators of construction activities must obtain

permit coverage under either an individual SPDES permit or one of the general permits prior to commencement of construction.

Guidance for local officials on complying with state and federal stormwater management requirements, Minimum Measures 4 and 5 can be found on [NYSDEC's website](#). Detailed maps that depict where the regulated MS4 boundaries lie can be found on the [NYSDEC's website](#).

No MS4 permits had been issued in the Chautauqua-Conneaut Watershed area as of the date of data collection for the Chautauqua-Conneaut Watershed in August 2014.

III. Summary of Data Analysis

A large collection of tabular and spatial data was compiled for all communities from federal, state, and local sources. Community specific information was collected through pre-Discovery interactive mapping webinars with stakeholders and during the in-person Discovery meetings. This section is divided into three parts: data that can be used to develop Risk MAP flood risk products, flood risk and mapping data, and other information that helped the study team to better understand the study area. Table 5: *Data Collected for the Chautauqua-Conneaut Watershed*, lists the data products and the respective sources.

Table 5: Data Collected for the Chautauqua-Conneaut Watershed

Data Types	Source
Average Annualized Loss (AAL) Data	Census 2010 and Hazus
Boundaries: Community	FEMA, NYSDEC
Boundaries: County and State	FEMA, NYSDEC
Boundaries: Watersheds	USGS, NYSDEC
Census Blocks	U.S. Census Bureau
Coastal Barrier Resource System (CBRS)	U.S. Fish and Wildlife Service
Contacts	Local websites, State/FEMA updates, NYSDEC
Community Assistance Visits	Community Information System
Community Rating System	FEMA's "Community Rating System Communities and Their Classes"
Coordinated Needs Management Strategy	FEMA
Critical Facilities vulnerable to Flooding	Local Mitigation Plans
Dams and/or Levees	USACE, NYSDEC
Declared Disasters	FEMA's "Disaster Declarations Summary"
Demographics, Industry	U.S. Census Bureau, Hazard Mitigation Plans
Effective Floodplains: Modernized SFHAs	FEMA's Mapping Service Center and Mapping Information Platform
Coastal Gage Data	USGS, NOAA CO-OPS
Hazards Mitigation Plans and Status	NYSDEC

Data that can be used for Flood Risk Products

During the Discovery process, a database of available flood hazard and flood risk assessment data was created. This database is an inventory of available data and helps identify flood hazard data gaps. State, county, and other government Geographic Information System (GIS) websites are a good place to start the data search, however local knowledge of flooding and mitigation projects

is critical to accurately determine flood risks and mapping needs. Therefore, locally and regionally developed data were used where available.

Average Annualized Loss Data (AAL)

The AAL data provides a general understanding of the dollar losses associated with a certain flood event frequency within a county and are used to obtain a relative comparison of flood risk. This data is determined by using FEMA's Multi-Hazard Risk Assessment and Loss Estimation Program, otherwise known as Hazus-MH. The current Hazus-MH analysis is based on approximate flood boundaries and national datasets.

The Hazus Flood Model analyzes both riverine and coastal flood hazards. Flood hazard is defined by a relationship between depth of flooding and the annual chance of inundation to that depth. Probabilistic events are modeled by looking at the damage caused by an event that is likely to occur over a given period of time, known as a return period or recurrence interval (10, 25, 50, 100, and 500-year). Annualized losses are the summation of losses over all return periods multiplied by the probability of occurrence. Loss estimation for this Hazus module is based on specific input data. The first type of data includes square footage of buildings for specified building types. The second type of data includes information on the local economy that is used in estimating losses.

The countywide results for the Chautauqua-Conneaut Watershed were obtained from the report called FEMA Hazus AAL Usability Analysis and are shown in Table 6: *2010 Hazus-MH AAL Data*. AAL data summarized at the census block level are shown on Discovery Maps. AAL data is also available in Appendix D: *FEMA Hazus-MH Average Annualized Loss (AAL)*.

Total losses for the communities included in the Chautauqua-Conneaut Watershed are estimated at over \$64.6 million for AAL. The Lake Erie shoreline represents the majority of losses for the Chautauqua-Conneaut Watershed. AAL exposure in the Village of Silver Creek includes Silver Creek and Walnut Creek. The Village of Fredonia AAL exposure is along Canadaway Creek, specifically between West Main Street and Water Street.

Table 6: 2010 Hazus-MH AAL Data (in Thousands of Dollars)

County	Community	Building Loss (in thousands of dollars)	Contents Loss (in thousands of dollars)	Total Loss (in thousands of dollars)*
Cattaraugus	Perrysburg, Town of	No Loss Estimate Provided		
	Arkwright, Town of	\$33	\$42	\$75
	Brocton, Village of	\$1,653	\$1,695	\$3,348
	Chautauqua, Town of	\$74	\$47	\$121
	Dunkirk, City of	\$948	\$1,813	\$2,761
	Dunkirk, Town of	\$283	\$313	\$596
	Forestville, Village of	\$754	\$683	\$1,437
	Fredonia, Village of	\$4,710	\$4,125	\$8,835
	Hanover, Town of	\$6,436	\$7,025	\$13,461

Table 6: 2010 Hazus-MH AAL Data (in Thousands of Dollars)

County	Community	Building Loss (in thousands of dollars)	Contents Loss (in thousands of dollars)	Total Loss (in thousands of dollars)*
Chautauqua (Cont'd)	Pomfret, Town of	\$7,272	\$7,804	\$15,076
	Portland, Town of	\$732	\$831	\$1,563
	Ripley, Town of	\$201	\$163	\$364
	Sheridan, Town of	\$92	\$58	\$150
	Silver Creek, Village of	\$3,562	\$6,518	\$10,080
	Westfield, Town of	\$1,217	\$1,085	\$2,302
	Westfield, Village of	\$1,529	\$2,923	\$4,452
Total:		\$29,496	\$35,125	\$64,621

Source: FEMA HAZUS AAL Usability Analysis 2010

* Total Loss include business disruption losses where applicable

Gage Data

Stream Gages

According to the U.S. Geological Survey (USGS), most USGS stream gages operate by measuring the elevation of the water in the river or stream and then converting the water elevation (called “stage”) to a stream flow (“discharge”) by using a curve that relates the elevation to a set of actual discharge measurements. For more information on stream gages, please see the [USGS website](#).

There are no known gages in the Chautauqua-Conneaut Watershed.

Rain Gages

The National Oceanic and Atmospheric Administration’s (NOAA) [Cooperative Observer Program](#) is a weather and climate observing network of more than 8,700 volunteers who take observations nationwide on farms, in urban and suburban areas, National Parks, seashores, and mountaintops. Within the two counties of the Chautauqua-Conneaut Watershed, there are no locations currently active.

Additional information on rainfall in New York can be found in NOAA [Technical Paper No. 49](#) and in the Technical Memorandum [NWS HYDRO-35](#), both on NOAA’s website. Additional technical manuals and web-based tools including regional extreme rainfall maps and graphics are also available on the NRCS’ [Extreme Precipitation in New York and New England](#) website.

Water Level Observations Network

The NOAA National Ocean Service is responsible for recording and disseminating water level data. The [National Data Buoy Center \(NDBC\)](#) is part of the NOAA National Weather Service (NWS). NDBC designs, develops, operates, and maintains a United States network of data collecting buoys and coastal stations. NOAA Stations provides hourly data, including wind

speed, direction, and gust; atmospheric pressure; and air temperature. No stations within the Great Lakes provide tidal information, as the tidal range is minimal. Table 7: *NOAA Stations* provides the location of NOAA gages in the Chautauqua-Conneaut Watershed.

Table 7: NOAA Stations

County	Gage Location
Chautauqua	DBLN6 City of Dunkirk 42.493N 79.353W
Chautauqua	BARN6 Village of Westfield 42.345N 79.595W

Levees and Dams

Levees

A levee or floodwall is defined in 44 CFR §59.1 as “a man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding.” Levee certification and/or accreditation information can be found in Attachment 3: *Levee Certification vs. Accreditation*.

A review of current and preliminary FIRMs finds that there are no identified levees in the study area.

Dams

According to the [NYSDEC’s Dam Safety Section](#)’s dam inventory, the Chautauqua-Conneaut Watershed contains 45 dam structures. The NYSDEC uses a classification scale of A-D and 0 (zero) to assign hazard potential to each of the dam structures contained within the inventory. The NYSDEC classifications of dams within the state are as follows:

Class A-Low Hazard Potential: Resulting damages from a dam failure would likely be minimal and not interfere with any critical infrastructure; personal injury and substantial economic loss is unlikely to occur.

Class B-Intermediate Hazard Potential: A dam failure may result in damage to isolated homes, roads and railways; critical facilities may experience disruption; personal injury or substantial economic loss is likely, but loss of human life is not expected.

Class C-High Hazard Potential: Dam failure may result in widespread or serious damage to homes; damage to roads, railroads, commercial buildings and critical infrastructure is expected; loss of human life and substantial economic loss is expected.

Class D-Negligible or No Hazard Potential: Dam has been breached, removed or otherwise has failed or no longer materially impounds waters, or the dam was planned, but never

constructed at this location. Class D dams are considered to be defunct dams posing negligible or no hazard.

Class 0-Unclassified Hazard Potential: Hazard code has not yet been assigned.

The locations of dams in the watershed are shown in Figure 3: *Dams in Chautauqua-Conneaut Watershed*.

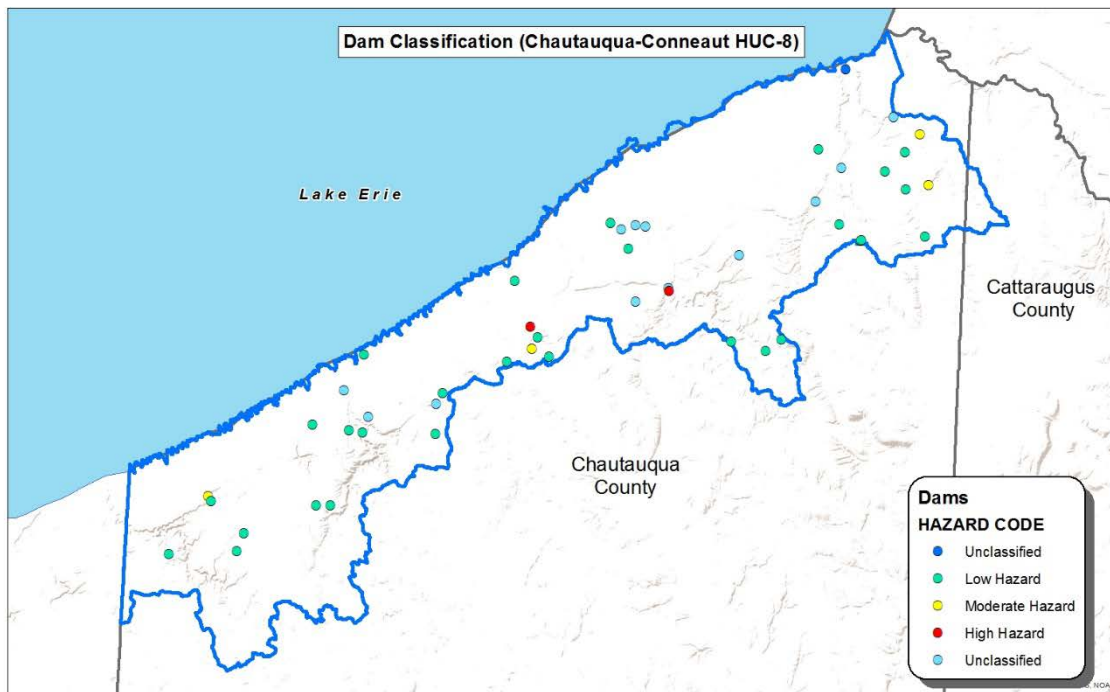


Figure 3: Dams in Chautauqua-Conneaut Watershed.

Table 8: *Dams in the Chautauqua-Conneaut Watershed* shows the classification of dams located in the Chautauqua-Conneaut Watershed. According to NYSDEC’s Dam Safety Section’s dam files, many of the Class B and C dams have reports and studies available. There are 12 Class D dams within the study area. Class D structures are considered to have no hazard potential. A summary of this information is available in Appendix E: *Dams and Floodplain Structures*. Information includes inspection and certification dates, site plans, analysis (Hydrologic and Hydraulic), As-Built drawings, Emergency Action Plans, applications and permits for maintenance, and correspondence related to each dam.

Table 8: Dams in the Chautauqua-Conneaut Watershed

County	Class A	Class B	Class C	Class D	Unclassified	Total
Cattaraugus	0	0	0	0	0	0
Chautauqua	27	4	2	12	0	45
Total	27	4	2	12	0	45

Streamlines/Hydrograph

Streamlines, when available, were obtained from the effective FIRM databases issued for the communities. Streamlines are paths made over a period of time that are in line with the direction of velocity and flow of water. By definition, a hydrograph is a plot of the rate of flow (discharge) versus time past a specific point in a river or channel. Discharge is the volume of water flowing past a location per unit time (usually in cubic feet per second [cfs]). These components are important to understand the location and severity of floods, forecasting floods, and enabling communities to plan, mitigate, and prevent loss of life and property. For more information, visit the [NOAA website](#).

Topography

Topography is the description of surface features including elevation information. Topographic information can be generated in the form of Light Detection and Ranging (LiDAR) data. LiDAR is a state of the art method for collecting accurate topographic information using an instrument that measures distance to an object by emitting pulses of light via a laser. LiDAR elevation data are only available for the Lake Erie shoreline of Chautauqua County. More information on LiDAR data coverage for the State of New York is available at the [GIS.NY.Gov](#) website.

Sources of available LiDAR are the 2011 USACE Joint Airborne LiDAR Bathymetry Technical Center of Expertise (JALBTCX) and 2008 FEMA New York LiDAR. The 2011 USACE topographic dataset has a 2-meter point spacing with a 0.75-meter root-mean-square-error horizontal accuracy and a 20-centimeter root-mean-square-error vertical accuracy, and the 2008 FEMA LiDAR dataset has a 1.4-meter point spacing with a 1-meter root-mean-square-error horizontal accuracy and an 18.5-centimeter root-mean-square-error vertical accuracy.

Bathymetry

[Bathymetry](#) is the underwater equivalent to topography. The data used to make bathymetric maps today typically comes from an echo sounder (sonar) mounted beneath or over the side of a boat, "pinging" a beam of sound downward at the seafloor, or from remote sensing systems. The bathymetry is combined into a seamless Digital Elevation Model (DEM)/terrain and is used to determine the offshore component for the overland wave analysis/coastal hazard analysis and is also a necessary component to study storm surge.

Bathymetric data were compiled from multiple sources to provide complete coverage of the study area. The data sources used to create the bathymetric portion of the terrain are 2011 USACE JALBTCX, 2007 USACE JALBTCX, 1999 U.S. Geological Survey (USGS) National Elevation Dataset (NED) 1/3 arc-second ArcGrid, 1940 and 1980 National Oceanic and Atmospheric Administration (NOAA) National Ocean Service (NOS) Hydrographic Survey Data.

Shoreline Change Information

The study area has approximately 38 miles of shoreline along Lake Erie contained within Chautauqua County. Portions of the shoreline may be vulnerable to coastal erosion through natural actions (runoff of surface water or groundwater seepage) and human intervention. Erosion is the loss of land near the coastline from exposure to water movement from wave action, currents, tides, wind driven water, ice, or other storm impacts. The coastline of Lake Erie is at

risk to coastal erosion from natural and human activities and is regulated. These areas are currently mapped as [coastal erosion hazard areas](#) (CEHAs) and require a CEHA permit (Article 34 Part 505) for any regulated activity.

Coastal Barrier Resources System

The Coastal Barrier Resources Act (CBRA) of 1982 and (subsequent amendments) established the John H. Chafee Coastal Barrier Resources System (CBRS). The CBRS consists of undeveloped coastal barriers located along the Atlantic, Gulf of Mexico, Great Lakes, U.S. Virgin Islands, and Puerto Rico coasts. CBRS areas are generally depositional geologic features that are subject to wave, tidal, and wind energies; protect landward aquatic habitats from direct wave attack; and contain associated aquatic habitats, including adjacent wetlands, marshes, estuaries, inlets, and near shore waters. The law encourages the conservation of vulnerable, biologically rich coastal barriers by restricting federal expenditures that encourage development, such as federal flood insurance. CBRS areas are identified and depicted on a series of official maps entitled “John H. Chafee Coastal Barrier Resources System.” These maps are controlling and form the basis of CBRS boundaries shown on FEMA FIRMs. The CBRS maps are maintained by the Department of the Interior through the U.S. Fish and Wildlife Service. Aside from three minor exceptions, only Congress has the authority to add or delete land from the CBRS and create new units. These exceptions include: (1) voluntary additions to the CBRS by property owners; (2) additions of excess federal property to the CBRS; and (3) the CBRA 5-year review requirement that solely considers changes that have occurred to System units by natural forces such as erosion and accretion. <http://www.fws.gov/cbra/index.html>

The CBRS contain two types of units, System units (e.g., NY-11) and Otherwise Protected Areas (OPAs). OPAs are denoted with a “P” at the end of the unit number (e.g., NY-11P). An interactive CBRS Mapper is available to the public to help property owners, and the local, state and federal stakeholders to determine sites affected by CBRA at [CBRS Mapper](#).

There are no CBRS or OPAs located within the Chautauqua-Conneaut Watershed.

Coastal Zone Protection Structures

The USACE Enterprise Coastal Inventory Database houses information on over 900 coastal structures as well as associated inlet data across the United States. The coastal structures protect harbors and shore-based infrastructure, provide shoreline stability control, and protect coastal communities, roadways, and bridges. Coastal structures include seawalls, groins, bulkheads, revetments, dikes, levees, breakwaters, jetties, and piers. Due to the variability of long-term lake water levels from year to year, coastal structures designed and constructed during one particular lake level may not afford the same level of risk protection when lake levels either increase or decrease. Coastal structures should be evaluated for a range of lake water levels. The coastal structure data for the Chautauqua-Conneaut Watershed were provided by the USACE, Buffalo District. These data have been added to the Discovery Map.

Watershed Boundaries

As described by the USGS, the “United States is divided and sub-divided into successively smaller hydrologic units which are classified into four levels: regions, sub-regions, accounting units, and cataloging units. The hydrologic units are arranged within each other, from the smallest (cataloging units) to the largest (regions). Each hydrologic unit is identified by a unique hydrologic unit code (HUC) consisting of two to eight digits based on the four levels of classification in the hydrologic unit system.”

The Chautauqua-Conneaut Watershed is a HUC8 watershed. Figure 4 shows the boundaries of the portion of the Chautauqua-Conneaut Watershed in the State of New York. The first two digits of the HUC are the code for the Regional Boundary (e.g., 04, for the Great Lakes Region). The next two digits of the HUC are the code for the Subregional boundary (e.g., 0412, Eastern Lake Erie). The next two digits are the code for the Accounting Unit (e.g., 041201, Chautauqua-Conneaut Basin, New York). The next two digits of the HUC are the Cataloging Unit (e.g., 04120101, Chautauqua-Conneaut). Table 9: *Chautauqua-Conneaut Watershed* has the HUC-8 code and the name for the watershed.

Table 9: Chautauqua-Conneaut Watershed

HUC 8 Code	Name
04120101	Chautauqua-Conneaut

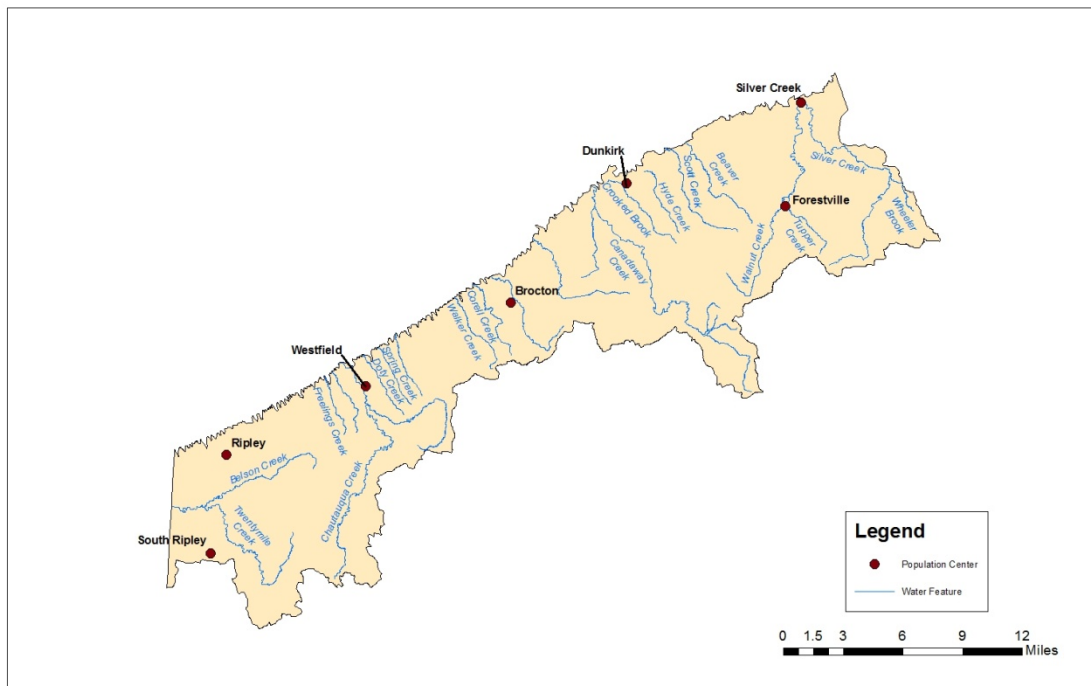


Figure 4: New York portion of Chautauqua-Conneaut Watershed

Jurisdictional Boundaries

Jurisdictional boundaries were obtained from NYSDEC and are also available through the [New York State GIS Clearinghouse](#). During the Discovery meetings, officials reviewed their jurisdictional boundaries as presented on the work maps. No communities noted discrepancies with the jurisdictional boundaries presented.

Transportation

Transportation features include roads, rail, and air. Transportation features are critical for community planning related to risk assessments for evacuation routes and potential flooding issues that could occur. Transportation features were obtained from FIRM databases where applicable and supplemented with data from communities and the [New York State GIS Clearinghouse](#).

Flood Risk and Mapping Data

FEMA FIRMs, Letters of Map Change (LOMCs), historical flooding information, and FEMA's Coordinated Needs Management Strategy (CNMS) database can all provide important information about flooding problems and hot spots within communities and where mitigation and risk communication efforts would be most beneficial. This information was reviewed as part of the Lake Erie Chautauqua-Conneaut Watershed Discovery process and is summarized in the sections below.

Regulatory Mapping

The Chautauqua-Conneaut Watershed covers portions of two counties in New York, Cattaraugus and Chautauqua. The mapping in place is made up of all older FIRMs. Countywide digital FIRMs have yet to be produced for either Cattaraugus or Chautauqua counties.

The effective FIS/FIRM for each of the participating communities is shown in Table 10: *FIS/FIRM Effective Dates*.

Table 10: FIS/FIRM Effective Dates (as of August 2014)

Coastal	County	Community	FIS/FIRM Effective Date	Notes
No	Cattaraugus	Perrysburg, Town of	4/20/1984	Community-based FIS
Yes	Chautauqua	Dunkirk, City of	2/4/1981	Community-based FIRMs ranging from 1971-1984.
		Dunkirk, Town of	8/6/1982	
		Hanover, Town of	9/17/1971	
		Pomfret, Town of	12/18/1984	
		Portland, Town of	3/11/1983	
		Ripley, Town of	N/A*	
		Sheridan, Town of	10/7/1983	
		Silver Creek, Village of	8/1/1983	
		Westfield, Town of	6/8/1984	

Coastal	County	Community	FIS/FIRM Effective Date	Notes
No	Chautauqua	Arkwright, Town of	4/8/1983	
		Brocton, Village of	N/A*	
		Chautauqua, Town of	6/15/1984	
		Forestville, Village of	3/18/1983	
		Fredonia, Village of	7/16/1984	
		Westfield, Village of	10/7/1983	

*No published FIS or FIRM for community.

Letters of Map Change (LOMC)

Due to limitations in the scale or topographic detail of the source maps used to prepare a FIRM, on occasion, small areas of elevated land may be included in an SFHA. When a property owner feels that this has occurred, they may request a LOMC for their property or structure.

A LOMC is the general term for a suite of methods FEMA uses to make an official flood hazard determination for a structure or property. The Letter of Map Amendment (LOMA), for properties on natural high ground and the Letter of Map Revision based on Fill (LOMR-F), for properties elevated by the placement of fill, are the most common ways used by property owners to amend the effective FIRM. These methods do not physically change the FIRM for a community; rather they amend, *by letter*, the FIRM and do not result in the publication of a revised FIRM panel. By comparison, a Letter of Map Revision (LOMR) is commonly used by community officials to request FIRM revisions stemming from completed development, flood-control projects, or other larger-scale changes. LOMRs physically revise a portion of a FIRM panel or panels and/or the Flood Insurance Study (FIS) report.

Table 11: *LOMCs in the Project Area* and Figure 5 highlight the areas within the Chautauqua-Conneaut Watershed that have LOMCs. There are 9 LOMAs/LOMR-F and no LOMRs located in the Chautauqua-Conneaut Watershed.

More information on the LOMA and LOMR-F processes can be found on [FEMA's LOMC website](#) or by reviewing Attachment 4 - *LOMA-LOMR-F Fact Sheet*, included with the digital copy of this Discovery Report.

Table 11: LOMCs in Project Area (as of August 2014)

County	Community	Number of LOMA/LOMR-Fs	Number of LOMRs	Effective Date
Cattaraugus	Perrysburg, Town of	0	0	4/20/1984
Chautauqua	Arkwright, Town of	0	0	4/8/1983
	Brocton, Village of	0	0	N/A*
	Chautauqua, Town of	0	0	6/15/1984
	Dunkirk, City of	1	0	2/4/1981
	Dunkirk, Town of	0	0	8/6/1982
	Forestville, Village of	0	0	3/18/1983

County	Community	Number of LOMA/ LOMR-Fs	Number of LOMRs	Effective Date
Chautauqua (Cont'd)	Fredonia, Village of	0	0	7/16/1984
	Hanover, Town of	2	0	9/17/1971
	Pomfret, Town of	0	0	12/18/1984
	Portland, Town of	2	0	3/11/1983
	Ripley, Town of	0	0	N/A*
	Sheridan, Town of	0	0	10/7/1983
	Silver Creek, Village of	0	0	8/1/1983
	Westfield, Town of	4	0	6/8/1984
	Westfield, Village of	0	0	10/7/1983

*No published FIS or FIRM for community.

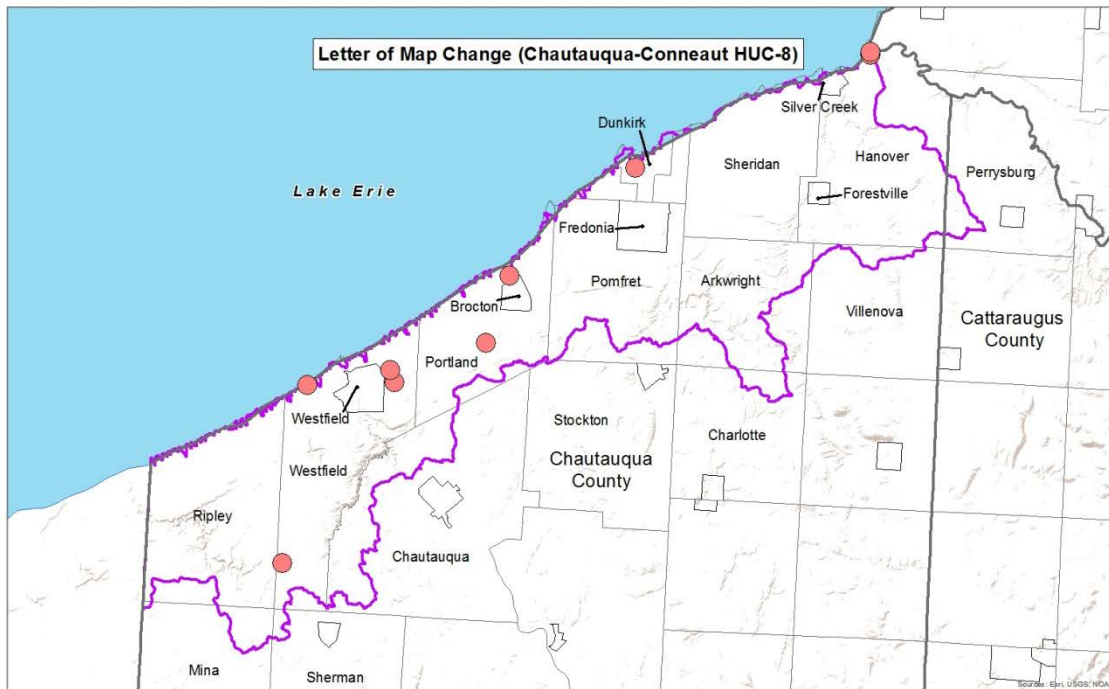


Figure 5: Location of LOMCs in the Chautauqua-Conneaut Watershed

Historical Flooding

Throughout the recorded history of the Chautauqua-Conneaut Watershed, flooding has been a constant threat. The Allegheny Mountains lie partially in the Chautauqua-Conneaut Watershed, and their heights often act as a sponge, squeezing out copious amounts of rain and snow from storm systems flowing up from the middle of the United States. Floods in the early summer months are often associated with tropical storms moving north along the Atlantic coast. During the winter, flooding is a threat when ice jams impede the free flow of streams.

Flooding usually occurs in the late winter and early spring, when the ground is still frozen and snowmelt adds to heavy rainfall to produce increased runoff. Table 12: *FIS Historical Flooding Areas* summarizes the historical flooding noted in each community's FIS report.

Table 12: FIS Historical Flooding Areas

County	Community	Areas of Concern
Cattaraugus	Perrysburg, Town of	N/A
	Brocton, Village of	N/A
	Chautauqua, Town of	Principal flooding sources are Chautauqua Lake and Big Inlet. Streams that flood frequently are located in rural areas with little development.
	Dunkirk, City of	Flooding in the city occurs mostly along Crooked Brook, which is downstream of the confluence of the Tributary of Crooked Brook. Flooding problems exist along the Lake Erie shoreline and along the Tributary of Crooked Brook in the vicinity of Greco Lane and Central Avenue.
	Dunkirk, Town of	N/A
	Forestville, Village of	N/A
	Fredonia, Village of	Canadaway Creek has an extensive history of flood problems. Flooding is frequently aggravated by ice jams or blockage from debris.
	Hanover, Town of	Flooding occurs almost annually along Lake Erie. Most of the floods are caused by wave run-up during periods of high water levels in the lake, usually in the later winter or early spring. Cattaraugus Creek has a long history of damaging floods often caused by ice jams near the mouth. Many major floods are also caused by sand bars that form across the mouth of the creek.
	Pomfret, Town of	Most floods are a result of heavy winter or early spring rainfall, augmented by melting snow.
	Portland, Town of	N/A
	Ripley, Town of	N/A
	Sheridan, Town of	N/A
	Silver Creek, Village of	Flooding occurs almost annually along Lake Erie and Walnut Creek. Most of the floods are caused by rapid thawing of snow and ice cover in late winter and early spring, often accelerated by rainfall and ice jams. A major problem area is along Walnut Creek just south of Central Avenue.
	Westfield, Town of	N/A
	Westfield, Village of	N/A

N/A – Information unavailable

Cattaraugus County’s HMP notes that a total of 43 flood events have been recorded in the County, 31 of which were recorded as flash floods. Flash flooding in Cattaraugus County typically occurs every year and tends to be exacerbated by beaver dams, which cause debris jams leading to washouts and infrastructure damage. In the past decade, nine major flood events (i.e., greater than \$100,000 in damages) totaling nearly \$52 million in damages have occurred in Cattaraugus County. On average, the County experiences three major flood events per year, each causing damages estimated at \$3 million. The County has experienced multiple federally-declared storm events due to flooding in January 1996, June 1998, May through August 2001, and August 2009.

Chautauqua County’s HMP, updated in September 2015, notes that since 1996, there have been 45 recorded flood events with losses in the county. This corresponds to about 2.5 floods with losses per year. Of all these floods, only eight have cost more than \$100,000, with the most costly event occurring in the Village of Brocton in 2013, totaling \$500,000 in damages. Most floods in the County stem from heavy winter or early spring rainfall, usually augmented by melting snow. Occasionally, intense rainfall associated with cyclonic disturbances produces flooding. Low-lying areas along Chautauqua Lake are poorly drained, and during intense rainfalls severe flooding conditions have been experienced. Flooding and erosion of the Lake Erie shoreline has been caused by high wind and wave action coupled with high water levels on the lake, a frequent occurrence in recent years. Chautauqua County has experienced many historic severe storms. Since 1996, the estimated losses from these storms has totaled more than \$6 million.

Events of historical significance are summarized in Table 13: *Hazard Mitigation Plan Significant Flood Events*.

Table 13: Hazard Mitigation Plan Significant Flood Events

County	Community	Flood Events of Significance
Cattaraugus	Perrysburg, Town of	In August 2009, severe flash flooding occurred as the result of heavy rainfall, which caused major washouts and severe damage to critical facilities.
	Arkwright, Town of	No information available in HMP.
	Brocton, Village of	In 2013, the most costly flood event in Chautauqua County occurred in the Village of Brocton, totaling \$500,000 in damages.
	Chautauqua, Town of	No information available in HMP. Plan updated in 2015; no record of adoption as of July 2016.
	Dunkirk, City of	
	Dunkirk, Town of	
	Forestville, Village of	
	Fredonia, Village of	
	Hanover, Town of	
	Pomfret, Town of	
	Portland, Town of	
	Ripley, Town of	
	Sheridan, Town of	

County	Community	Flood Events of Significance
Chautauqua (cont'd)	Silver Creek, Village of	See above
	Westfield, Town of	
	Westfield, Village of	

Declared Disasters

Like much of the eastern United States, one of the most frequent, widespread, and damaging natural disasters affecting the watershed is flooding from rainfall events; especially tropical systems tracking inland from the Atlantic Seaboard. With full records beginning in the 1950s, the watershed has repeatedly been subject to flooding from tropical storms, severe winter storms, and other non-cyclonic events with the most recent declared event occurring in the watershed November 17-27, 2014.

The President is authorized by the Robert T. Stafford Disaster Relief and Emergency Assistance Act to declare a disaster for any emergency situation or natural event when states and local municipalities need federal assistance. Once the President declares that a major disaster or emergency exists, an array of federal programs to assist in the response and recovery effort are activated. The determination of which programs are activated following a particular event is based on the needs found during damage assessments and any subsequent information that may be discovered.

The major flood-related disaster declarations for the study area are listed in Table 14: *Disaster Declarations*. Since 1972 there have been nine federally declared disasters where flooding was a factor within the study area. FEMA's disaster declarations and emergency declarations history can be viewed at FEMA's website at <http://www.fema.gov/disasters>.

Table 14: Disaster Declarations (as of January 2015)

Date	Title of Event	Number of Counties Declared within Study Area
6/1/1972	New York Tropical Storm Agnes	2
3/1/1976	New York Ice Storm, Severe Storms, Flooding	2
8/3/2004	New York Severe Storms and Flooding	2
10/02/2004	New York Severe Storms and Flooding	2
4/19/2005	New York Severe Storms and Flooding	1
9/1/2009	New York Severe Storms and Flooding	2
7/12/2013	New York Severe Storms and Flooding	1
7/8/2014	New York Severe Storms and Flooding	2
12/22/2014	Severe Winter Storm, Snowstorm, and Flooding	2

During the Discovery Meetings, several community officials noted flood events that caused significant flooding in their communities. The Towns of Hanover, Portland, and Ripley and the Villages of Fredonia, Silver Creek, and Westfield all noted past declarations in 2009 and 1972.

The events provided by the communities did not include specific dates of events and/or damages.

High Water Marks

A limited amount of verified High Water Mark (HWM) data was available from the USGS or USACE prior to the Discovery meeting.

During the Discovery meetings, communities identified the following verifiable HWMs:

- Town of Hanover – Railroad bridge over Cattaraugus Creek
- Town of Ripley – 9764 West Lake Road
- Village of Silver Creek – Along Silver Creek and Walnut Creek
- Village of Silver Creek – Lake Erie shoreline

Limited details were provided for these HWMs.

Ice Jams

As explained by the NWS Office, “ice jams cause localized flooding and can quickly cause serious problems in an area. Rapid rises behind the jams can lead to temporary lakes and flooding of homes and roads along rivers. A sudden release of a jam can lead to flash flooding below with the addition of large pieces of ice in the wall of water, which will damage or destroy most things in its path.”

There are two types of ice jams: Freeze up and Break up. Freeze up jams usually occur in early to mid-winter during extremely cold weather. Break up jams usually occur in mid-to-late winter with thaws. The NWS (found [online](#) or in References section of this report) notes the conditions of both below:

Freeze Up Jam Criteria:

“Three consecutive days with daily average temperatures of less than 0°F. Early to mid-winter formation, fairly steady discharge, frazil and broken border ice, unlikely to release suddenly, smooth to moderate surface roughness.”

Break Up Jam Criteria:

“Ice around 1 foot thick or more (presumed) and Daily Average Temperature forecast to be greater than 42°F or more. Direct sunlight plays a large role as open water areas absorb sunlight. A break up jam can occur at any time after ice cover formation, but generally takes place in mid-to-late winter. Break up jams are highly unstable with sudden failures.”

Rainfall or snowmelt with a thaw will enhance the potential for Break up jams as rising water helps to lift and break up the ice. A very short thaw with little or no rain or snowmelt may not be enough to break up thick ice.

Flooding caused by ice jams is not calculated nor shown on FEMA’s FIRMs. Furthermore, the NWS’s statement on ice jams also explains that river forecasts found on its website do not take into account the effect of ice on river levels.

Table 15 identifies some of the known “trouble spots” of ice jamming in the watershed. The complete list with fuller descriptions of the circumstances of jamming at each location can be found at <http://icejams.crrel.usace.army.mil/>

Table 15 : Ice Jam Flooding Sources

Flooding Source	Location
Canadaway Creek	Fredonia, Hanover
Silver Creek	Hanover, Silver Creek
Walnut Creek	Hanover, Silver Creek

The following measures will help communities prepare for and address ice jam conditions as they occur.

Ice Jam Preparedness

1. Monitoring areas to identify problem areas early
2. Alert system for evacuation
3. Identification of evacuation routes if jam overtops roads
4. Mitigation
 - a. Ice weakening/thinning/removal
 - b. Equipment placement
 - c. Supplies
 - Sandbags
 - Jersey barriers
5. Permanent Measures
 - a. Freeze up Jam Control
 - Displace jam location
 - Control production and transport of frazil ice
 - b. Break up Jam Control
 - Control timing of breakup
 - Displace jam location

During the Discovery Meetings and on the community data worksheets, several communities noted areas of historic and repeated ice jams. Ice jam locations were noted for the City of Dunkirk (Crooked Brooke, Point Gratiot), Town of Hanover (Cattaraugus Creek, New Sunset Bay Irving, and Hanford), Town of Portland (Little Canadaway Creek, Walker Creek), Village of Silver Creek (Silver Creek and Walnut Creek), Village of Brocton, Town of Pomfret, and the Town and Village of Westfield (Chautauqua Creek). Specific information related to the stream extent and location was not provided.

NYSDEC scoping notes from 2005 indicate that the Town of Hanover experiences ice jamming at Cattaraugus Creek from the railroad bridge to Lake Erie. The ice backs up at Lake Erie and dams the Cattaraugus Creek. The same situation occurs with Silver Creek in the Village of Silver Creek.

Coordinated Needs Management Strategy (CNMS) and NFIP Mapping Needs

The Lake Erie Discovery process did identify unmet needs. During many discussions with community officials, the need or desire for updated digital FIRMs was raised. Many of the communities do not have digital maps and the information depicted on the maps is not current (e.g., location of flooding and roads). As presented in Table 23: *Summary of Community Floodplain Mapping* and Table 26: *Summary of Community Floodplain Mapping Needs*, municipalities within the watershed have noted their current flood maps are not accurate.

CNMS is a FEMA initiative to update the way FEMA organizes, stores, and analyzes flood hazard mapping needs information for communities. CNMS defines an approach and structure for the identification and management of flood hazard mapping needs that supports data-driven planning and the flood map update investment process in a geospatial (or GIS) environment. The goal is to identify areas where existing flood maps are not up to FEMA's mapping standards.

There are three classifications within the CNMS: "Valid," "Unverified," and "Unknown". New and updated studies (those with new hydrologic and hydraulic models) performed during the Map Modernization program were automatically determined to be "Valid" and the remaining studies went through a 17 element validation process with seven critical and 10 secondary elements. Validation elements apply physical, climatological, and environmental factors to stream studies to determine validity. A stream study has to pass all of the critical elements and at least seven secondary elements in order to be classified as "Valid." The remainder of the streams are classified as "Unverified."

The following seven Critical Elements or "checks" must be answered satisfactorily in order for a stream reach to be determined "Valid":

1. Change in the gage record: Has a major flood event caused a sizable change in gage record since effective analysis?
2. Change in discharge: Do the updated and effective peak discharges differ significantly based on confidence limit criteria in *FEMA's Guidelines and Specifications* (G&S)?
3. Model methodology: Is the model methodology no longer appropriate based on FEMA's G&S?
4. Hydraulic change: Has a major flood-control structure (dam/levee/floodwall/other change) been added or removed from the reach?
5. Channel reconfiguration: Is the current channel reconfiguration outside the effective SFHA (i.e., has the stream moved)?
6. Other hydraulic changes: Have more than five hydraulic structures (bridge/culvert) been added or removed that impact Base Flood Elevations (BFEs) on the reach?
7. Channel area change: Has there been significant channel fill or scour?

If one or more of the above noted elements are true, then the flood hazard information for the reach is “Unverified.” Not all elements may be applicable for all flooding sources.

In addition to the seven Critical Elements, if four or more of the following Secondary Elements are true, then the flood hazard information must be recorded as “Unverified.”

1. Regression Equation: Has a rural regression equation been used in a now urbanized area?
2. Repetitive Loss: Are there repetitive losses outside the SFHA?
3. Impervious Area: Has there been an increase in impervious area in the sub-basin of equal to or greater than 50 percent of previous area (i.e., 10 percent to 15 percent, 20 percent to 30 percent, etc.)?
4. Hydraulic Structure: Have more than one, but less than five, hydraulic structures (bridge/culvert) been added or removed that impact BFEs on the reach?
5. Channel Improvements: Have there been channel improvements or shoreline changes?
6. Topography Data: Is better topography and/or bathymetry available?
7. Vegetation or Land Use: What changes to vegetation or land use have occurred in the area?
8. Coastal Dune: Failure to identify primary frontal dune in coastal areas?
9. High Water Mark: Have significant storms occurred with recorded HWMs?
10. Regression Equation: Are new regression equations available?

CNMS is a living database that is continuously updated whenever new or revised studies become available. Valid stream reaches will be reassessed every five years and Unverified streams will be prioritized for potential funding. Watershed Discovery meetings will provide input for CNMS community requests and help prioritize studies in the watershed. Table 16: *Current Status of CNMS* shows the status of the counties in this project area prior to the Discovery process.

A CNMS Factsheet is included in the digital version of this Discovery Report as Attachment 6 - *Coordinated Needs Management Strategy*. More information about CNMS can also be found on [FEMA’s CNMS webpage](#) or by viewing an informative CNMS PowerPoint® presentation of the process created by the [Illinois State Water Survey](#).

Table 16: Current Status of CNMS

County	FIPS*	Stream Mileage within Chautauqua-Conneaut Watershed			
		Valid	Unverified	Unknown	Total
Cattaraugus	36009	0	0	0.007	0.007
Chautauqua	36013	0	0	142.6	142.6

*FIPS = Federal Information Processing System

All needs identified as a result of this Discovery process have been included in both CNMS and this Discovery Report.

Other Data and Information

The following section contains a summary of other information that helped the study team to better understand the study area, local flood risks, and potential mitigation needs within the watershed as part of this Discovery project.

Flood Insurance Policies

A community's agreement to adopt and enforce floodplain management ordinances as part of the NFIP, particularly with respect to new development, is an important element in making federally-backed flood insurance available to home and business owners. For this Discovery project, data on NFIP flood insurance policies in the watershed communities were gathered.

As of July 2014, for the communities included in this Discovery Project of the Chautauqua-Conneaut Watershed, 446 policies were in-force accounting for \$65.2 million in Insurance Coverage and \$336,130 in written premiums. The number of policies, total coverage, and total NFIP premiums are listed in Table 17: *Flood Insurance Policy Data*.

Chautauqua County represents over 99 percent of the insurance policies (445) and insurance coverage (\$65,207,600) within the Chautauqua-Conneaut Watershed. The Town of Hanover leads in the number of flood insurance policies with 238 policies and over \$28 million in coverage.

Table 17: Flood Insurance Policy Data (as of May 2014)

County	Community	Number of Policies by Zone		Total Coverage	NFIP Total Premium	Total Claims Since 1978	Total Paid Since 1978
		A Zone	Total Policies				
Cattaraugus	Perrysburg, Town of	0	1	\$28,000	\$174	3	\$2,234
Chautauqua	Arkwright, Town of	0	0	\$0	\$0	0	\$0
	*Brocton, Village of	0	1	\$350,000	\$414	0	\$0
	Chautauqua, Town of	38	69	\$11,297,000	\$53,882	51	\$167,902
	Dunkirk, City of	16	31	\$5,604,000	\$28,248	58	\$145,758
	Dunkirk, Town of	2	3	\$260,000	\$3,742	11	\$23,355
	Forestville, Village of	0	0	\$0	\$0	2	\$1,304
	Fredonia, Village of	13	37	\$6,323,300	\$36,843	97	\$572,798
	Hanover, Town of	197	238	\$28,862,500	\$158,801	1,388	\$5,828,962
	Pomfret, Town of	8	14	\$3,103,500	\$14,720	9	\$57,081
	Portland, Town of	3	10	\$2,275,300	\$6,134	14	\$11,916
	*Ripley, Town of	0	0	\$0	\$0	0	\$0
	Sheridan, Town of	1	5	\$666,000	\$2,753	10	\$95,014
	Silver Creek, Village of	5	32	\$5,875,200	\$26,353	67	\$1,088,714
	Westfield, Town of	3	4	\$548,800	\$3,855	0	\$0
	Westfield, Village of	0	1	\$42,000	\$211	2	\$110
Total:		286	446	\$65,235,600	\$336,130	1,712	\$7,995,148

* All Zone C and X - No published FIS or FIRM for community

Repetitive Loss/Severe Repetitive Loss Properties

A Repetitive Loss (RL) is a property that has received two or more claim payments of more than \$1,000 from the NFIP within any rolling 10-year period. In the Chautauqua-Conneaut Watershed, there were 679 RLs within the study area as of May 2015, accounting for \$5.2 million in claims paid. The Town of Hanover has 603 RL properties, followed by the Village of Silver Creek with 28 RL properties and the Village of Fredonia with 24 RL properties. The Village of Silver Creek has the highest average claims paid, with \$20,803 on average paid for 28 losses. The data are shown in Table 18: *Repetitive Losses in the Study Area*.

Of the communities that have RLs, only the Village of Silver Creek noted during the Discovery meetings that they were aware of the RLs in their communities.

Table 18: Repetitive Losses in Study Area (as of May 2015)

County	Community	Number of RLs	Total Claims Paid
Cattaraugus	Perrysburg, Town of	-	-
Chautauqua	Arkwright, Town of	-	-
	Brocton, Village of	-	-
	Chautauqua, Town of	5	\$19,626
	Dunkirk, City of	13	\$97,332
	Dunkirk, Town of	2	\$6,093
	Forestville, Village of	-	-
	Fredonia, Village of	24	\$367,029
	Hanover, Town of	603	\$4,150,984
	Pomfret, Town of	-	-
	Portland, Town of	2	\$5,418
	Ripley, Town of	-	-
	Sheridan, Town of	2	\$6,457
	Silver Creek, Village of	28	\$582,475
	Westfield, Town of	-	-
	Westfield, Village of	-	-
Total:		679	\$5,235,414.00

Structures that flood frequently strain the NFIP Fund. In fact, RL properties are the biggest draw on the fund. FEMA had paid almost \$3.5 billion in claims for RL properties as of 2005 and that number continues to grow. RL properties not only increase the NFIP's annual losses and the need for borrowing funds from Congress, they also drain funds needed to prepare for future catastrophic events.

Clusters of RL and previous NFIP assistance, including claims and other financial support such as Flood Mitigation Assistance and Hazard Mitigation Assistance grants, are used to identify "hot spot" areas within communities. This information can be used to identify areas of mitigation interest and updated mapping needs and products for individual communities.

Community Rating System (CRS)

The CRS is a voluntary incentive program that provides flood insurance premium discounts to NFIP-participating communities that take extra measures to manage floodplains above the minimum requirements. The more measures a community takes to minimize or eliminate exposure to floods, the more CRS points are awarded and the higher the discount on flood insurance premiums.

No communities within the study area participate in the CRS. For more information on CRS, please see Attachment 5 - *Joining the CRS Program*, or visit [FEMA's CRS website](#).

Community Assistance Visits (CAVs) and Community Assistance Contacts (CACs)

FEMA uses a number of tools to determine a community's compliance with the minimum regulations of the NFIP. Among them are Community Assistance Visits (CAVs) and Community Assistance Contacts (CACs). These tools help assess a community's implementation of its floodplain management regulations and identify any deficiencies and/or violations.

CACs

The CAC is a telephone call or brief visit by a FEMA staff member (or staff of a state agency on behalf of FEMA) to establish contact with the community's designated floodplain manager and their contact information.

CACs in the watershed have been sporadic during the last 20 years. CACs are a tool employed by FEMA and its state partners to periodically contact a community to see if they are having any difficulties in administering the local floodplain management ordinance or program. The CAC can be used as a way to screen for potential community floodplain management issues that would require a CAV. CACs are also a means of encouraging Code Enforcement Officers to attend annual floodplain management workshops. CACs can serve as a means to support local officials when they need help effectively administering the NFIP in their community.

CAVs

Statewide Community Assistance Visits (CAVs) are part of the evaluation and review process used by FEMA and NYSDEC Floodplain Management staff to ensure that each community adequately enforces local floodplain management regulations to remain in compliance with NFIP requirements. Generally, a CAV consists of a FEMA staff member or staff of a state agency on behalf of FEMA touring the floodplain, inspecting community permit files, and meeting with local appointed and elected officials. During a CAV, observations and investigations will focus on identifying issues in various areas, such as community floodplain management regulations/ordinances, community administration and enforcement procedures, engineering or other issues related to FIRMs, and other problems in community floodplain management.

Any administrative problems or potential violations identified during a CAV will be documented in the CAV findings report. The community will be notified and given the opportunity to correct administrative procedures and remedy any violations to the maximum extent possible within established deadlines.

CAVs are also a way to provide technical assistance to communities. FEMA or the state will work with the community to help bring the program into compliance with NFIP requirements. In extreme cases where the community does not take action to bring itself into compliance, FEMA may initiate an enforcement action against the community. A program deficiency is a defect in a community's floodplain management regulations or administrative procedures that impacts effective implementation of floodplain management regulations of the standard in 44 CFR §60.3, §60.4, or §60.6. "Open" CAVs can be indicative of unresolved violations.

CACs and CAVs performed within the project area are identified in *Table 19: CACs and CAVs Performed within the Project Area*. Ten of the 21 communities have not had a CAV completed in the past 15 years. Five communities within the watershed had serious engineering problems listed during the CAV, and of those, three were listed as needing remedial actions before closing the CAV. Due to the sensitivity of this information, specific community details are not captured in this report.

Table 19: CACs and CAVs Performed within the Project Area

County	Community	Most Recent CAC Date	Most Recent CAV Date
Cattaraugus	Perrysburg, Town of	-	-
Chautauqua	Arkwright, Town of	-	-
	Brocton, Village of	-	-
	Chautauqua, Town of	02/22/2012	06/02/2008
	Dunkirk, City of	-	01/15/2010
	Dunkirk, Town of	07/29/2011	05/04/2005
	Forestville, Village of	-	05/22/2008
	Fredonia, Village of	09/10/2010	08/14/1992
	Hanover, Town of	05/23/2012	01/14/2009
	Pomfret, Town of	05/04/1995	07/30/1993
	Portland, Town of	04/27/2000	12/08/2009
	Ripley, Town of	-	-
	Sheridan, Town of	01/15/2003	10/28/1993
	Silver Creek, Village of	-	05/22/2008
	Westfield, Town of	04/27/2000	-
	Westfield, Village of	-	-

Ordinances

The project area's local jurisdictions have a patchwork of regulations regarding development within known SFHAs, ranging from ordinances with minimum NFIP requirements to strong, proactive ordinances that not only regulate and protect new and improved development in existing SFHAs, but seek to mitigate the growth of SFHAs caused by increased runoff from developed areas and the degradation of natural flood control areas, such as wetlands and forests. The NFIP uses six different ordinance levels (60.3 land-use classification levels).

The following summarizes the three different ordinance levels based on 44 CFR §60.3 that apply to New York local law for the communities participating in the NFIP.

1. The “A” type should be used when 1-percent-annual-chance floodplains have not yet been identified.
2. The “D” type should be used when 1-percent-annual-chance floodplains without BFEs have been identified; 1-percent-annual-chance floodplains with BFEs, but without floodways have been identified; and 1- percent-annual-chance floodplains with BFEs and a floodway have been identified. If the community also has coastal flooding, but does not have coastal high-hazard areas (V Zones), it is a “D” type.
3. The “E” type should be used when coastal high-hazard areas (V Zones) have been identified.

Table 20: *Program Status and Ordinance Level* lists the NFIP program status and ordinance level for each community in the Chautauqua-Conneaut Watershed.

Table 20: Program Status and Ordinance Level (as of August 2014)

County	Community	Program Status	Ordinance Level
Cattaraugus	Perrysburg, Town of	Regular	D
Chautauqua	Arkwright, Town of	Regular	D
	Brocton, Village of	Regular	A
	Chautauqua, Town of	Regular	D
	Dunkirk, City of	Regular	D
	Dunkirk, Town of	Regular	D
	Forestville, Village of	Regular	D
	Fredonia, Village of	Regular	D
	Hanover, Town of	Regular	D
	Pomfret, Town of	Regular	D
	Portland, Town of	Regular	D
	Ripley, Town of	Regular	A
	Sheridan, Town of	Regular	D
	Silver Creek, Village of	Regular	D
	Westfield, Town of	Regular	D
	Westfield, Village of	Regular	D

The NFIP-participating communities within the project area have floodplain management regulations in place and have a mechanism for updating their ordinances. Local ordinances are available in Appendix F: *Community Ordinances*.

Hazard Mitigation Plans (HMPs)

A local HMP is a long-term strategic/guidance document used by an entity to reduce future risk to life, property and the economy in a community. HMPs are often completed at the county or

regional level. At the local level, each municipal government also adopts the HMP as an individual plan or regional plan. The purpose of the HMP is to:

- Identify vulnerabilities to natural hazards and provide for potential projects to reduce those vulnerabilities in the future;
- Ensure safety and protect life and property by reducing the potential for future damages and economic losses that result from natural hazards;
- Help communities qualify for additional grant funding, in both the pre-disaster and post-disaster environment;
- Speed recovery and redevelopment following future disaster events;
- Demonstrate a firm local commitment to hazard mitigation principles; and
- Comply with both state and federal legislative requirements for local HMPs.

The county and municipal HMPs outline mitigation actions to address vulnerabilities, which officials believe are attainable and can be implemented. Some of these activities include:

- Reduce the number of critical facilities in hazard prone areas;
- Map all critical facilities in SFHAs;
- Develop regulations that require zero-increase in runoff;
- Elevate structures located in flood prone areas;
- Require flood resistant building construction methods; and,
- Develop a comprehensive plan to relocate critical facilities to safer areas.

Status of Approved Mitigation Plans

Each municipal HMP was reviewed for initiatives, critical facilities, and mitigation actions. As of August 8, 2014, only one community within the study area had an approved HMP; the other 15 communities, all of which are located within Chautauqua County, had HMPs that were in progress.

The status of the approved HMPs is shown in Table 21: *Approved Hazard Mitigation Plans*.

Table 21: Approved Hazard Mitigation Plans (as of July 2016)

County	Community	Approval Date	Plan Expiration
Cattaraugus	Perrysburg, Town of	1/21/2014	1/21/2019
Chautauqua	Arkwright, Town of	Plan updated in 2015; no record of adoption as of July 2016	To Be Determined
	Brocton, Village of		
	Chautauqua, Town of		
	Dunkirk, City of		
	Dunkirk, Town of		
	Forestville, Village of		
	Fredonia, Village of		
	Hanover, Town of		
	Pomfret, Town of		
	Portland, Town of		

County	Community	Approval Date	Plan Expiration
Chautauqua (Cont'd)	Ripley, Town of	Plan updated in 2015; no record of adoption as of July 2016	To Be Determined
	Sheridan, Town of		
	Silver Creek, Village of		
	Westfield, Town of		
	Westfield, Village of		

Critical Facilities and Infrastructure

Critical facilities are those entities that are essential to the community's health and welfare. Critical facilities included in the HMPs vary based on how the locality defines a critical facility/infrastructure and the types of data available. Critical facilities often include 911 and emergency services facilities, airports, colleges and universities, schools, fire departments, police departments, sewage treatment plants, hospitals, and nursing homes.

The HMPs for the Chautauqua-Conneaut Watershed communities identified critical facilities located within the SFHA within the town of Perrysburg. All Chautauqua critical facilities in the SFHA are based on analysis performed for the 2006 Hazard Mitigation Plan. This information is in the process of being revised for the 2015 HMP update and it was unavailable at the time this report was completed. Table 22: *Critical Facilities and Infrastructure* summarizes the critical facilities that were noted in the HMPs as being at risk from flood-related events. Updates to these plans will need to include the critical structure vulnerability.

Table 22: Critical Facilities and Infrastructure

County Name	Community Name	Facilities Located within SFHA
Cattaraugus	Perrysburg, Town of	(7) – 1 Gas Regulation, 1 Hospital, 2 Indian Reservations, 1 Other Health Building, 1 Recreational Facility, 1 School
Chautauqua	Arkwright, Town of	None Listed
	Brocton, Village of	(1) – 1 Bridge
	Chautauqua, Town of	(4) – 1 Evacuation Shelter, 1 Water Treatment Plant, 2 Performing Arts Halls
	Dunkirk, City of	None Listed
	Dunkirk, Town of	(2) – 1 Town Hall, 1 Fire Station
	Forestville, Village of	None Listed
	Fredonia, Village of	(2) – 1 Water Treatment Plant, 1 Fire Station
	Hanover, Town of	(4) – 1 Fire Station, 2 Water Treatment Plants, 1 Water Transmission Line
	Pomfret, Town of	None Listed
	Portland, Town of	(2) – 1 Mobile Home Park, 1 Sewage Treatment Plant
	Ripley, Town of	None Listed
	Sheridan, Town of	None Listed

County Name	Community Name	Facilities Located within SFHA
Chautauqua (Cont'd)	Silver Creek, Village of	(5) – 1 Police Department Building, 1 EMS Building, 1 Municipal Building/Policy/Fire, 1 DPW Building, 1 Water Treatment Plant
	Westfield, Town of	None Listed
	Westfield, Village of	(4) – 1 Hospital, 1 School, 1 Water Treatment Plant, 1 Sewer Pump Station

Mitigation Projects

FEMA administers three programs that provide funding for eligible mitigation projects to reduce disaster loss and protect life and property from future disaster damage. The three programs are the Hazard Mitigation Grant Program (HMGP), the Flood Mitigation Assistance (FMA) Program, and the Pre-Disaster Mitigation (PDM) Program.

- [HMGP](#) assists in implementing long-term hazard mitigation measures following a Presidential major disaster declaration;
- [PDM](#) provides funds for hazard mitigation planning and projects on an annual basis; and
- [FMA](#) provides funds for projects to reduce or eliminate risk of flood damage to buildings that are insured under the NFIP on an annual basis.

HMGP funding is generally 15 percent of the total amount of federal assistance provided to a state, territory, or federally-recognized tribe following a major disaster declaration. PDM and FMA funding depends on the amount Congress appropriates each year for those programs.

Appendix G lists FEMA funded hazard mitigation projects that have occurred in the project area.

The community HMPs identified mitigation projects/actions/strategies to reduce long-term vulnerability to hazards. Each county listed several mitigation projects related to reducing flood vulnerability.

The Cattaraugus and Chautauqua County HMP's include county-wide mitigation projects related to improving public awareness about flood hazards, protecting infrastructure and improving repeatedly-damaged infrastructure, ensuring maintenance of drainage ways and waterways, and identifying and acquiring RL properties.

Mitigation actions specific to individual communities within the watershed are identified are shown in Table 23: *Hazard Mitigation Plan Actions*.

Table 23: Hazard Mitigation Plan Actions

County Name	Community Name	Mitigation Actions
Cattaraugus	Perrysburg, Town of	<ul style="list-style-type: none"> • Continue to support the ongoing Flood Risk Management Feasibility Study. • Replace repetitively damaged/undersized culverts at various locations.
Chautauqua	Arkwright, Town of	N/A
	Brocton, Village of	N/A

Table 23: Hazard Mitigation Plan Actions

County Name	Community Name	Mitigation Actions
Chautauqua (Cont'd)	Chautauqua, Town of	<ul style="list-style-type: none"> Dredge Prendergast and Dewittville Creeks and remove vegetation along the shoreline. Address inadequate hydraulic opening of culvert at Massey Avenue.
	Dunkirk, City of	<ul style="list-style-type: none"> Re-establish original flow characteristics of the drainage channel to the unnamed tributary to Lake Erie along Otter, Ounce, Rabbit, and Warsaw Streets and Wright Park Drive.
	Dunkirk, Town of	<ul style="list-style-type: none"> Increase the capacity of downstream conveyance piping through the removal of vegetation. Replace twin 36" pipes under Vineyard Drive.
	Forestville, Village of	N/A
	Fredonia, Village of	N/A
	Hanover, Town of	Update the 2001 study for emergency access to Sunset and Hanford Bay.
	Pomfret, Town of	<ul style="list-style-type: none"> Address Feral Road flooding through culvert improvements. Address Bear Lake road-flooding through culvert improvements along with lower end.
	Portland, Town of	Replace bridges on Ellicott Road and Webster Road
	Ripley, Town of	N/A
	Sheridan, Town of	<ul style="list-style-type: none"> Replace culvert over Scott Creek at Newell Road Replace East Middle Road deteriorating culvert; Replace bridge on South Roberts Road.
	Silver Creek, Village of	N/A
	Westfield, Town of	N/A
	Westfield, Village of	<ul style="list-style-type: none"> Cover open ditches at Bliss Street (Union Street Extension), Spring Street and install storm sewers Address Persons Street-Doty Creek railroad culvert by expanding culvert capacity at point where water enters railroad bed.

N/A – Information not available

IV. Discovery Meetings

A series of conference calls with virtual meeting capabilities was held on May 19-20, 2014, and was followed up with three in-person Discovery meetings held June 10-12, 2014, throughout the Lake Erie Watershed.

Webinars

RAMPP conducted the pre-Discovery WebEx™ sessions with public officials on May 19-20, 2014. These sessions introduced the planning team, requested feedback from the municipalities,

counties, and regional groups within the project area, determined what additional local floodplain and hazard risk data were available, and who to include in the process.

Invitees to the WebEx TM sessions included community officials engaged in the administration, planning, emergency management, and public works duties of local jurisdictions. A list of the community leaders invited to the sessions is available in Appendix H: *Pre-Discovery Mailing List and Invitation Letter*. A sample invitation letter is also shown. A record of the participants of these meetings can be found in Appendix I: *Pre-Discovery Stakeholder Meetings*. While not expressly excluded, the public does not generally attend these meetings.

The second half of the session was interactive, with community maps shown on the meeting screen and participants discussing floodplain mapping needs within their communities. Floodplain mapping needs and areas of concern included areas that experience flooding, locations of bridge/culvert replacements, and areas where FEMA maps are inaccurate or do not exist, etc. To further expand on this discussion, participants were asked to complete and return community data worksheets to supplement the interactive discussion. Representatives from Cattaraugus, Chautauqua, Erie, Genesee and Wyoming Counties, USACE, the Nature Conservancy, and Regional Planning Commissions attended.

The participants were asked if there were additional stakeholders that should be added to the list. Several participants suggested the Cooperative Extensions and Soil and Water Conservation District in each county be invited. It was also suggested the Erie County Water Quality Committee be added to the distribution lists.

The meeting notes are shown in Appendix J: *Kickoff Meeting Notes*. These notes contain comments from those interviewed by RAMPP and other staff to determine each attending community's flood mapping priorities.

In-Person Meetings

In-Person Discovery meetings were held with affected communities and other selected stakeholders to:

- Review new or previously submitted information provided by communities, state and regional agencies, and local stakeholders relevant to the Discovery process
- Identify flood risk concerns in the Chautauqua-Conneaut Watershed
- Discuss each community's floodplain management activities and mitigation planning projects
- Gather additional feedback for FEMA to consider when developing Risk MAP products, including new FIRMs where needed.

Table 24: *Community Meeting Information* includes meeting dates and locations for the in-person Discovery meetings held that affect the Chautauqua-Conneaut Watershed.

Table 24: Community Meeting Information

Date and Time	Counties	Meeting Location
Tuesday, June 10, 2014 2:30 PM to 5:00 PM	Chautauqua	Woodlawn Beach State Park S-3580 Lakeshore Rd Blasdell, NY 14219
Wednesday, June 11, 2014 9:30 AM to 12:00 PM	Cattaraugus	Town of Concord Court 86 Franklin Street Springville, NY 14141

Representatives of FEMA, various state agencies, county officials, and several non-governmental organizations attended these sessions. Communities represented at the in-person meetings included:

- Chautauqua County
- Village of Fredonia
- Town of Hanover
- Town of Portland
- Town of Sheridan
- Village of Silver Creek
- Village of Westfield

At the start of the meetings a PowerPoint® presentation was delivered. The second half of the meeting was interactive and included breakout sessions during which community officials and stakeholders met with representatives from FEMA, NYSDEC, and RAMPP to discuss the following:

- What are areas of recent or planned development or high growth or other significant land changes?
- What other flood risks are present?
- What other mitigation plans and projects are in the affected area(s)?
- What are your community's concerns?
- How can we (both FEMA and you) communicate risk within your community and increase resilience from floods?

Appendices K through N include the Discovery meeting preparation and meeting materials:

- Meeting Agenda/Minutes (Appendix K: *Discovery Meeting Agenda*);
- Meeting Sign-In sheet (Appendix L: *Discovery Meeting Sign-In Sheet*);
- Meeting Presentations (Appendix M: *Discovery Presentation*); and
- Discovery Meeting Worksheets (Appendix N: *Discovery Meeting Data Worksheets and Stream Matrices*).

The results of the Discovery meeting breakout sessions with watershed stakeholders are provided in Section V: Discovery Process Outcomes.

V. Discovery Process Outcomes

Table 25: *Summary of Community Floodplain Mapping* and Table 26: *Summary of Community Floodplain Mapping Needs* capture the discussion of needs that took place during the Discovery process. These tables highlight the communities that participated in the planning, provided information on the community data worksheets, and noted specific needs related to their effective FIRMs. Approximately 30 percent of the communities within the Chautauqua-Conneaut Watershed provided needs that have been captured in CNMS.

The main types of needs identified by participants related to the existing FIRMs included:

- Specific unstudied streams in areas of growth and development;
- Old, difficult-to-read maps, due to scale (e.g., several communities have flat fold 11x17 maps and all of the watershed's FIRMs are not yet digital); and
- Need to establish BFEs on large bodies of water that are currently mapped as approximate flood zones.

During the Discovery process, stakeholders also noted a need for additional training related to Risk MAP products, floodplain management, and hazard mitigation topics. Table 26: *Summary of Community Training Needs* summarizes these training needs as indicated by specific communities.

Please note that in Table 27: *Summary of Community Floodplain Mapping Needs* some of the data included in community needs comes from meetings that the NYSDEC held with communities in the watershed that occurred in March of 2005. It should be further noted that some of the data collected during the Discovery process relates to flood hazards outside the Chautauqua-Conneaut Watershed. Where applicable, a footnote has been added to identify the watershed name that corresponds with the comment and/or need. All needs and priorities should be looked at as products of the times that the meetings were held and are subject to update or change.

Recommendations for Future Action

The following summarizes the key findings of this Discovery process:

- There is a lack of existing digital FIRM data in the majority of the watershed; the age and non-digital format of this information can make local floodplain management and mitigation efforts difficult.
- There are a number of existing flood studies prepared by New York State Department of Transportation (NYSDOT) and the USACE, which should be acquired and incorporated into FISs.
- There is a need for Risk MAP products, floodplain management, and hazard mitigation training.
- There is a general lack of understanding about the CRS program, its benefits, and how to join, which indicates a need for further outreach and training on this topic within the watershed, given its potential benefits.

- While development has been largely subdued, there is a prevalence of smaller developments planned across the watershed. Continued vigilance must be maintained so that as development occurs, good building practices continue for communities within the watershed.

Table 25: Summary of Community Floodplain Mapping.

County	Community	Effective Date	Submitted Data Worksheet and Mapping Needs	Current FIRMs Format (Paper or Digital)	Needs Captured in CNMS Database	Current Maps Accurate for Needs	Request for Training	Attended WebEx	Attended In-Person Meeting
Cattaraugus	Perrysburg, Town of	04/20/1984	No	Paper	Yes	No	No	No	No
Chautauqua	Arkwright, Town of	04/08/1983	No	Paper	No	No	No	Yes	No
	Brocton, Village of	None	Yes	-	Yes	No	No	No	No
	Chautauqua, Town of	06/15/1984	Yes	Paper	No	Yes	Yes	Yes	No
	Dunkirk, City of	02/04/1981	Yes	Paper	Yes	No	Yes	No	No
	Dunkirk, Town of	08/06/1982	No	Paper	Yes	No	No	No	No
	Forestville, Village of	03/18/1983	No	Paper	No	No	No	No	No
	Fredonia, Village of	11/15/1989	Yes	Paper	No	Yes	Yes	No	Yes
	Hanover, Town of	12/18/1984	Yes	Paper	No	No	Yes	Yes	Yes
	Pomfret, Town of	12/18/1984	No	Paper	No	No	No	No	No
	Portland, Town of	10/07/1983	Yes	Paper	Yes	No	Yes	No	Yes
	Ripley, Town of	None	Yes	-	No	No	Yes	No	No
	Sheridan, Town of	10/07/1983	Yes	Paper	No	Yes	Yes	No	Yes
	Silver Creek, Village of	08/01/1983	Yes	Paper	Yes	No	Yes	No	Yes
	Westfield, Town of	06/08/1984	Yes	Paper	No	No	No	No	No
	Westfield, Village of	10/07/1983	Yes	Paper	Yes	No	Yes	Yes	Yes

Table 26: Summary of Community Floodplain Mapping Needs¹.

County	Community	Summary of Needs/Map Update Justification
Cattaraugus	Perrysburg, Town of	No specific comments
Chautauqua	Arkwright, Town of	No specific comments.
	Brocton, Village of	Ice jam locations noted by the County should be taken into account and studied. Meetings held by the NYSDEC in 2005 yielded the following: The tributary to Slippery Rock Creek has a series of piped underground areas as it flows through the Village. They should be studied to determine their impact. Priorities for the community include: Slippery Rock Creek should have a new detailed study through the Village. The unnamed tributary to Slippery Rock Creek should have a new detailed study. This creek is intermittently piped throughout the Village.
	Chautauqua, Town of	There are some piped storm drainage lines along Chautauqua Lake ² that should be studied and their impact taken into account. 2005 NYSDEC meetings yielded the following: There are erosion problems throughout the town. The town officials stressed the need to maintain streams and address problems related to silt and bank erosion. Wing Creek ³ – The Mt. Pleasant Road bridge crossing was replaced with a box culvert in 1986. This has alleviated some flooding in the area. The Hewes Road Bridge Crossing overflows frequently. The Potter Road Bridge ⁴ Crossing was replaced in 1985. The bridge is no longer overtopped. Prendergast Creek ⁵ – The Webber Road Bridge Crossing was replaced in 1993. Flooding has been reduced since then. This is a meandering stream with erosion problems. A detailed study for the Creek exists from Chautauqua Lake to Rte. 394. This should be revised and extended to include the total length of the Creek within the Town.

¹ This table includes information gathered at meetings held by the New York State Department of Environmental Conservation (NYSDEC) with communities.

² This flooding source is not located in the Great Lakes Coastal Flood Study (GLCFS) Area. It is located in the Conewango Watershed.

³ Ibid.

⁴ This bridge is not located in the GLCFS Area. It is located in the Conewango Watershed.

⁵ This flooding source is not located in the GLCFS Area. It is located in the Conewango Watershed.

Table 26: Summary of Community Floodplain Mapping Needs¹.

County	Community	Summary of Needs/Map Update Justification
Chautauqua (cont'd)	Chautauqua, Town of (cont'd)	<p>Big Inlet⁶ – The Flats Road Bridge Crossing was replaced. Areas around Awson Road and Elmflats Road, near Big Inlet remain wet. Brocton Road is occasionally overtopped.</p> <p>The wetland area in the northern part of the town has no flooding problem.</p> <p>Dewittville Creek⁷ – The Meadows Road Bridge Crossing was replaced in the late 70s or early 80s. It floods occasionally at the confluence of the Creek with its tributary. The Creek has lot of silt and bank erosion problems. The existing approximate study of the Creek should be reviewed and updated to a detailed study from Chautauqua Lake to Rte. 430.</p> <p>Mud Creek⁸ - The Rte. 430 Bridge Crossing is old and may need study, retrofit or replacement.</p> <p>There are some piped storm drainage lines along the Chautauqua Lake.</p>
	Dunkirk, City of	<p>Seawall is currently being demolished and rebuilt.</p> <p>Crooked Brook should be studied between Brigham Road and Lake Erie.</p>
	Dunkirk, Town of	No specific comments.
	Forestville, Village of	<p>No specific community comment due to lack of participation.</p> <p>2005 NYSDEC meetings yielded the following:</p> <p>The Tupper Creek approximate study should be extended through the Village of Forestville. The remainder of the creek is a good candidate for re-delineation or reuse. NYSDEC Region 9 has fielded several questions regarding the construction of snowmobile bridges.</p>
	Fredonia, Village of	A new study should be performed along Canadaway Creek near the bridge to address issues with ice jams.
	Hanover, Town of	<p>Possible bridge replacement on the Cattaraugus Creek⁹ at Routes 5 & 20 King Road should be investigated/studied. There is a USACE project at the mouth of Cattaraugus Creek. USACE may have studied the breakwater. This study should be obtained and taken into account.</p> <p>Piping under Hopper Road and piping between the upper and lower reservoirs should all be studied. A breakwall was built for boats that tends to exacerbate flooding as it causes ice jams and</p>

⁶ This flooding source is not located in the GLCFS Area. It is located in the Conewango Watershed.

⁷ Ibid.

⁸ Ibid.

⁹ This flooding source is located in the GLCFS Area, in the Cattaraugus Watershed.

Table 26: Summary of Community Floodplain Mapping Needs¹.

County	Community	Summary of Needs/Map Update Justification
Chautauqua (cont'd)	Hanover, Town of (Cont'd)	<p>sedimentation, compounding flooding. All these issues should be looked into; some plans to dredge have been discussed.</p> <p>There is an area along Routes 5 and 20 that also meets up with Route 90 that is outside of the floodplain. There have been discussions to build a hotel, shopping center, and/or water park. There is also potential for Seneca Gaming Corporation development.</p> <p>Residential development is taking place on Sunset Bay and Hanford Bay. A subdivision has been proposed for these areas. All are in the floodplain and should be studied to ensure that they are built to code or amended to code.</p> <p>Sunset Bay, Irving, and Hanford Bay all experience ice jam flooding, some due to lake storms. The flood zone in this area should be expanded.</p> <p>Ice jams are also a problem at Cattaraugus Creek¹⁰ from the railroad bridge to the Lake. The ice backs up at Lake Erie and dams the creek.</p> <p>The low area between Pleasant Avenue, Erie Street West, Cayuga Street, and Michigan Street was once filled in and no longer floods. This should be confirmed and studied.</p> <p>Tributary C-1 to Cattaraugus Creek – This is locally known as Rose Brook. There is a recent study done of the creek between the Golf Course on Spears Road and I-90.</p>
	Pomfret, Town of	No specific comment due to lack of participation.
	Portland, Town of	A detailed study is needed for Slippery Rock Creek from the intersection of Lake Ave. and Peerless Street.
	Ripley, Town of	<p>NYSDEC 2005 meetings yielded the following:</p> <p>The Western Stream near Barnes Road should be studied using detail methods from the confluence with Lake Erie to the intersection of Route 20 with Barnes Road and Coomis Street. This stream is intermittently piped. This should be taken into account for mapping.</p> <p>The easternmost stream near Route 76 should be studied in detail from Lake Erie to Route 20. There are two new culverts on the stream near Ross Street.</p> <p>A new dam was constructed upstream of Shaver Street.</p>

¹⁰ This flooding source is located in the GLCFS Area, in the Cattaraugus Watershed.

Table 26: Summary of Community Floodplain Mapping Needs¹.

County	Community	Summary of Needs/Map Update Justification
Chautauqua (cont'd)	Ripley, Town of (Cont'd)	<p>The central stream near Hamilton Road from its mouth at Lake Erie to the intersection of Route 20 with Hamilton Road and Goodrich Street should be studied in detail.</p> <p>The unnamed tributary at Sheldon Corners should have an approximate study for its entire length in the Town and should be linked to the existing approximate study from the Town of Westfield.</p>
	Sheridan, Town of	<p>Chapin Road, South Roberts Road, Scott Creek, and Beaver Creek all need maps with accurate flood elevations and distances.</p> <p>Airport construction has modified the floodplain and resulted in increased flooding.</p>
	Silver Creek, Village of	<p>Walnut Creek - There is stream bank erosion occurring along Route 20 near the southern corporate limits. Flooding extent along Route 20 in the southern portion of the Village is inaccurate. The area between the two bends frequently floods, but is not shown on the FIRM. The New York State Department of Transportation (NYSDOT) replaced the Main Street / Route 20 Bridge Crossing in 1995.</p> <p>The Main Street / Route 20 Bridge Crossing causes an ice restriction, which can create upstream flooding.</p> <p>At the confluence of Walnut Creek and the Tributary to Walnut Creek, there is a small area of flooding.</p> <p>The area between Karen Drive and Central Avenue is prone to ice jam flooding.</p> <p>The NYSDOT replaced the Central Avenue Bridge Crossing in 2000.</p> <p>The Village Hall Emergency Management Office is located on Central Avenue in an area that is prone to flooding.</p> <p>The Sewer Plant is located on Walnut Creek very close to an area prone to flooding.</p> <p>AO zone along Montgomery Street – Water backs up in this area from Silver Creek and causes flooding.</p> <p>Silver Creek – The upstream reach of the stream within the Village has high banks. There is an area of flooding along the Creek just upstream of the Central Avenue Bridge that is not included on the map. The flood extents in this location are inaccurate.</p> <p>There is a completed bank stabilization project on the upstream side of the Central Avenue Bridge.</p> <p>The NYSDOT replaced the Central Avenue Bridge Crossing in 2000.</p>

Table 26: Summary of Community Floodplain Mapping Needs¹.

County	Community	Summary of Needs/Map Update Justification
Chautauqua (cont'd)	Silver Creek, Village of (cont'd)	<p>The Department of Public Works is located in the floodplain along Silver Creek.</p> <p>The Howard Street Bridge Crossing is a restriction.</p> <p>There is a FEMA funded stream bank stabilization project along Silver Creek just downstream of the confluence with Walnut Creek.</p> <p>At the mouth of Silver Creek there is a large sandbar that blocks flow into Lake Erie. The Village is hoping to work with the USACE to get the sandbar removed.</p> <p>Eroded floodwalls were repaired near all bridge replacement projects within the Village.</p> <p>From NYS DEC 2005 scoping notes: Walnut Creek should be a detailed restudy from the confluence with Silver Creek to the Southern Corporate Limits. There are old floodwalls along this stretch of the stream that are eroded.</p> <p>The flood extents also seem to be inaccurate; areas that flood are not indicated on the map.</p> <p>Silver Creek should be a restudy using detailed methods from the confluence with Lake Erie to the Eastern Corporate Limits. There are old floodwalls lining this stream throughout the Village. The community representatives were unaware of who originally built these walls or who currently is responsible for maintaining them.</p>
Cattaraugus	Westfield, Town of	No specific comment due to lack of participation.
	Westfield, Village of	No specific comment due to lack of participation.

Table 27: Summary of Community Training Needs

County	Community	Training Needed
Cattaraugus	Cattaraugus County ¹¹	Hazard Mitigation Training Building and Enforcement Guidance Planning and Development Training
	Perrysburg, Town of	No data gathered from Community due to lack of participation.
Chautauqua	Chautauqua County	Floodplain Management Training Risk Map Product Training Hazard Mitigation Training Building and Enforcement Guidance
	Arkwright, Town of	No data gathered from Community due to lack of participation.
	Brocton, Village of	No data gathered from Community due to lack of participation.
	Chautauqua, Town of	Floodplain Management Training Risk Map Product Training Hazard Mitigation Training
	Dunkirk, City of	Floodplain Management Training Risk Map Product Training Hazard Mitigation Training Building and Enforcement Guidance
	Dunkirk, Town of	No data gathered from Community due to lack of participation.
	Forestville, Village of	No data gathered from Community due to lack of participation.
	Fredonia, Village of	Floodplain Management Training Risk Map Product Training Hazard Mitigation Training Building and Enforcement Guidance
	Hanover, Town of	No data gathered from Community due to lack of participation.
	Pomfret, Town of	No data gathered from Community due to lack of participation.
	Portland, Town of	No data gathered from Community due to lack of participation.
	Ripley, Town of	Floodplain Management Training Risk Map Product Training

¹¹ Cattaraugus County is not an NFIP participating community. Training request made on behalf of all Cattaraugus County communities in the Chautauqua-Conneaut watershed.

Table 27: Summary of Community Training Needs

County	Community	Training Needed
Chautauqua (cont'd)		Hazard Mitigation Training GIS Mapping
	Sheridan, Town of	Floodplain Management Training Hazard Mitigation Training Building and Enforcement Guidance
	Silver Creek, Village of	No training requested.
	Westfield, Town of	No data gathered from Community due to lack of participation.
	Westfield, Village of	Floodplain Management Training Hazard Mitigation Training Building and Enforcement Guidance

VI. Risk MAP Projects and Needs

FEMA's Risk MAP program allows communities to make informed mitigation decisions by providing products and technologies that communicate and visualize risks. Risk MAP also equips communities with the information and tools they need to develop mitigation programs and actions.

Coastal Studies

As discussed in the Overview section of this report, coastal flood hazard analyses and mapping will be performed for some communities along the shoreline of Lake Erie as a part of the GLCFS. This study will produce revised flood hazard analysis and work maps. Currently there is no scope of work for FIRM production.

Below is a summary of data that will be collected and analysis that will be performed:

1) Creation of Bathymetric and Topographic Map Data Inventory

Topographic data for the coastal areas to be studied will be used for coastal analysis, floodplain boundary delineation, and/or testing of floodplain boundary standard compliance. The topographic data used will be based on the data collected as part of this Discovery process, and will depend on the date and accuracy of existing topographic data. Only topographic data that are of better quality than that of the existing study and effective FISs will be used. New topographic and bathymetric LiDAR, orthoimagery, and [hyperspectral imagery](#) will be used for the coastal study areas and will replace the existing datasets.

2) Base Map Acquisition

Base map data for all counties, including data collected during this Discovery process as an initial inventory will be collected and organized. The necessary permissions from the map sources will be obtained to allow FEMA to use and distribute hard-copy and digital map products using the digital base map. Base map data must comply with FEMA's Guidelines and Standards (G&S).

3) Coastal Flood Hazard Analysis

Response-based computational approaches outlined in FEMA G&S Appendix D.3, dated May 2012 (FEMA, 2012), will be used to perform coastal flood hazard analysis for the Lake Erie shoreline and areas subject to coastal flooding or more recent requirements depending on the date of contract and requirements current at the time. Coastal flood hazard analyses include some but not all of the following components:

- Wave setup;
- Erosion;
- Wave runup;
- Wave overtopping;
- Overland wave propagation; and
- Primary frontal dune identification (where applicable).

A transect-based approach for assessing coastal flood risks along Lake Erie will be used.

The 1.5-foot breaking wave height will be selected from the Wave Height Analysis for Flood Insurance Studies' results and used to define the landward limits of the Limit of Moderate Wave Action (LiMWA) as described in FEMA Procedure Memorandum No. 50, updated in 2012.

Coastal flood hazards will be mapped as outlined in FEMA's G&S Appendix D.3, dated May 2012 (FEMA, 2012). Flood hazard mapping will extend to the landward limit of coastal flooding as a result of wave run ups or storm surge, whichever is higher.

Coastal flood maps (or work maps) will be produced for the study area. The work maps will include the 1- and 0.2- percent-annual-chance SFHA, Coastal High Hazard Area (Zone VE), BFEs, and LiMWA. Communities will be provided with an opportunity to review the work maps after the coastal modeling is complete and before FEMA moves forward with updated coastal flood maps.

Mitigation Projects

During the Discovery process, FEMA, NYSDEC, and RAMPP met with the communities and discussed their recent and current mitigation projects. Based on the results of the Lake Erie coastal study, the communities can determine if their existing projects and programs are adequate or if they would benefit from additional mitigation measures.

Technical assistance is available through Risk MAP to help communities identify, select, and implement activities to support mitigation planning and risk reduction. Activities could include (but are not limited to):

- Advising in the creation of initial HMPs;
- Advising in the update of existing HMPs;
- Training to improve a community's capabilities for reducing risk;
- Assisting in incorporating flood risk datasets and products into potential and effective community legislation, guidance, regulations, procedures, etc.;
- Assisting with creating, acquiring, and incorporating GIS data into potential and effective maps, planning mechanisms, emergency management procedures, etc.; and
- Facilitating the identification of data gaps and interpreting technical data to identify risk reduction deficiencies that should be corrected.

Regulatory Considerations

Coastal Special Flood Hazard Areas

The Lake Erie Coastal Flood Study analysis may result in new SFHAs, or areas that will be inundated by a flood event having a 1-percent annual chance of being equaled or exceeded in any given year. The 1 percent-annual-chance flood is also referred to as the base flood or 100-year flood. SFHAs labeled as Zone AE have been studied by detailed methods and show BFEs. SFHAs labeled as Zone VE are along coasts and are subject to additional hazards from storm-induced velocity wave action. BFEs derived from detailed hydraulic analyses are shown within these zones.

The NFIP shows coastal flood hazards in two different zones on its FIRMs:

- Zone VE, where the delineated flood hazard includes wave heights equal to or greater than 3 feet; and
- Zone AE, where the delineated flood hazard includes wave heights less than 3 feet.

These zones were discussed in greater detail during the Discovery meetings.

Building Requirements in VE Zones

The zone designation and the BFE are critical factors in determining which requirements apply to a building and, as a result, how the structure must be built. The NFIP minimum requirements for buildings constructed in Zone VE (Coastal High Hazard Areas) are as follows:

1. The building must be elevated on pile, post, pier, or column foundations.
2. The building must be adequately anchored to the foundation.
3. The building must have the bottom of the lowest horizontal structural member at or above the BFE, with NYSDEC requiring a minimum of 2 feet above the BFE.
4. The building design and method of construction must be certified by a design professional.
5. The area below the BFE must be free of obstructions.
6. Enclosures must be made of lightweight wood lattice, insect screening, or breakaway walls.

Communities participating in the NFIP that have mapped VE Zones must adopt floodplain management regulations that meet or exceed the minimum NFIP and New York State requirements described above.

LiMWA

Post-storm field investigations and laboratory tests have confirmed that waves heights as low as 1.5 feet can cause significant damage to structures that are constructed without consideration of coastal hazards. Additional flood hazards associated with coastal waves include floating debris, high velocity flow, erosion, and scour, which can cause damage to Zone AE-type construction in these coastal areas.

To help community officials and property owners recognize this increased potential for damage due to wave action in the AE Zone, FEMA issued Procedure Memorandum 50 in December 2008, as modified by Operating Guidance No. 13-13 Oct. 30, 2013, which provides guidance on identifying and mapping the 1.5-foot breaking wave height line, referred to as the Limit of Moderate Wave Action (LiMWA). The LiMWA alerts property owners on the lakeward side of this line that although their property is in a Zone AE area, it may also be affected by breaking waves of 1.5 feet to just below 3.0 feet. Consequently, it is important to be aware of the area between this waterward limit and the Zone VE boundary, as the area may face a high risk—though not as high as Zone VE. Figure 6 depicts the LiMWA zone location.

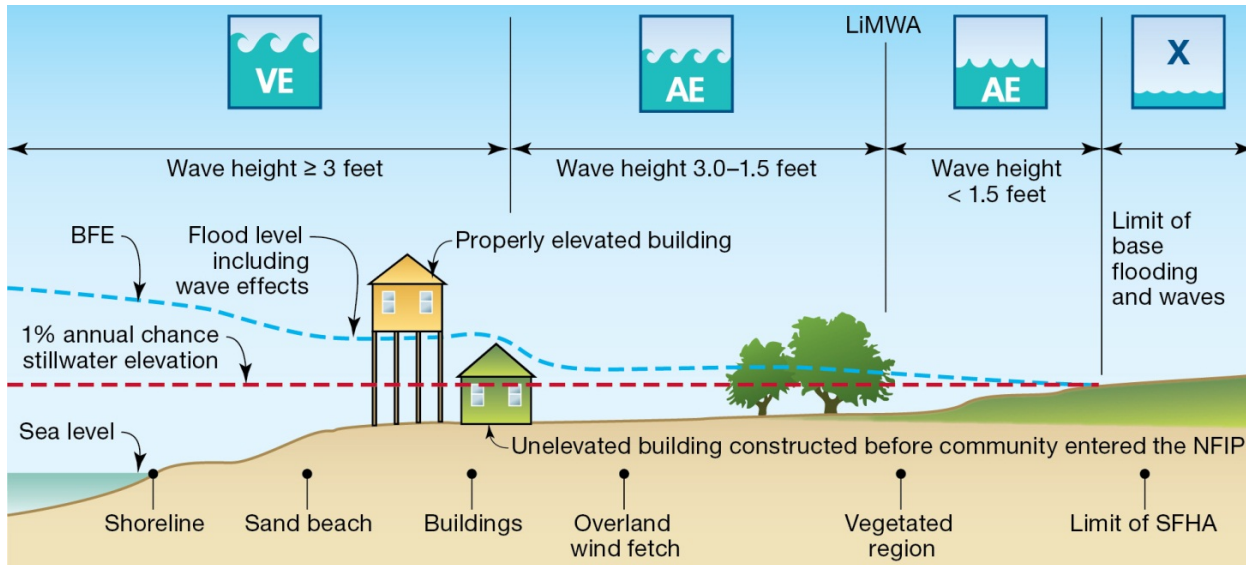


Figure 6: Limit of Moderate Wave Action

A new line layer will be added to the FIRM Database to accommodate the LiMWA features. The new layer will also be depicted on updated FIRM panels. The LiMWA will be identified in the FIRM legend as “Limit of Moderate Wave Action,” and a note will be included in the “Notes to Users” section on the map panel to explain the LiMWA boundary.

Figure 7 is an example FIRM showing the delineated LiMWA. The area in Map A shows the delineation of the LiMWA in an area where the predominant coastal flood hazard is overland wave propagation. Map B shows the delineation of the LiMWA in a region where the major coastal flood hazard is breaking waves and wave runup. The triangle along the LiMWA line points toward the source of the breaking waves.

While FEMA does not impose floodplain management requirements based on the LiMWA, the LiMWA is provided to help communicate the higher risk that exists in that area. Because the 1.5-foot breaking wave in the LiMWA zone can potentially cause foundation failure, communities must adopt building construction standards similar to those in Zone VE in those areas. For communities that do adopt Zone VE building standards in the area defined by the LiMWA, additional CRS credits are available. Additional information on CRS can be found [online](#).

Mapping the LiMWA provides community officials and other stakeholders with additional important flood risk details to consider when buying/developing, mitigating, or enforcing floodplain management regulations in coastal flood hazard areas. When a LiMWA has been mapped, specific building codes may apply lakeward of the line.

Residents and business owners living or working in the LiMWA zone should be aware of the potential wave action along with floating debris, erosion, and scour that could cause significant damage to their property. They are encouraged to build safer and higher than the minimum local requirements in order to reduce the risk to life and property.

While the risk of damage is higher between the LiMWA line and the Zone VE line than it is in other parts of the coastal AE Zone, the NFIP flood insurance rates currently do not differ from other AE Zone rates.

The federal mandatory purchase requirement does apply in these zones, and property owners are encouraged to carry coverage equivalent to the replacement cost of their building and to include contents coverage.

For additional background information on the LiMWA, please refer to FEMA [Procedure Memorandum No. 50](#) and [Operating Guidance No. 13-13](#).

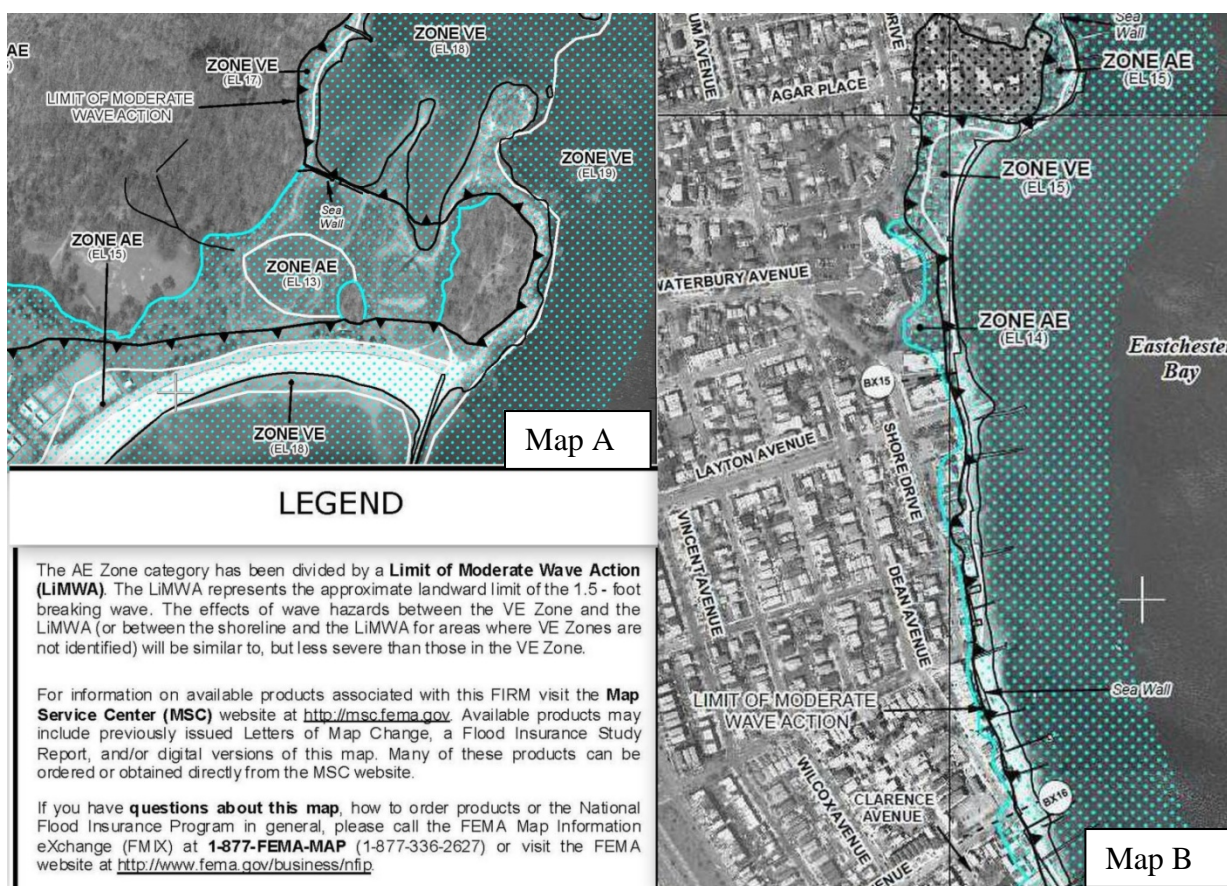


Figure 7: Example FIRM Showing LiMWA

VII. Conclusion

The current effective Flood Insurance Studies for communities in the Chautauqua-Conneaut Watershed range in date from 1971-1984. Due to the age of these effective studies, there are no communities within the watershed that have digital floodplain products available. The Chautauqua-Conneaut Watershed communities have expressed concern with current mapping accuracy, paper products, and lack of information to make accurate floodplain management determinations. As noted in the Demographics section of this Report, the watershed's slow, but steady, population growth offers local jurisdictions the opportunity for thoughtful floodplain mitigation and management. Municipalities with the greatest need are along the Lake Erie Shoreline and surrounding Chautauqua Lake. The remaining communities are still very rural in nature and have very little development pressure. The quality of the available flood data and lack of digital products makes floodplain management and mitigation difficult. Continued vigilance must be maintained so that as development pressure increases, good building practices continue for communities within the watershed.

Stream extents that have been discussed as priority needs (as shown in Table 26: *Summary of Community Floodplain Mapping Needs*) and warrant updated studies include Slippery Rock Creek, Mill Creek, Chautauqua Lake, Canadaway Creek, Cattaraugus Creek, Silver Creek, Beaver Creek, Walnut Creek, Chautauqua Creek, and Lake Erie.

To supplement the needs discussed as part of this process, NYSDEC meeting notes from 2005 include the following priorities:

1. Sunset Creek, formerly known as Snake Creek, should be studied as a detailed study.
2. Crooked Brook in the Town of Dunkirk should be studied using detailed methods for its entire length to the headwaters in the Town of Sheridan.
3. Halfway Brook in the Town of Hanover should be studied using detailed methods.
4. Walnut Creek in the Village of Silver Creek should be studied using detailed methods.
5. Silver Creek in the Village of Silver Creek should be restudied.
6. Canadaway Creek in the Town of Dunkirk should be studied by detailed methods.
7. Cattaraugus Creek in the Town of Hanover should be studied by detailed methods.
8. Slippery Rock Creek in the Village of Brocton should be studied by approximate methods.
9. The unnamed Creek running along Hamilton Road in the Town of Ripley should be studied with approximate methods.
10. The unnamed creek running along Rte 76 in the Town of Ripley should be studied with approximate methods.

Many of the communities participating in this Discovery process expressed an interest in receiving training. Training in the NFIP is essential for the community floodplain managers who must administer their NFIP based local ordinances. Communities cannot be compliant with the NFIP and meet its intended goals if their officials and staff do not understand its requirements. Communities in the Watershed are encouraged to seek out training opportunities and to become familiar with floodplain management development requirements. Information on the NFIP's building requirements in the SFHA can be found in Attachment 2: *Floodplain Construction Requirements in New York State*.

VIII. Deliverables

Communications (Supporting materials available in Appendices C, and H-M)

Contacts

Stakeholders

Notifications/Invitations

A. *Discovery Meeting Notification via emails (WebEx) and paper copies (in-person meetings)*

B. *Meeting notes distributed via email and through RAMPP website*

Information Exchange (Supporting materials available in Appendix N)

Community Data Worksheets

Discovery Meeting (Supporting materials available in Appendices K-N)

Agenda

Presentation

Sign-In Sheet

Discovery Meeting Map

Meeting Minutes

Evaluations

Discovery Deliverables

Report

Project Area Map

Final Discovery Maps

Tabular Data, including Data Sources and Mapping Needs

Geodatabase

CNMS Database Updates

Due to file size, the Discovery meeting maps and CNMS database have not been included in the Discovery report. Maps and data are available through NYSDEC for review upon request.

IX. References

Federal Emergency Management Agency, www.fema.gov

FEMA, Map Service Center. <https://msc.fema.gov/portal>.

Federal Emergency Management Agency, HAZUS flood loss estimation.
<http://www.fema.gov/HAZUS>.

FEMA, Disasters, <http://www.fema.gov/disasters>.

FloodSmart, the official site of the National Flood Insurance Program (NFIP):
www.floodsmart.gov

National Committee on Levee Safety: <http://www.leveesafety.org/>.

National Weather Service Ice Jam Information:
<http://www.weather.gov/media/aly/Hydrology/IceJamInfo.pdf>

New York State Department of Environmental Conservation: <http://www.dec.ny.gov/>

NFIP Reform: www.fema.gov/bw12

Risk Assessment, Mapping and Planning Partners: www.RAMPP-team.com/ny.htm

U.S. Census Bureau, 2010, State and County Quick Facts, <http://quickfacts.census.gov/>,
accessed November 2014.

U.S. Fish and Wildlife, Coastal Barrier Resources System: <https://www.fws.gov/ecological-services/habitat-conservation/coastal.html>

USGS National Water Information System: <http://nwis.waterdata.usgs.gov/ny/nwis/peak>

U.S. Department of Agriculture, New York Rapid Watershed Assessment Profile:
<http://www.nrcs.usda.gov/wps/portal/nrcs/main/ny/technical/dma/rwa/>

USDA 2007 Census of Agriculture:
<http://www.agcensus.usda.gov/Publications/2007/index.php>