

**INCORPORATED VILLAGE OF
MAMARONECK, NEW YORK**

May 2012

**FINAL
LOCAL MULTI-HAZARD
MITIGATION PLAN**



PREPARED BY:



**Environmental
Technology
Group, Inc.**

300 WHEELER ROAD, SUITE 307, HAUPPAUGE, NEW YORK 11788

INCORPORATED VILLAGE OF MAMARONECK, NEW YORK

LOCAL MULTI-HAZARD MITIGATION PLAN

May 2012

Submitted to

Village of Mamaroneck

**123 Mamaroneck Avenue
Mamaroneck, New York 10583**

Prepared By



**Environmental Technology Group Inc.
300 Wheeler Rd., Suite 307
HAUPPAUGE, NY 11788**

Village of Mamaroneck, NY Local Multi-Hazard Mitigation Plan

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Incorporated Village of Mamaroneck: Multi-hazard Mitigation Plan

Preface and Summary Statement

This Local Multi-Hazard Mitigation Plan for the Village of Mamaroneck identifies and assesses natural and manmade hazards that could adversely impact the community and proposes and evaluates feasible mitigation activities for the village, which could reduce the hazard's impacts. The plan applies to the jurisdiction of the Village. The Village will coordinate with any future multi-jurisdictional plan prepared by Westchester County. The main body of the Plan follows the Federal Emergency Management Administration (FEMA) guidance used to develop hazard mitigation plans. Where applicable, Geographic Information Systems (GIS) maps are used in this plan. The plan includes an appendix with supporting documents and articles and hazard analyses details which were discussed in the main part of the plan.

The Village of Mamaroneck, New York, incorporated in 1895, is an incorporated municipality located within the Town of Mamaroneck and the Town of Rye in south eastern Westchester County along Long Island Sound at 40.5559 North Latitude and 0734334 West Longitude. (See Figures 0-1 and 0-2) The area is bounded on the north by the City of Rye and the Town/Village of Harrison, NY, to the west and south by the Town of Mamaroneck and to the East by Long Island Sound. (See Figure 0-2.) Mamaroneck was originally a farming community located on both sides of the Mamaroneck River.

The portion of the village which is located on the east side of the Mamaroneck River is within the Town of Rye and is also known as Rye Neck. Today the Village is largely a residential and commuter community on Long Island Sound. It has a major inland harbor and facilities to build and service large pleasure boats and yachts.

Mamaroneck has a temperate coastal climate with an average high July temperature of 81.7 degrees Fahrenheit. The average minimum temperature in January is 28 degrees. The highest and lowest recorded temperature since 1948 in White Plains was 102 degrees in 1966 and minus10 degrees in both 1961 and 1979, respectively. The average annual rainfall is 50.24 inches.



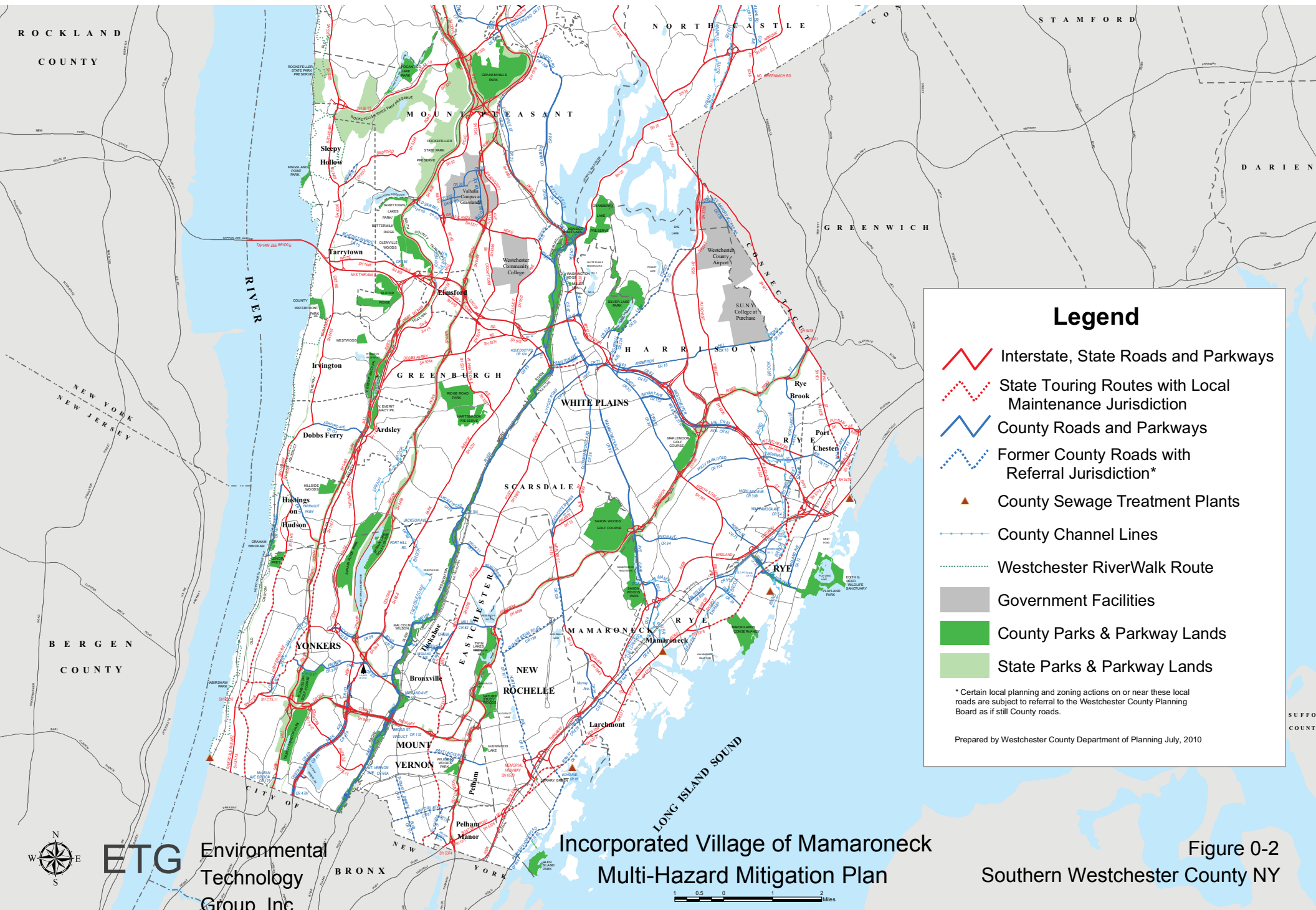
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Group, Inc.

300 WHEELER ROAD, SUITE 307, HAUPPAUGE, NEW YORK 11788

Project Name
Incorporated Village of Mamaroneck
Multi-Hazard Mitigation Plan

Figure Title
Regional Location Map
for Mamaroneck, NY

Figure 0-1
DWN BY: AJZ
CHK BY: JB
SCALE: AS SHOWN
DATE: 04/27/12



The Village is home to a number of distinct residential neighborhoods, each with its own characteristics. Along the Sound, there are Shore Acres, several homes in the Greenhaven section, and Orienta; areas where all properties were previously owned by wealthy families from New York City, and utilized as summer residences.

Heathcote Hill overlooks the harbor. Harbor Heights, at the northeastern corner of the Village was developed in the 1920's. The Old Rye Neck area is populated with older homes built in the 1880's along North Barry and Melbourne Avenues. Further east in Rye Neck, neighborhoods began to develop in the 1920's and 1930's. The Washingtonville area, first developed before the Civil War, is encircled by higher ground, making it especially susceptible to flooding.

The main commercial areas are Mamaroneck Avenue from 1-95 to Boston Post Road (U.S. Route 1). An industrial and light manufacturing area is located along Fenimore Road and Waverly Avenue.

Interstate 95, a major highway serving the north east corridor from New York City to Boston, cuts across the northwestern section of the village. It is the busiest transportation route in the northeast. The local railroad from New York City, the New Haven line of Metro North, runs north/south through the center of the village. Today the village of Mamaroneck is a commuter's home for individuals working in Manhattan.

Mamaroneck was at one time the location of summer residences for wealthy families from New York City. A harbor on the Long Island Sound supports facilities for pleasure boating and also contains a large park with sporting facilities. The enclosed harbor with its park is a valued resource to the community and is used by residents to participate in sports or relax and enjoy the view of the harbor and its surroundings.

The Harbormaster oversees the Village's nine miles of shoreline. There are numerous yacht clubs, boat yards and marinas located along the coastline, containing approximately 800 boat slips and 400 moorings. Beach Clubs can also be found along the Sound. Harbor Island Park is the centerpiece of the waterfront community. It provides a public beach, soccer, softball and baseball fields and a tennis facility.

The Village population grew from about 1,500 in 1895, when it was a small farming community, to just under 18,930 for the 2010 census. The census of 2010 showed little population increase of 0.9% to 18,930 people since 2000 and 6,998 occupied housing units in the village. In 2009 there were 6495 households in the village with a median income of \$94,396. The population density was 5,799.4 inhabitants per square mile (2,239.2 /km²) and 7,353 housing units at an average density of 2,274.1 per square mile (878.0 /km²). The racial makeup of the village in 2010 was 65.3% White, 3.7% Black or African American, 0.1% Native American, 4.8% Asian, 0.4% from other races, and 1.4% from two or more races. Hispanic or Latino of any nationality was 24.3% of the population.

In 2000 about 4.2% of families and 6.9% of the population were below the poverty line, including 6.7% of those under age 18 and 9.0% of those ages 65 or over. Males had a median income of \$52,103 compared to \$40,186 for females. The per capita income for the village was \$36,926.

The Village of Mamaroneck is protected by 5 volunteer fire companies of the Village of Mamaroneck Fire Department (VMFD) that operate out of 4 Fire Stations, located throughout the village. The combined volunteer fire companies operate a total of 5 Engines, 2 Trucks, 3 Utility Units, and 3 Command Vehicles. The combined volunteer fire companies respond to approximately 1,000 emergency calls annually.

The village has a total area of 6.7 square miles, of which 3.2 square miles is land and 3.5 square miles or 52%, is water with approximately 9 miles of coastline. The Village Department of Public Works maintains approximately 46 miles of roadways and has 50 employees.

The Village is situated immediately adjacent to the Long Island Sound. The village terrain slopes upward from Long Island Sound on the east and ranges from sea level at the Mamaroneck Harbor to 50 feet above sea level in the west central part of the Village (see Figure 4-1). Elevations range from 300 feet on the western boundary to 10 to 15 feet at the shores of Long Island Sound. The Mamaroneck River which runs north to south through the area, contributes to frequent flooding. Drainage from the Village flows mostly into the harbor and then into the Sound.

The majority of the Village is located in designated flood zones according to the Village Flood Insurance Rate Maps (FIRM) and Flood Insurance Study (FIS). (See Figure 4-2)). Accordingly, the Village is prone to, and, has experienced serious flooding problems over the years.

The Village operates under a Council-Manager form of government, where the elected Mayor and four Trustees set Village policy and the Manager oversees the day to day operations of the Village. The Village administration is responsible for services which include fire and police protection, public works, snow removal, street and sewer repair and park maintenance. The Village Department of Public Works performs solid waste collection and recycling. The Village organization and services are discussed further in Section 1A.

The Village receives most of its water from a system owned and operated by Westchester Joint Water Works, a public benefit corporation of the Village of Mamaroneck, Town of Mamaroneck, and Town/Village of Harrison, established through state law. The Water Works provides potable water to its member communities. The Waterworks also conveys water to portions of the City of Rye, the City of New Rochelle, and the Village of Larchmont, as well as the private system operated by United Water, New Rochelle

This Multi-Hazard Mitigation Plan follows the Community Rating System (CRS) planning process and FEMA regulations and guidelines for State and local mitigation planning. (See 44 CFR Part 201 and FEMA Example Plans, 2003.) The requirements for the Hazard Mitigation Planning and Hazard Mitigation Grant Program are described in the Federal Register (Vol. 67 No. 38/February 26, 2002). The approach involves collecting and profiling hazard information, assessing hazard impacts, setting goals and objectives, developing and reviewing mitigation alternatives, evaluating risks and benefits, establishing priorities and preparing a course of action. This plan also satisfies requirements for several federal programs. Target grant and insurance rate reduction programs include, but are not limited to:

- FMA, (Flood Mitigation Assistance Program)
- PDM (Pre-Disaster Mitigation Grant Program)
- HMGP (Hazard Mitigation Grant Program)
- DMA 2000 (Disaster Mitigation Act of 2000)

The DMA 2000 amends the Robert T. Stafford Disaster Relief and Emergency Assistance Act by adding a section, which places emphasis on Mitigation Planning. It requires local governments to have an approved “All-Hazard Mitigation Plan in place to be eligible to receive Hazard Mitigation Grant Program funding. The plan must also include criteria established in 44 CFR Part 201.6 Hazard Mitigation Planning and Hazard Mitigation Grant Program. Requirements and criteria for developing the Plan are specified in this regulation. This Multi-Hazard Mitigation Plan for the Village of Mamaroneck incorporates all probable hazards in accordance with these requirements. Completion and approval of a Multi-Hazard Mitigation Plan is required by federal regulations in order to receive funding for flood prevention and storm protection projects or other FEMA Programs. For disasters declared after November 1, 2004 a local government must have this Plan approved by FEMA in order to receive grants.

The flood hazards mitigation portion of this plan can be used as the first step in getting approval for the Community Rating System (CRS) Program. This Program is a National Flood Insurance Program (NFIP) that provides incentives for the communities to complete activities that reduce flood hazards risks. When a community completes these activities, the insurance premiums of these policyholders can be reduced. This Plan, subsequent filing of an application, and receiving approval are necessary for qualifying for this Program. Under the CRS Program, each homeowner’s flood insurance cost could be reduced from 5% to 50%.

Mamaroneck is a densely populated community, which has, on several occasions, been impacted by major storms, floods and other hazards that have caused damage to property. (See Section 4.) Flooding has long been identified as a major problem in the Village. The Village Storm Water Management Program Annual Report (MS4) for 2010 Draft and earlier years is available online. (http://www.village.mamaroneck.ny.us/Pages/MamaroneckNY_Stormwater/index).

These reports discuss the Village’s program for managing flood problems.

This Multi-Hazard Mitigation Plan is the result of a process that involved the work of the consultant, the Environmental Technology Group (ETG), Inc. and the Village Hazard Mitigation Planning Committee, Village Board of Trustees, the Mayor’s Office, Village Manager and Assistant Village Manager, operating departments of the Village, Mamaroneck Fire Department,

Police Department, Public Works, participating citizens, Westchester County Department of Emergency Services and the New York State Office of Emergency Management (SOEM).

The purpose of this Plan is to address both the past and possible future hazards and to develop action items and a program, which the Village can implement to protect its citizens' businesses, and their property. This Plan is divided into 10 Sections. Each of the sections is a step in the FEMA process that addresses a phase in the planning process. The process is based on FEMA's guidance and example plans dated March 2003. These first 8 steps are:

Step 1 Organize Resources

Step 2 Involve the public, by creating a working committee and through public meetings

Step 3 Coordinate with other agencies and Organizations

Step 4 Assess the Hazards

Step 5 Assess the Problems

Step 6 Set Goals and Objectives

Step 7 Review Possible Activities

Step 8 Prepare a Draft Action Plan

These Steps represent the Multi-Hazard Mitigation Plan development. The last two Steps are action items for the Village to take once the Plan is approved by FEMA following its adoption by the Village Board of Trustees. They are:

Step 9 Implement, Evaluate and Revise the Plan

Step 10 Adopt the Plan.

The plan process involves identifying all possible hazards that could harm people in the community or damage buildings and structures. A profile of each hazard is prepared and each hazard is ranked according to their importance. Rating and ranking of scores are developed using the New York State Hazards NY (HAZNY) computer program. (See Section 4C.) This assessment is based on the frequency of occurrence, extent of impact, severity of impact to property and people, cascading effects on other hazards, duration of the hazard, warning time prior to onset of the hazard, and recovery time from the hazard. Based on this analysis and the

hazard assessment in each profile, only the most significant hazards were analyzed further for a detailed impact analysis, proposed mitigation measures and a cost benefit evaluation. Priorities were then established for mitigation activities based on these analyses and the goal and objectives set for the community.

This Plan contains information obtained from a variety of federal, State and local sources. (see Section 3, Coordination with Other Agencies.) The accuracy of this information has been verified to the best extent possible. For the majority of hazards evaluated in Section 4D and 4E (such as hurricanes, high winds, blizzards and ice storms), specific locations or extent of damages could not be specified since the entire Village is at risk. Flood information shown on the maps in this Plan is approximate and is based on existing data sources such as current Flood Insurance Rate Maps (FIRM) and Flood Insurance Studies (FIS). Information on these maps is regarded as acceptable for planning purposes.

The public participation program is discussed in Section 2 of this plan. Village residents participate and provided input in public meetings and expressed concerns about the flood hazards they face on a regular basis. The Village Manager and staff have met personally with several residents who are impacted by local flooding. The residents provided strong support for actions that would correct the problems.

The public will continue to be involved in the revision and updating process. Public meetings on key issues will continue and notices ad progress will be published in local papers. The Village will post updates on their Website <http://www.village.mamaroneck.ny.us/Pages/index> . The Village will also send e-mail updates as well.

This Plan will be updated and modified by the Village according to Step 9 in Section 9. Updates will include the success of implementing the Plan's activities, availability of funds, availability of new information and changes in priorities.

Village of Mamaroneck: Multi-Hazard Mitigation Plan

Section 1 – Planning Process

1.A Introduction and Background

This Local Multi-Hazard Hazard Mitigation Plan includes the single jurisdiction of the Village of Mamaroneck, NY located in the southern portion of Westchester County adjacent to the Town of Mamaroneck. (See Preface, Figures 0-1, 0-2, and Figure 1-1). The Federal Emergency Management Administration (FEMA) requires municipalities to compile a structured “pre-hazard mitigation plan” to qualify for a number of FEMA grant programs. Prior to these requirements, local governments could choose if they wanted to implement a hazard mitigation plan or a Flood Mitigation Action Program in order to qualify for FEMA funds. Following the devastating floods of 2007, the village of Mamaroneck completed a Flood Mitigation Action Plan under earlier FEMA guidelines and submitted a final version of the flood plan in February 2008. Subsequently, the Village was required to prepare a Multi-hazard Mitigation Plan that meets current Federal requirements if it applies for FEMA funding. FEMA authorized \$37,500 in Fiscal Year 2010 under the Pre Disaster Mitigation program for the Village of Mamaroneck, NY, Multi-hazard Mitigation Project. A major objective of a Hazard Mitigation Plan is to prevent or mitigate hazards that would otherwise require an emergency response under the National Incident Management System (NIMS) which is administered by FEMA.

This Multi-Hazard Mitigation Plan is based on the 10-Step Community Rating System (CRS) planning process and FEMA regulations and guidelines, which were discussed in the Preface. This Plan follows the process described in the FEMA State and Local Mitigation Planning How to Guides (FEMA 386 Parts 1-4, FEMA, 2003a) and follows the FEMA example Plans (FEMA 2003b). The New York State Office of Emergency Management (NYSOEM) oversees the process and reviews and comments on the draft plan.

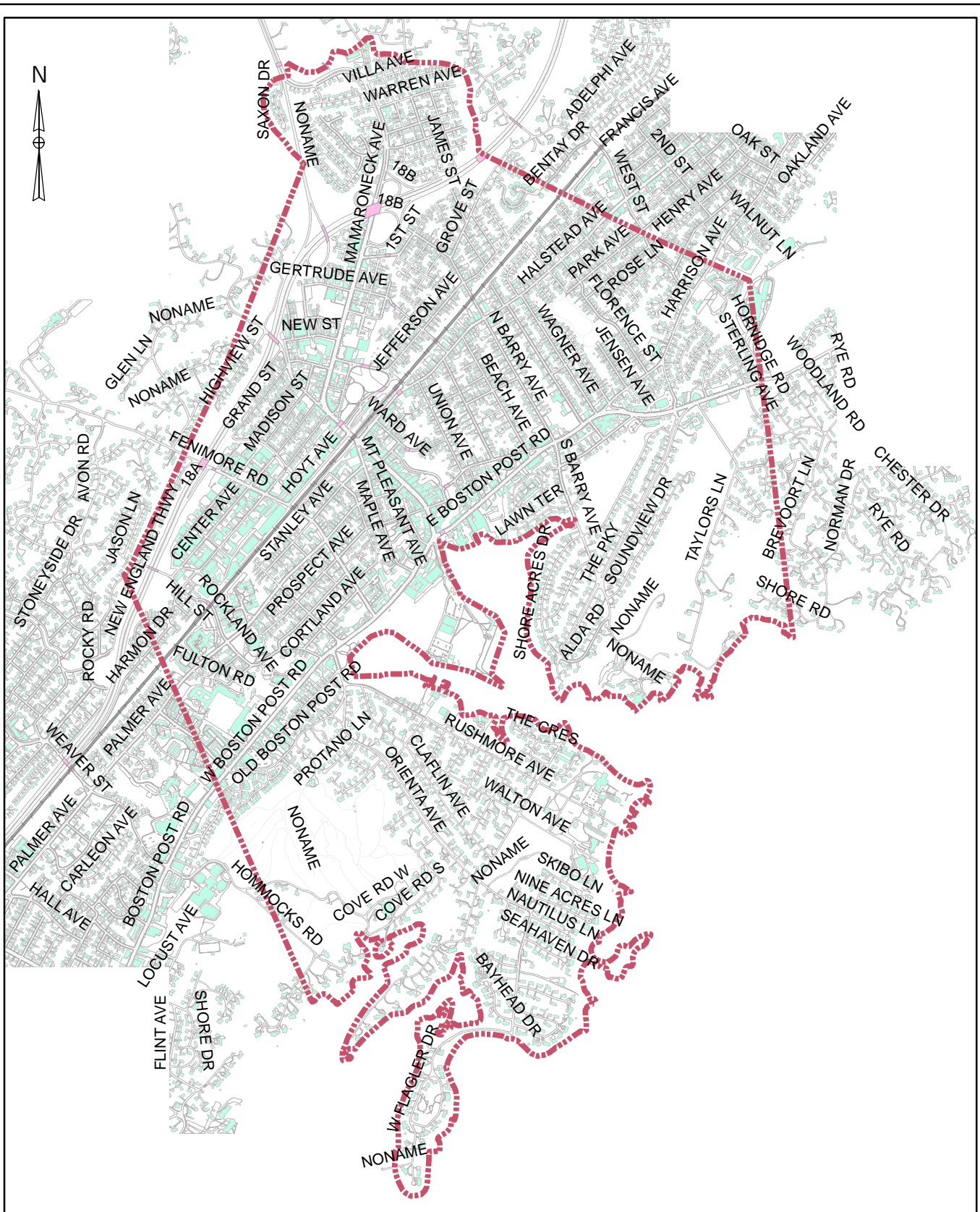


Figure 1-1
Village of Mamaroneck Boundary
Incorporated Village of Mamaroneck
Multi-Hazard Mitigation Plan

Legend

 Municipal Boundaries

DWN BY: YS
CHK BY: JB
SCALE: AS SHOWN
DATE: 03/21/12



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300 WHEELER ROAD, SUITE 307, HAUPPAUGE, NEW YORK 11788

0 1,250 2,500 3,750 5,000 Feet

Basemap information by Westchester County GIS

The elected Mayor and Board of Trustees govern the Village activities (See Figure 1-2) and is supported by a full-time Village Manager and Assistant Village Manager, who are responsible for managing the Village's day-to-day operations. The Manager also carries out the policies and directives enacted by the Board. The Village administration is responsible for departmental services such as fire and police protection, public works and building inspections (See Table 1-1). Services include garbage and recycling, fall leaf collection, snow removal, street and storm and sanitary sewer repair, park maintenance and other services such as parking, building permits, zoning and planning issues and code enforcement.

Table 1-1. Village of Mamaroneck Administrative Departments.

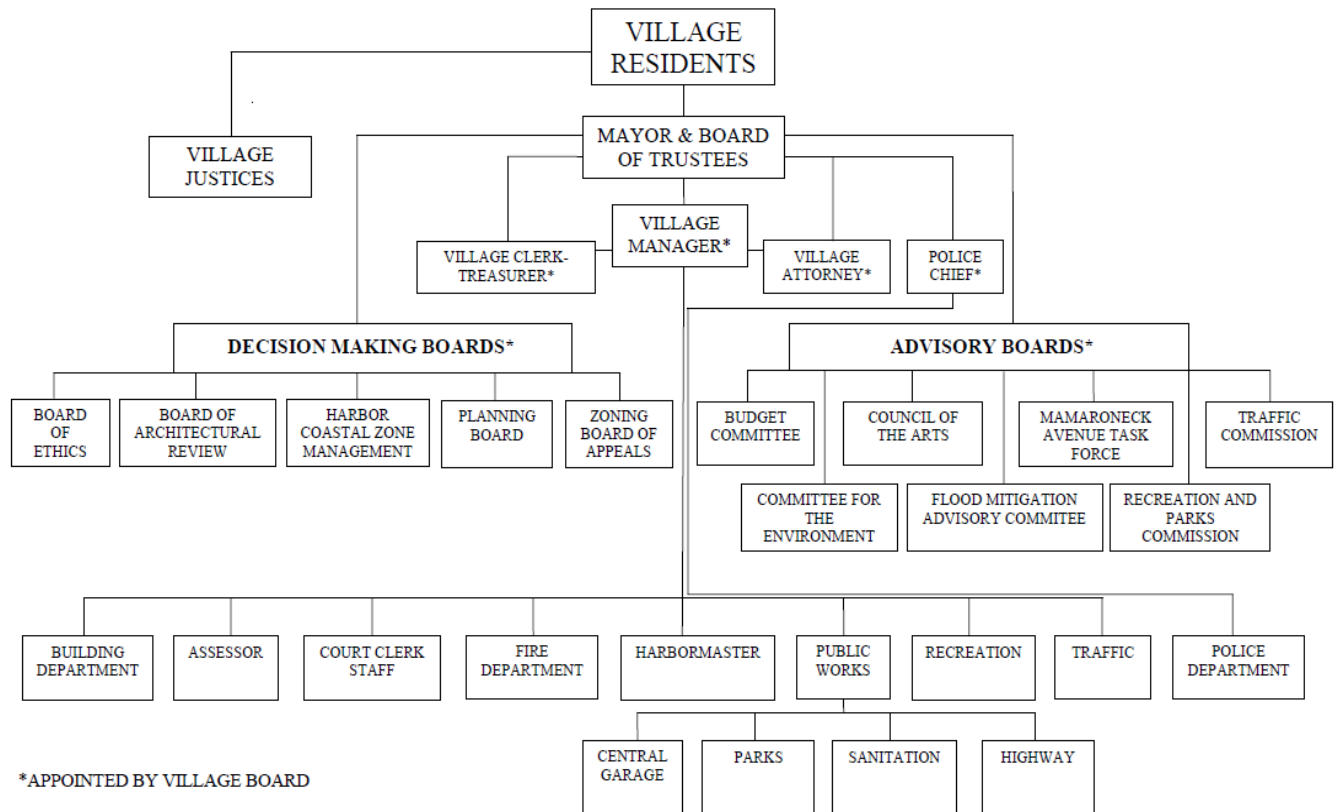
Assessor	Harbormaster	Public Works
Building Department	Police Department	Recreation
Village Clerk – Treasurer	Traffic	Village Attorney
Fire Department	Manager	EMS (Town of Mamaroneck Ambulance District)

Organizing the Village resources is a first step in the planning process. The Village's administrative staff was critical in organizing the multi-hazard mitigation planning team and in working closely with the consultant during the development of the Plan. The Village Manager, Richard Slingerland, Assistant Daniel Sarnoff and the Village staff were active in coordinating resources and public involvement and providing information for the development of the Plan.

In addition to the village administrative departments, there are several boards, commissions and committees that make decisions, provide oversight, input, regulation and advice for various village functions. (See Figure 1-2.) These include budget, traffic, master plans, planning, parks and recreation, harbor and coastal zone and flood mitigation actions. Several of these boards may be active in developing and implementing this Hazard Mitigation Plan.

Figure 1-2.

VILLAGE OF MAMARONECK ORGANIZATIONAL CHART



A kickoff meeting to plan and organize the process was held with Village officials on April 18, 2011 at the Mamaroneck Village Hall. Figure 1-3 shows the roles and responsibilities established for the planning process. Supervision and direction of the process is discussed in Section 1B. Key meetings and other milestones are given in the following Section 2, Table 2-1.

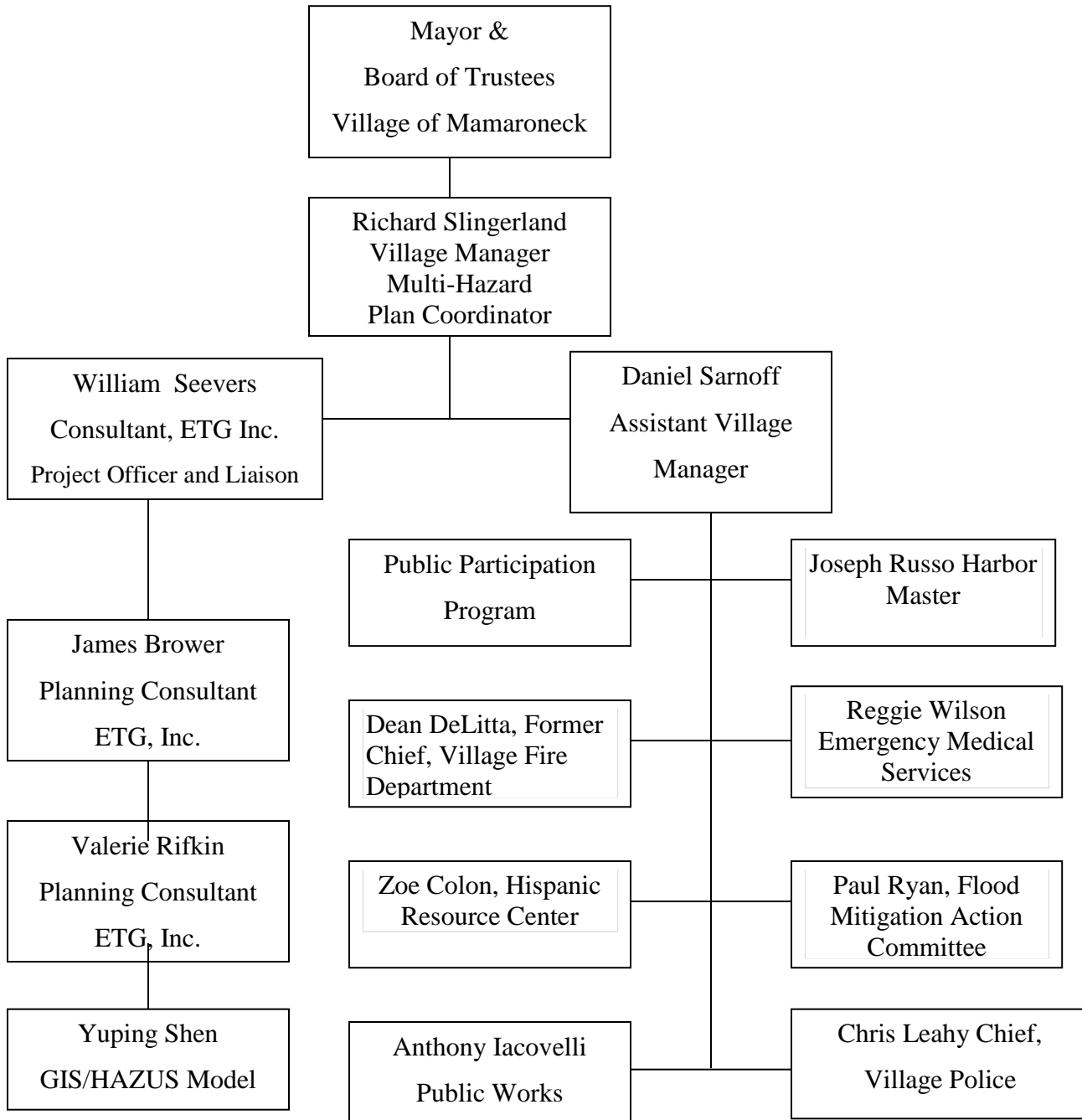
This hazard mitigation planning process involves organizing Village resources, identifying and assessing hazard risks, developing a hazard mitigation plan, and implementing and monitoring the progress of the plan. The process included the Mamaroneck Village staff organizing and forming a project team and coordinating the Village staff. The process included input, review and comment from the Village staff, Trustees, public citizens and stakeholders at several steps in developing the Plan. Village officials, the Planning Committee, and community participants' review and comment on the Plan. NYSOEM also reviews the Plan prior to its final approval. Using a "Crosswalk Process" FEMA reviews and comments on the plan and comments on the draft plan are resolved prior to approval. The Draft Final Plan is presented to the Village Board of Trustees for approval and acceptance and then forwarded by NYSOEM to FEMA for their final review and approval. The project team, participating citizens and organizations involved in the planning process are discussed below.

Figure 1-3 shows the organization and responsibilities for the planning process. Key to the success of the process was the coordination of Village officials, the Consultant, stakeholders and the public.

1.B Supervision and Direction of the Plan

Richard Slingerland, the Village Manager, was the designated coordinator of the Multi-Hazard Mitigation Plan (see Figure 1-3). The Environmental Technology Group, Inc. (ETG), Inc. managed the consultant planning activities. James E. Brower, Ph.D. an Environmental Planner, supervised and advised the planning efforts. The plan was prepared with the assistance of the Village staff and the Planning Committee.

**Figure 1-3. Responsibilities for Developing
Mamaroneck's Multi-Hazard Mitigation Plan.**



ETG worked closely with the manager and Assistant Manager, the Planning Committee and other Village officials in developing the Plan. William J. Seevers of ETG, served as the Consultant Project Officer and liaison with consulting personnel. Valerie Rifkin assisted in collecting, researching and reviewing documents, evaluating hazard information, assessment of the hazards and in preparing several sections of the Plan. The GIS mapping and HAZUS modeling and technical assistance were provided by ETG consultant Yuping Shen.

1.C Hazard Mitigation Planning Committee

A Hazard Mitigation Planning Committee was appointed by the Administrator to provide input, guidance, review and information needed to develop the Multi-Hazard Mitigation Plan. (See Figure 1-3) It contained key representatives of the Village who provided various services for the Village affected by the proposed plan. Richard Slingerland served as the Chairperson of the Hazard Mitigation Planning Committee. Members of the Committee are listed in Figure 1-3 and consist of Village staff and public citizens who are familiar with the potential hazards facing the Village. Daniel Sarnoff, the Assistant Village Manager served as the primary point of contact for the mitigation planning consultant and the Planning Committee.

The Planning Committee was knowledgeable of the Village needs and was very active and involved in the Plan development. Two public citizens served on the panel and contributed significantly. The viewpoints of the committee regarding hazards of concern and mitigation needs have been solicited through formal meetings. The Committee has met frequently during the preparation of the plan to discuss the progress of the Plan and to provide input into the process (see Table 1-2). They have been especially helpful in focusing on the issues that are of greatest importance to the safety of Village property and residents. They have played a large part in identifying major hazards, shaping the goals, objectives and proposing activities given in Section 6 of the Plan. The committee included a diverse group representing different services in the Village.

The Planning Committee was responsible for the following planning activities:

- Assist and oversee the public involvement process.

- Identify and encourage participation from regional agencies, stakeholders and citizens in the development of the plan.
- Assist in identifying community hazards.
- Review and comment on the hazard ranking and assessment.
- Develop goals and objectives for mitigation activities.
- Assist in identifying hazard mitigation activities important to the community.
- Assist in gathering information, plans and documents to include in the plan.
- Oversee the development and review of the plan drafts.
- Adopt, revise and maintain the plan.

1.D Public Involvement

Section 2 discusses the second stage of the planning process – public involvement and how the public was involved in the process. Two formal public meetings were held to inform the community and the elected Board of trustees about the planning process. Drafts of the plan were made available for community review. Input from the community was actively sought through public notices, public meetings, and direct participation on the Planning Committee.

The Mamaroneck website:

http://www.village.mamaroneck.ny.us/Pages/MamaroneckNY_WebDocs/departments provided a good resource for public involvement.

1.E Planning Activities

Table 1-2 list the key activities and milestones in developing the Multi-Hazard Mitigation Plan. Preparation of this plan involved:

- Input and coordination from several key Village participants including the Village Board, the Mayor, Village management,
- Regular meetings and discussions with the Hazard Mitigation Committee,
- Input from interested participating partners,
- Review, comment and approval by the Village community
- Review, and approval from the New York State Office of Emergency Management and
- Review, comment and approval from FEMA.

In addition several plans, documents and requirements were reviewed including:

- Village Building and Fire Codes
- Village Emergency Response Plan
- Village Evacuation Plan
- Village Development Plans
- Village Stormwater Management Plan (MS4)
- Westchester County Stream Control Law
- Westchester County Emergency Management Plan
- New York State Building Code
- Village's Flood Insurance Study /Village Flood Insurance Rate Maps
- U.S. Army Corps of Engineer Reports (regarding recommendations related to the Mamaroneck and Sheldrake Rivers)
- Federal Disaster Mitigation Act of 2000
- New York State Hazard Mitigation Plan
- FEMA "How to Guide" (FEMA 386)
- National Weather Service Information
- USGS Information

Table 1-2 Key Activities, Meetings and Milestones.

Date	Event	Key Participants
1/10/2011	Board of Trustees authorize the plan	Village Board of Trustees
3/14/2011	Award consultant contract	Village Board of Trustees, Village Mgmt. ¹
4/18/2011	Project initiation and kickoff meeting with Village representatives	Village Mgmt., Consultant ²
6/09/2011	1 st Committee meeting project review, information needs	Village Mgmt., Consultant, Committee ³
6/27/2011	2 nd Committee meeting review of hazards HAZNY analysis	Village Mgmt., Consultant, Committee
6/27/2011	1 st Public Meeting. briefing on hazards and plan process	Village Board of Trustees, Public ⁴
8/23/2011	3 th Committee meeting – review of goals and objectives	Village Mgmt., Consultant, Committee
9/20/2011	4 th Committee Meeting – review of mitigation measures	Village Mgmt., Consultant, Committee
11/01/2011	Submit 1 st Draft for Committee review	Village Mgmt., Committee
12/07/2011	5 th Committee Meeting – review comments on Draft Plan	Village Mgmt., Consultant, Committee
1/09/2012	Complete Plan revision	Consultant
1/15/2012	Submit Draft Plan to NYSOEM for review and comment by FEMA	Village Mgmt.
3/15/2012	Receive FEMA Comments and Crosswalk	Village Mgmt., Consultant
3/16/2012	Begin 30-day Public Review Period	Public, Participating Partners ⁵
3/26/2012	2 nd Public meeting, Draft Plan Presentation	Village Board of Trustees, Public
3/30/2012	Review and incorporate FEMA Crosswalk comments	FEMA, Consultant
4/03/2012	FEMA approval pending adoption by Village Board	Village Mgmt., Consultant, FEMA, Board
4/16/2012	Close of Public Comment period	Public
4/23/2012	Adoption of Plan by Village Board	Village Board of Trustees
4/30/2012	Incorporate Final Comments in Plan	Consultant, Village Mgmt.
5/01/2012	Submit Final Draft Plan to NYSOEM and FEMA	Village Mgmt.

1. Village Manager and Assistant Manager. 2. Consultant – ETG, Environmental Technology Group. 3. Committee – Village of Mamaroneck Hazard Mitigation Committee. 4. Public - Village of Mamaroneck residents. 5. Participating Partners – Organizations having an interest in the Plan.

1.F Formal Community Process

A Mamaroneck resolution was offered and officially authorized the acceptance of a proposal for preparation of a Pre-Disaster Hazard Mitigation Plan on January 10, 2011 and establishment of a committee to complete the project. The Hazard Mitigation Committee, consisting of Village staff, interested parties and the planning consultant (Figure 1-3) were given full authority to carry out the steps in the hazards identification, assessment, planning and mitigation process.

Once the draft plan has been accepted by the participants and by FEMA, the Village will adopt the Plan through a formal resolution (See Section 10). The revisions to the Plan will be submitted to FEMA through NYSOEM to assure that all comments have been resolved and for approval of the Plan.

Key elements of the January 10, 2011 Board authorization resolution to prepare the plan read as follows:

Board of Trustees 1/10/2011 p. 21

Agreement with NY State Office of Emergency Management Pre-Disaster Mitigation Grant

RESOLUTION

**AUTHORIZATION TO EXECUTE AN AGREEMENT WITH THE NEW YORK STATE
OFFICE OF EMERGENCY MANAGEMENT □ PRE DISASTER MITIGATION GRANT**

WHEREAS, the Village of Mamaroneck (Village) has submitted multiple grant applications to the New York State Office of Emergency Management (NYSOEM) which is the coordinating agency for the Federal Emergency Management Administration's (FEMA) competitive grant program for Pre-Disaster Mitigation; and

WHEREAS, a Pre-Disaster Mitigation Plan study involves identifying risks and hazards in the community as well as projects that can reduce damage from future natural and man-made hazards; and

WHEREAS, government agencies must complete a Multi-Hazard Mitigation Plan, approved by FEMA, in order to be eligible for most federal grants for hazard mitigation capital improvement projects; and

WHEREAS, the Village received notice from NYSOEM, dated November 10, 2010, that one of its grant applications was awarded by FEMA; and

WHEREAS, WHEREAS, NYSOEM subsequently proffered a grant agreement to the Village, received on January 10, 2011, attached hereto and made a part hereof, said agreement providing for a grant award of \$50,000 with FEMA providing project funding of 75%, or \$37,500 in cash, and a Village required local cash match of at least 25% or \$12,500; and

WHEREAS, based on the scope of the project staff and subsequent to a Request For Proposal process, staff will recommend to the Village Board that a professional consulting firm be employed to assist the Village in the research and development of the plan in accordance with Federal and State regulations.

On motion of Trustee Albert, seconded by Trustee Ryan:

RESOLVED, that the Village Manager is herein authorized to execute a Multi Year Grant Agreement with the State of New York, for the preparation of a Multi-Hazard Mitigation Plan; and be it further

RESOLVED, that the Village Manager is herein authorized to undertake administrative acts as may be required pursuant to the terms of the agreement.

Ayes: Albert, Hofstetter, Ryan, Santoro, Rosenblum

Nays: None

Board of Trustees Meeting 3/14/2011 p. 21

D. Award of Contract to Prepare All Hazard Mitigation Plan

RESOLUTION RE:

AUTHORIZATION TO EXECUTE A PROFESSIONAL SERVICES AGREEMENT FOR THE PREPARATION OF A MULTI-HAZARD MITIGATION PLAN

WHEREAS, by resolution of January 10, 2011, the Village Board authorized the execution of a grant agreement with the New York State Office of Emergency Management to provide funding assistance in an amount up to \$37,500 for preparation of a Multi-Hazard Mitigation Plan; and

WHEREAS, a Pre-Disaster Mitigation Plan study involves identifying risks and hazards in the community as well as projects that can reduce damage from future natural and man-made hazards; and

WHEREAS, government agencies must complete a Multi-Hazard Mitigation Plan, approved by FEMA, in order to be eligible for most federal grants for hazard mitigation capital improvement projects; and

WHEREAS, the Village Manager reports that he publicly advertised a Request for Proposals (RFP) on January 14, 2011 and notified fifteen (15) consultants of the Village's RFP; and

WHEREAS, WHEREAS, on the RFP response date of February 25, 2011 eight (8) proposals were submitted and after reviewing the proposals, Environmental Technology Group, 300

Wheeler Road, Suite 307, Hauppauge, NY 11788 (ETG) has been identified as the preferred vendor to prepare such a plan for the Village of Mamaroneck, based on the following;

- ☐ ETG has relevant experience relative to preparing Multi-Hazard Mitigation plans and New York State specifically as it relates to NYSOEM and with FEMA Region II, the agency which will ultimately approve an All Hazard Mitigation Plan;
- ☐ ETG provided the most cost-effective proposal for the Village in the amount of \$31,732.

On motion of Trustee Ryan, seconded by Trustee Albert:

RESOLVED, that the Village Manager is herein authorized to execute a Professional Services Agreement with Environmental Technology Group, 300 Wheeler Road, Suite 307, Hauppauge, NY 11788, to prepare a Multi-Hazard Mitigation Plan for the Village of Mamaroneck based on their proposed cost of \$31,732; and be it further

RESOLVED, that all costs associated with preparation of such Multi-Hazard Mitigation Plan be charged to A.1440.0421; and be it further

RESOLVED, that the Village Manager is herein authorized to undertake such administrative acts as may be required pursuant to the terms of the agreement.

Ayes: Albert, Hofstetter, Ryan, Santoro, Rosenblum. Nays: None

Section 2 – Public Involvement and Outreach

The community in Mamaroneck Village participated in the process to develop this Hazard Mitigation Plan. The public was involved through invitations in newspaper notices, web site notices, and attendance at public meetings. They provided comments at meetings, in letters and E-mail (See Appendix). A draft of this Plan was made available to the public at the Village Hall, and on the Village website. A list of all public and committee meetings and other key activities of this plan step were given in Table 1-2 in Section 1.

Public meetings will be held in conjunction with the Village Board of Trustees meetings. These meetings can be accessed through LMC-TV the local public access television station. The can be viewed on Cablevision channel 76 or Verizon channel 35. The Board meetings can be viewed online at www.lmc-tv.org Videos on Demand, Municipal meetings.

2.A Public Meetings

Public meetings were held in the Village Hall Court room to inform interested people in the community about the plan and to obtain their input. A notice for the first public meeting was issued on June 16, 2011 announcing the first meeting held on June 27, 2011 at 7:00 PM. A copy of this public notice is provided below. The purpose of this first meeting was to summarize for the community the current status of the project, future planning activities and the process for developing the Multi-Hazard Mitigation Plan. Members of the community were encouraged to provide input. Several statements and questions were presented and responded to by the Village Management and its consultant. (See Appendix.) A second public meeting was held March 26, 2012 to present the Draft Plan for their review and comment. The purpose of this meeting was to summarize the Plan, present the next steps in the planning and approval process and obtain public input.

**VILLAGE OF MAMARONECK
REVISED (DATE)**

Notice of Public Meeting
To Solicit Public Input
For the preparation of a
Pre-Disaster Hazard Mitigation Plan (PDHMP)
For the Village of Mamaroneck, NY
Date: **Monday, JUNE 27, 2011**
Time: 7:30 PM
Place: 169 Mount Pleasant Avenue

All interested residents are invited to attend a Public Meeting hosted by the Village of Mamaroneck Pre-Disaster Hazard Mitigation Planning Committee, which includes contractual, elected, appointed and citizen representatives to assist and contribute in the preparation of an All Hazard Mitigation Plan for the Village of Mamaroneck.

The Village is preparing this Pre-Disaster Plan with a grant from the Department of Homeland Security / Federal Emergency Management Association (FEMA) in the amount of \$37,500 . Additional administrative oversight and technical assistance is being provided by the NYS Division of Homeland Security & Emergency Services , Office of Emergency Management (NYS OEM), and the Westchester County Office of Emergency Management.

It is anticipated that a plan will be prepared in draft from the comments and considerations presented by the Committee Members and interested citizens in the Village of Mamareoneck community. A second Public Meeting will be held later this year for additional public input and comment on the draft plan, before it is considered ready for submission to NYS OEM and FEMA.

For further information, or if you have any questions, please call Village Hall at (914) 777-7703.

Agostino A. Fusco
Clerk-Treasurer
June 16, 2011

2.B Public Information Activities

Members of the community were encouraged to attend public meetings and to report on notable hazard issues in the Village. A notice and meeting summary was also put on the Village Web Page at (<http://www.village.mamaroneck.ny.us/Pages/index>). A summary of the meeting presentations and discussions is given in the appendix of this Plan.

In order to facilitate coordination and communication between the Hazard Mitigation Planning Committee and Mamaroneck citizens, several methods of public outreach were conducted to inform the public of the Plan and encourage participation in the planning process. The Village has made the following efforts for public input in the preparation and review of this Plan:

- A public meeting notice, notifying the community about a public meeting on June 27, 2011 was sent to the local news outlets, including *The Journal News*, *Westchester Hispano*, *The Sound and Town Report*, and the *Larchmont-Mamaroneck Patch*. Notice was also posted on the Village's website.
- On January 27, 2012, the Draft Plan was posted to the Mamaroneck website. (<http://www.village.mamaroneck.ny.us/Pages/index>)
- A public meeting notice notifying the community about the second public meeting on March 26, 2012 was sent to the local news outlets and posted on the Village's website.
- A formal opportunity for public comment was provided for the Draft Plan that was submitted to NYSOEM and FEMA. A 30 day review period for the Plan was provided for public comment, which closed on April 16, 2012.
- The plan development was covered in the local print media by *The Sound & Town Report* and online by *Larchmont-Mamaroneck Patch* and *The Daily Mamaroneck*.

Examples of public outreach efforts are given and public comments that have been received to date are documented in the Appendix.

2.C Public Input

The Village officials and Board of Trustees sought public input on the plan that would help it identify and prepare for any disasters that could impact the community. The public was invited

to provide information by letter or E-mail and by participation at public meetings. The residents were informed that this plan would qualify the Village for grant money to help mitigate the hazards evaluated in the plan.

As part of the required planning process for a local pre-disaster mitigation plan, the village held its first public information session at the Board of Trustees meeting June 27, 2011. Although there wasn't a plan to review yet, the Assistant Village Manager explained that the village is seeking ideas from residents about potential hazards the villagers face and sought ways the local government can help residents prepare for and recover from disasters.

Public comments were noted and incorporated into this Plan where applicable and feasible. Several community members attended the first public meeting. The meeting was covered by the local press. The primary hazard of concern was frequent flooding in various areas of the Village. (See Section 4.D in this Plan.) Public input was also provided by one citizen who served on the Planning Committee. A second public meeting was held on March 26, 2012 at the Village Hall Court Room to present the Draft Plan and discuss flooding and other hazard planning issues. Public input from residents at this meeting strongly emphasized the serious impacts from local street and home flooding in Mamaroneck. The public was invited to review and comment on the Draft Plan. Several comments were received by the close of public comment and are included in the Appendix.

Once the document was completed, it was submitted to the New York State Office of Emergency Management and to the Village for a 30-day public comment period. It was then submitted to FEMA for their review and approval. Though the planning procedure officially requires a specific 30-day comment period, feedback was continually sought and welcomed. Through public outreach the village will get ideas from people who have been impacted by these hazards and offer input on how the Village government can help. Anyone wishing to submit comments to the village could call (914) 777-7703, submit a letter or email to either the assistant manager or the Village Manager.

Section 3 - Coordinate with Other Agencies and Organizations

Several government agencies and private organizations have stakeholder interest in the development and implementation of this plan. Their roles and interests in the plan preparation and process were evaluated. Some key agencies may fund programs, oversee regulatory requirements or provide technical input or review. These agencies or organizations may also have relevant information useful to the village needs. Several existing plans and recent studies that are applicable to this Hazard Mitigation Plan involved different interested parties. These documents were reviewed and discussed in this plan. This section discusses the public agencies and organizations that may have stakeholder interest in development and implementation of this Plan.

3.A Community Stakeholders

Potential interested agencies, offices, organizations and groups and their potential roles are given in Table 3-1. These stakeholders have the various interests in or potential contributions to this plan. The following list identifies the group, its role in the planning process. Roles in the process include: providing sources of data and information, funding of projects, regulatory oversight, review and input to this plan and review of specific mitigation action plans prior to their implementation. Stakeholders were invited to review and comment on the online copy of the Hazard Mitigation Plan. Other groups, identified below, will be invited to participate a later time during the planning phase of a specific mitigation action.

Federal Agencies

- U.S. Geological Survey (USGS) - Provided earthquake and topographic information relevant to planning and implementation of mitigation activities.
- Federal Emergency Management Agency (FEMA) - Provided planning guidance, regulatory oversight, funds and program review for preparation and implementation of this Hazard Mitigation Plan. Approval of this Plan by FEMA is required.

Table 3-1. Stakeholders with Interest and Involvement in the Mamaroneck Mitigation Plan.

Federal Agencies	New York State Agencies	Local Agencies	Neighboring Communities	Private Organizations
Federal Emergency Management Administration (FEMA)	NY State Office of Emergency Management (NYSOEM)	Westchester County Dept. of Health	Town of Mamaroneck	Consolidated Edison
U.S. Army Corps of Engineers (COE)	NYS Dept. of Transportation (NYSDOT)	Westchester County Dept. Emergency Management	City of Rye	Verizon and other Communication Companies
U.S. Environmental Protection Agency (USEPA)	NYS Department of Environmental Conservation (NYSDEC)	Westchester County Dept. of Planning	Town of Harrison	Cablevision
National Oceanographic and Atmospheric Administration (NOAA)	Hudson River Valley Greenway	Westchester County Dept. Public Works		Metro North Rail Road
U.S. Geological Survey (USGS)	State Elected Officials	County Elected Officials		
Federal Elected Representatives	NY State Department of State (NYSDOS)	Mamaroneck School District / Rye Neck School District		
National Flood Insurance Program (NFIP), FEMA, Region 2, New York		Mamaroneck Chamber of Commerce		
		Nature Conservancy		
		Long Island Sound Watershed Intermunicipal Council (LISWIC)		
		Westchester Joint Water Works		

- National Flood Insurance Program (NFIP), FEMA, Region 2, 26 Federal Plaza, New York, NY. Regional administrator. This office is a key source of information on flood hazard insurance. They will be informed of plan activities that are related to flood mitigation and flood insurance activities.
- U.S. Army Corps of Engineers (USACE) - Any proposed projects related to the Mamaroneck or Sheldrake Rivers or its shorelines including dredging or dam repair will require interfacing with this agency for permits and regulatory approvals.
- National Oceanographic and Atmospheric Administration (NOAA) - This agency is a key source of data and information on natural hazards.
- Federal government elected representatives will be informed of plan activities that may require legislative actions or affect other jurisdictions. The Congressional representative for Mamaroneck will be requested formally to seek Federal Funds for flooding problems in the Village.

New York State Agencies

- New York State Department of Environmental Conservation- This State Agency would be involved with any State Environmental Quality Review Act (SEQRA) requirements, pollution discharge permits, regulation of hazardous material releases, protection of habitats, wetlands and protected species related to implementation of this Plan protection of habitats, wetlands and protected species that may be related to implementation of this Plan. NYSDEC involvement will be required during the planning stages of specific mitigation actions having potential environmental impacts.
- NY State Office of Emergency Management (NYSOEM) - NYSOEM implements planning guidance from FEMA, regulatory oversight, funding management, Plan review and approval of this Hazard Mitigation Plan and other emergency planning documents.
- NYS Dept. of Transportation - Interfacing with this State Agency will be needed for any transportation or State highway projects proposed this Plan. The Village coordinates with DOT for the Traffic Management related to hazard impacts.
- NYS Department of State (NYSDOS) – This State Agency would be involved with any Local Water Front Revitalization LWRP community issues.

- Hudson River Valley Greenway - This State sponsored program facilitates the development of a voluntary regional strategy for preserving scenic, natural, historic, cultural and recreational resources while encouraging compatible economic development and maintaining the tradition of home rule for land use decision-making. Review and input from this group will be sought for specific projects affecting their interests during the planning phase for that mitigation action.

Local Agencies

- Westchester County Dept. of Health - This agency will be needed for review and approval of any mitigation action plans that may impact drinking water quality of the area or disease vectors.
- Westchester County Dept. of Emergency Management - Any proposed activities that relate to interfacing of the County and Village fire and emergency services will require input from this department. Village emergency plans will be reviewed by this group to assure that they are consistent with the County plans. The Village of Mamaroneck will coordinate with any future multi-jurisdictional hazard mitigation plan. This Hazard Mitigation Plan was available to the County for review and comment.
- Westchester County's "Restoration of Society"- This initiative includes the County's plan for recovering and restoring communities following a catastrophic event. It focuses on restoring basic services such as power, water supply and other utilities and infrastructures.
- Westchester County Dept. of Planning - This department will be informed of any Village plans and proposals that relate to County plans.
- Westchester County Dept. Public Works - This department oversees design and construction of infrastructure systems, capital projects and non-recurring repair and replacement projects for the County. Implementation plans and designs involving public works projects will be provided to the County for their review and comment.
- Local and County Elected Representatives- Local and County officials need to be informed of multi-hazard issues and proposed mitigation activities. They may also assist in appropriating legislative funding for needed projects.
- The Long Island Sound Watershed Intermunicipal Council (LISWIC) - a group of 12 municipalities located in the Long Island Sound Watershed in Westchester County, New York. The group works to achieve a common goal of a cleaner Long Island Sound by

protecting the Sound's watershed. Review and input from this group will be sought for specific projects affecting their interests during the planning phase for that mitigation action.

- Westchester Joint Water Works – A public benefit corporation. Review and coordinate any plan activities that could affect water service or buried water lines.

Neighboring Communities

The following communities may be involved or affected by the planned actions and will be informed of mitigation activities being proposed. These communities were invited to review and comment on this Hazard Mitigation Plan:

- City of Rye
- Town of Mamaroneck
- Town of Harrison

Private Organizations

- Consolidated Edison - Review and coordinate plan activities that could affect power failures; tree damage to power lines or excavation that could affect buried cables.
- Verizon (and other communication companies) - Review and coordinate any plan activities that could affect telephone communications, tree damage to phone lines or excavation that could affect buried lines or cables.
- Cablevision - Review and coordinate actions that could affect cable TV, computer services, tree damage to cable lines or excavation that could affect buried cables.
- LMC TV – handles all public access broadcasts to residents.
- Metro North Rail Road – Provides commuter rail service to Mamaroneck residents. They would review and coordinate any plan activities or hazards that could affect rail service.
- Nature Conservancy - Coastal Resilience project. Provides communities, planners, businesses, and officials with easy access to information on projected changes in sea level and coastal storm impacts in order to assist in coastal planning and management decisions.
<http://coastalresilience.org/>

3.B Representative Agency Contacts

The Village sent a letter to several parties listed in Table 3-1 regarding their interest in the Multi-Hazard Mitigation Plan. Interested parties were invited to review and comment on the Plan, which was posted on the Village Web Site: <http://www.village.mamaroneck.ny.us/Pages/index> Contacts were made with several organization representatives to discuss hazards and mitigation measures relevant to the Village of Mamaroneck. A list of groups recommended for review and comment is given below in Section 3.D.

Existing documents were obtained from some of the agencies cited above. A full listing of available documents and citations is given in Section 3.C below and in the References Cited, Section 11, at the end of Part I of this Plan. A variety of information was obtained from several of these agencies using the Internet. Sources were also obtained from the local newspapers and newspaper websites were used for information on historic events.

3.C Review of Community Needs, Goals, Documents and Plans

Community needs, goals and plans were discussed with the Village officials from the beginning of the planning process. Discussions were held at Planning Committee meetings and public meetings. The Community presented their needs at two public meetings, particularly for mitigation of flood hazards. (See Section 2 above.) The public hazards concerns have been incorporated into the Plan. Additional public input to the Draft Plan will be included prior to the final submission of the Plan. The result of this review process is found in Steps 6, 7 and 8 in the establishment of goals, objectives, priorities and a mitigation plan.

Several plans, studies, reports are listed in Section 11 References Cited were used to obtain information for this Hazard Mitigation Plan. Key sources include:

- Flood Mitigation Action (FMA) Plan - February 2008
- Mamaroneck Village Web Site, <http://www.village.mamaroneck.ny.us/Pages/index>
- Feasibility Report - Flood Control Mamaroneck & Sheldrake Rivers – October 1977
- Local Flood Control Washingtonville/Central Business District Comprehensive Sanitary and Storm Sewer Report – January 1988
- Emergency Action Plan Mamaroneck Reservoir Dam – August 2010

- Emergency Action Plan Larchmont Reservoir Dam – August 2010
- Village of Mamaroneck -Local Water Front Revitalization Program (still in preparation) 2012.
- The Nature Conservancy, the Coastal Resilience Project.
- U.S. Census Bureau, 2010. Profile of General Demographic Characteristics, Mamaroneck, New York. <http://factfinder.census.gov/>
- Flood Insurance Study, Westchester County, New York. September 28, 2007
- Westchester County Hazard Mitigation Plan.

3.D Draft Action Plan Review

The Draft Hazard Mitigation Plan underwent comprehensive review and comment by Village administrators, the Hazard Mitigation Planning Committee, members of the Board of Trustees, interested Stakeholders, and the public. The public comment period was 30 days. The Draft Plan was sent to SEMO project manager for FEMA's review and comment. Comments by FEMA were resolved and incorporated into the plan. The final plan incorporates a resolution of the comments from these reviews.

Several communities, local agencies and groups were openly invited to review and comment on the plan via the Mamaroneck website.

These invitations included:

- Town of Mamaroneck
- Town of Harrison
- Town of Rye
- City of Rye
- Mamaroneck School District
- Rye Neck School District
- Mamaroneck Chamber of Commerce
- Westchester County Planning Department

To date no specific comments were received from these other parties.

Section 4 Assessing the Hazard

4.A Introduction and Background

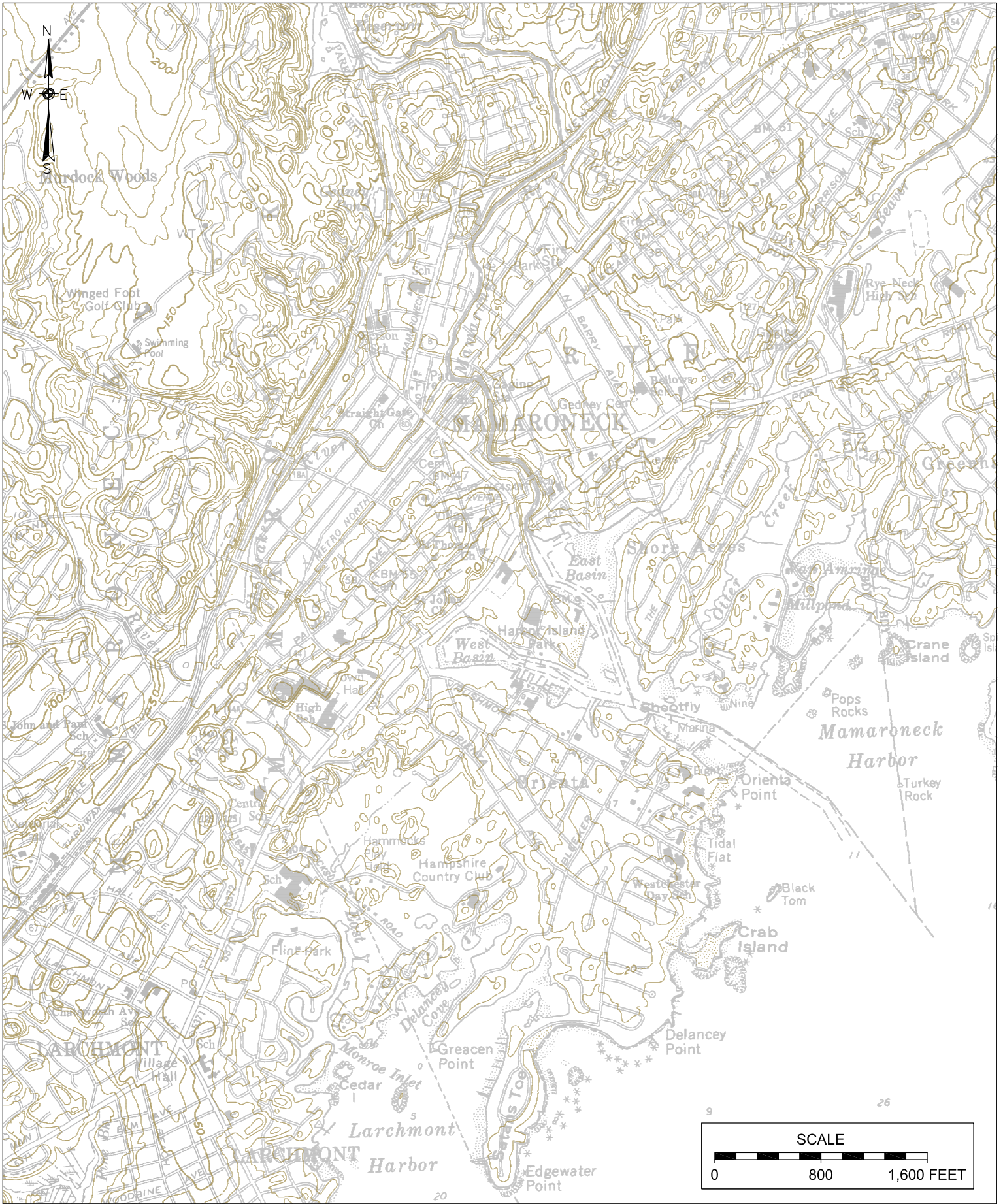
The Incorporated Village of Mamaroneck is a community located in south eastern Westchester County with a population of about 18,930 people recorded in the 2010 U.S. Census. The area is bounded on the north by the City of Rye and the Town/Village of Harrison, NY, to the west and south by the Township of Mamaroneck and to the East by Long Island Sound. (See Figures 0-2 and 1-1.) For additional background information see the Preface and Summary Statement at the beginning of this Plan. The topography of the Village slopes toward the Long Island Sound. (See Figure 4-1.)


The Village is subject to a variety of events that may lead to damage from water, wind and man-made hazards. From the perspective of FEMA's Community Rating System (CRS) objectives discussed in the Preface, this water-related hazard is a major concern to the Village. In addition to water-related events, there are severe wind storms, other natural events and man-made hazards to which the community is potentially exposed. This all-hazard mitigation plan evaluates flooding events, storm hazards, other natural hazards and several human-caused hazards as required under the Disaster Mitigation Act 2000 and FEMA 44 CFR Parts 201 and 206, 2002.

Process

The hazard identification and assessment process included four steps:

1. Identify all potential hazards based on the input from the hazard mitigation committee and the public, a review of documents and website searches. A list of potential hazards was developed.
2. Profiles of the hazards of concern were prepared and primary hazards of concern were evaluated for potential risk assessment. Each hazard was then summarized, evaluated and characterized in a hazard profile. (See Section 4D.)
3. Assets were then identified and inventoried for impacts of concern. (See Section 5)
4. Potential losses were estimated and the hazards were evaluated for human health and safety risks and for property damage and losses. (See Section 5.)



 <p>Environmental Technology Group, Inc. 300 WHEELER ROAD, SUITE 307, HAUPPAUGE, NEW YORK 11788</p>	<p>Project Name Incorporated Village of Mamaroneck Multi-Hazard Mitigation Plan</p>	<p>Figure Title Topographic Map Village of Mamaroneck</p>	<p>Figure 4-1 DWN BY: AJZ CHK BY: JB SCALE: AS SHOWN DATE: 04/27/12</p>
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A list of potential hazards was prepared and reviewed. Those that were not applicable, prevalent or would not cause significant damage or personal harm were screened out and not evaluated further. (See Tables 4-1b, 4-2, 4-3 and Section 4.E Elimination of Hazards.) The list of potential hazards was then evaluated and rated using New York State's HAZNY program (See Section 4.C below). The HAZNY process helps to evaluate the relative degree of hazard posed by each prevalent hazard or significant risk. The New York State Office of Emergency Management (NYS OEM) recommends that the HAZNY analysis program be used to review and assess the hazards. The American Red Cross together with NYS OEM developed this program. It is an interactive program where members of the Planning Committee and the consultants provided input to the process.

Background information, frequency of occurrence, impacts, severity, extent, location and other data were then summarized for each hazard profile. (See Section 4.D below).

Sources of Information:

In addition to the plans, studies and reports noted in Section 3C, several sources of information were used to identify and characterize the hazards of concern. For additional sources and detailed citations see Section 11, References Cited. These sources include:

- Letters from residents
- Public meeting with residents
- Village of Mamaroneck Officials
- Local newspaper articles
- Village of Mamaroneck Website <http://www.village.mamaroneck.ny.us/Pages/index>
- Documents, plans and Engineering reports supplied by the Village
- Several NOAA websites <http://noaa.gov/>
- National Climate Data Center (2006), www.ncdc.noaa.gov
- National Weather Service (2007), Hurricane Page, www.nhc.noaa.gov
- FEMA website www.fema.gov/
- Westchester County Flood Insurance Study (2007)
- USGS website <http://earthquake.usgs.gov/>
- Seismic Zoning Maps for NYS Seismic Bldg Code
- Lamont-Doherty Earth Observatory, Columbia University Website
- Consolidated Edison website, press releases, and studies, www.coned.com/
- Westchester County GIS website <http://giswww.westchestergov.com/westchester/emap/wc>
- EPA Enviromapper website <http://www.epa.gov/emefdata/em4ef.home>

4.B Hazard Identification

The hazards screened include those given in FEMA 386-2 guidance, FEMA (2003b) examples and Disaster Mitigation Act 2000 guidance (FEMA, 2000), HAZNY guidance and input from the Village Planning Committee. The Hazard Mitigation Planning Committee with the aid of the consultant screened all potential hazards listed and the committee concluded that these hazards are possible in the Village of Mamaroneck and surrounding area. Historic FEMA disaster declarations for New York State are listed below in Table 4-1a. Tables 4-1b and 4-2 summarize the hazards evaluated and the results of their initial screening.

Those hazards in the region that were judged to be prevalent, pose a significant human safety risk or have a potential to cause significant damage were selected for further analysis. This assessment was based on available documents, information from databases, and websites. (See sources above and Section 11 References Cited.) The sources used to determine the probability of future events for each natural hazard are given in Table 4-1c. Knowledge and experience of local officials and the Planning Committee aided the analyses and assessments made by the consultant. The consultant guided the Committee through the hazard assessment process during June and July 2011.

The hazards evaluated include

- natural hazards (floods, hurricanes, other severe storms, winter snow and ice storms and other natural non-storm hazards),
- technological hazards (environmental releases, fires, explosions and utility failures) and
- human-caused hazards (such as civil unrest and terrorism).

These hazards are individually profiled below in Section 4.D. The prevalent hazards and other hazards judged to be important were then evaluated using the HAZNY hazard ranking system discussed in Step 4.C below.

Table 4-1a. Major Historical Disaster Declarations for New York State.

Year	Date	Disaster Types	Active	Disaster Number
2011	09/13	Remnants of Tropical Storm Lee	Yes	4031
2011	08/31	Hurricane Irene	Yes	4020
2011	06/10	Severe Storms, Flooding, Tornadoes, Straight-line winds	Yes	1993
2011	02/18	Severe Winter Storm and Snowstorm	No	1957
2010	10/14	Severe Storms, Tornadoes, Straight-line winds	No	1943
2010	04/16	Severe Storms and Flooding	No	1899
2009	12/31	Severe Storms and Flooding, Tropical Depression Ida and Nor'easter	No	1869
2009	09/01	Severe Storms and Flooding	No	1857
2009	03/04	Severe Winter Storm	No	1827
2007	08/31	Severe Storms, Flooding, and Tornado	No	1724
2007	07/02	Severe Storms and Flooding	No	1710
2007	04/24	Severe Storms and Inland and Coastal Flooding	No	1692
2006	12/12	Severe Storms and Flooding	No	1670
2006	10/24	Severe Storms and Flooding	No	1665
2006	07/01	Severe Storms and Flooding	No	1650
2005	04/19	Severe Storms and Flooding	No	1589
2004	10/01	Tropical Depression Ivan	No	1565
2004	10/01	Severe Storms and Flooding	No	1564
2004	08/03	Severe Storms and Flooding	No	1534
2003	08/29	Severe Storms, Tornadoes and Flooding	No	1486
2003	05/12	Ice Storm	No	1467
2002	05/16	Earthquake	No	1415
2002	03/01	Snowstorm	No	1404
2001	09/11	Terrorist Attack	No	1391
2000	07/21	Severe Storms	No	1335
1999	09/19	Hurricane Floyd	No	1296
1998	09/11	Severe Storms	No	1244
1998	07/07	Severe Storms and Flooding	No	1233
1998	06/16	Severe Thunderstorms and Tornadoes	No	1222
1998	01/10	Severe Winter Storms	No	1196
1996	12/09	Severe Storms/Flooding	No	1148
1996	11/19	Severe Storms/Flooding	No	1146
1996	01/24	Severe Storms/Flooding	No	1095
1996	01/12	Blizzard	No	1083
1993	04/02	World Trade Center Explosion	No	984

**Table 4-1a. Major Historical Disaster Declarations for New York State
(Contd.).**

Year	Date	Disaster Types	Active	Disaster Number
1992	12/21	Coastal Storm, High Tides, Heavy Rain, Flooding	No	974
1991	09/16	Hurricane Bob	No	918
1991	03/21	Severe Storm, Winter Storm	No	898
1987	05/15	Flooding	No	792
1985	10/18	Hurricane Gloria	No	750
1985	03/22	Snow Melt, Ice Jams	No	734
1985	03/20	Flooding	No	733
1984	09/25	Severe Storms, Flooding	No	725
1984	04/17	Coastal Storms, Flooding	No	702
1977	02/05	Snowstorms	No	527
1976	09/03	Hurricane Belle	No	520
1976	07/21	Severe Storms, Flooding	No	515
1976	06/29	Flash Flooding	No	512
1976	03/19	Ice Storm, Severe Storms, Flooding	No	494
1975	10/02	Severe Storms, Heavy Rain, Landslides, Flooding	No	487
1974	07/23	Severe Storms, Flooding	No	447
1973	07/20	Severe Storms, Flooding	No	401
1973	03/21	High Winds, Wave Action, Flooding	No	367
1972	06/23	Tropical Storm Agnes	No	338
1971	09/13	Severe Storms, Flooding	No	311
1970	07/22	Heavy Rains, Flooding	No	290
1969	08/26	Heavy Rains, Flooding	No	275
1967	10/30	Severe Storms, Flooding	No	233
1965	08/18	Water Shortage	No	204
1963	08/23	Heavy Rains, Flooding	No	158
1962	03/16	Severe Storm, High Tides, Flooding	No	129
1956	03/29	Flood	No	52
1955	08/22	Hurricane, Floods	No	45
1954	10/07	Hurricanes	No	26

Source: www.FEMA.gov

Table 4-1b. Initial Screening of Potential Hazards.

Potential Hazards	Possible Hazards	Prevalent Hazards*	Potential Hazards	Possible Hazards	Prevalent Hazards*
Natural Hazards			Extreme Temperature	X	
Flood	X	X	Land Subsidence		
Severe Storm Hazards			Land (Rock) Slide	X	
Hailstorm	X		Mudflow		
Hurricane	X	X	Tsunami		
Coastal Storm	X	X	Volcano		
Thunder Storm	X	X	Wildfire		
Tornado	X				
Windstorm	X	X	Technological Hazards		
Winter Storm Hazards			Air Contamination	X	
Avalanche			Building Fire	X	
Ice Jam	X		Transportation Hazardous Material Spills	X	
Ice Storm	X	X	Oil Spill	X	
Severe Snow Storm	X	X	Hazardous Materials Releases (Fixed Site)	X	
Other Natural Hazards			Explosion		
Erosion			Radioactive Release	X	
Dam Failure	X		Utility Failure	X	X
Drought	X		Water Supply Failure	X	
Earthquake	X		Human-Caused Hazards		
Epidemic	X		Civil Unrest	X	
Expansive Soils			Terrorism	X	

* A frequent or regular event. May occur more than once in 7 years to several times a year.

Table 4-1c. Sources Used to Determine Probability of Future Events for Natural Hazards.

Hurricane & Storm Hazards	Historical weather data NOAA/National Climatic Data Center US Landfall Hurricane Probability Project, Colorado State University National Weather Service
Flood Hazards	Historical flood data Village Flood Insurance Study Engineering Reports supplied by the Village FEMA Flood Mapping Village FIRM
Earthquake	FEMA NYS OEM USGS NYCEM Lamont-Doherty Cooperative Seismographic Network of Columbia University
Winter Storms	Historical weather data NOAA/NCDC National Weather Service
Tornado and Wind Hazards	Historical data NOAA/NCDC Tornado Project Website SEMO wind zones
Extreme Temperature & Drought	Historical Data NOAA/NCDC National Weather Service
Epidemic	Historical data Center for Disease Control Westchester County Health Department

Table 4-2. Summary of Significant Safety Risks and Damage Potential.

Possible Hazards	Health and Safety Risks	Potential for Damage
Natural Hazards		
Flood	X	X
Severe Storm Hazards		
Hailstorm		X
Hurricane	X	X
Coastal Storm	X	X
Thunder Storm	X	X
Tornado	X	X
Windstorm	X	X
Winter Storm Hazards		
Ice Storm	X	X
Severe Snow Storm	X	X
Other Natural Hazards		
Drought		
Earthquake		X
Epidemic	X	
Extreme Temperature	X	
Technological Hazards		
Air Contamination	X	
Explosion	X	X
Fire	X	X
Fuel Oil Spill		
Hazardous Material Spills (Transport)	X	X
Hazardous Material Spills (Fixed)	X	X
Radioactive Release (Fixed Site)	X	
Water Supply Failure	X	
Utility Failure	X	
Human-Caused Hazards		
Civil Unrest	X	X
Terrorism	X	X

Of the 35 listed hazards, 26 were considered as possible for the region and only 8 were considered to be prevalent hazards to the community. A significant health and safety risk was associated with 20 possible hazards and 16 hazards were linked to significant damages to property, buildings and other structures.

Preliminary Hazard Elimination

Based on the above screening, several Hazards were eliminated from further consideration and include:

Avalanches: There are no mountains in or near the village that could produce avalanches.

Erosion of soils: There are no significant areas subject to severe erosion.

Land Subsidence: There are no significant areas subject to subsidence.

Expansive soil hazards: There are no expansive soils hazards in the area.

Land (Rock) Slide: There are no significant areas subject to landslides.

Tsunamis: Do not occur in this region of the country

Volcanoes: Do not occur in this region of the country.

4.C Hazard Ranking by The HAZNY System

Identification and ranking of all hazards that affect the Village of Mamaroneck is a primary system assessing significant hazards (See Section 4.B above). The Hazards New York (HAZNY) method further identifies and ranks hazards based on a rigorous method, which combines input from the community with the experience of emergency services professionals. The Hazard Mitigation Committee was guided through the HAZNY process to resolved questions concerning the risk level and priority of consideration for several of the risk factors.

This section discusses the process for selecting and ranking the hazards based on the HAZNY process. The results of these analyses are shown in Table 4-3 and are discussed below. The analysis was done under the guidelines of the HAZNY program, which is a New York State organized process for identifying and prioritizing the risks of hazards that might be experienced in Mamaroneck. The formation of the list, and the determination of their relative values, is based in part on the actual experience of the Committee members. Additional details are given in the appendix.

4.C.1 HAZNY Process

The HAZNY process involves a logical ordering by priority, and perception of the hazards that affect a community like Mamaroneck. It analyzes and ranks hazards on the basis of five factors which include:

- Scope covers the aerial extent of the impact and the likelihood that the event itself would trigger another hazard (i.e. Cascade Effect).
- Frequency of the event.

- Impact from the standpoint of the likelihood of injury or death, and damage to private property and public facilities.
- Onset, or how much warning time will be received.
- Duration, or the length of the event and its recovery time.

The detailed summary of Ground Rules is found in the NYS OEM Ground Rules for HAZNY, which is found in attachments in the Appendix of this Plan. We have ranked FEMA-recognized “generic” hazards including hazards that have been identified in the Village of Mamaroneck from the standpoint of likelihood of occurrence and prevalence. Using the HAZNY Ground Rules the committee scored the major risk factors for the group of Mamaroneck hazards that are possible and prevalent. These factors can be used to examine and quantify other risk factors that may be identified in the future.

Some potential hazards such as avalanches, mudflows, and volcanoes were excluded since they were considered of low probability and judged insignificant for further evaluation. (See Table 4-2.) Several hazards such as civil unrest, epidemics, drought and ice jams were considered to be not prevalent but were included in the HAZNY analysis because they were considered to have potentially significant impacts, although uncommon. The results of the HAZNY analysis are given in Table 4-3.

Table 4-3. Summary of Hazards Scores Based on HAZNY Analysis.

High Hazards	HAZNY Score Village of Mamaroneck
None	321-400
<u>Moderately High Hazard</u>	241-320
Flood	302
Coastal Storm*	253
Severe Storm & Thunderstorm**	246
<u>Moderately Low Hazard</u>	161-240
Fire	240
Winter Storm (Severe)	230
Wind Storm	230
Transportation Accident	230
Dam Failure	224
Utility Failure	221
Terrorism	219
Ice Storm	217
Storm Surge/Wave Action	216
Hurricane	212
Hazardous Materials (in Transport)	210
Earthquake	202
Oil Spill	201
Landslide (Rockslide)	199
Extreme Temperatures (Hot)	196
Explosion	192
Water Supply Contamination	182
Hazardous Materials (Fixed Site)	168
Structural Collapse	164
<u>Low Hazard</u>	44-160
Epidemic	160
Hailstorm	159
Tornado	155
Fuel Shortage	142
Radiological (Fixed Site)	140
Air Contamination	132
Blight	128
Ice Jam	123
Food Shortage	119
Fuel Oil Spill	114
Drought	101
Civil Unrest	96
Wildfire	94

* Including tropical storms, nor'easters.

** Including severe and gale force winds as well as other non-winter storms listed. Hurricanes and coastal storms not included

4.C.2 Hazard Ratings

The HAZNY rating scores were used to further screen hazards. The information from the HAZNY analysis contributed to the preparation of the Hazard Profiles in Section 4.D. The Committee concurred in general with the selection of the moderately high and moderately low hazards in Table 4-3. The detailed results of scoring for each hazard are given in the Appendix.

The most significant hazard in Table 4-5 is flooding. (See Section 4.D below.) The storm of greatest concern for this area is the coastal storm which includes several types of storms as well as hurricanes which by itself was rated as a moderately low hazard. This may reflect the fact that few high category hurricanes hit Mamaroneck. By the time a hurricane makes land fall it is often relegated to a tropical storm. Floods were considered the most severe hazard which is caused by several types of storms such as coastal storms and thunder storms which were rated as number two and three in the HAZNY analysis. Coastal storms scored 253 and were rated the 2nd highest hazard (Table 4-3). Although not as severe as hurricanes, these storms cause severe flooding and wind damage. Such storms often last longer and flood more often than hurricanes. Frequent local flooding is the major community concern expressed in public meetings.

Both localized and regional utility power failures are a concern which can be the result of cascade effects from other hazards discussed in Section 4.D below. Utility failures can also impact critical facilities, rail transportation systems as well as residences, industrial and commercial facilities. Dam failure with a score of 224 was rate as a moderately low hazard in the Table 4-5.

Winter storms ranked 5th had a score 230. These storms include blizzards that can damage buildings, power lines, critical facilities and transportation systems. Although damage can be significant for ice storms, they are less frequent than winter snowstorms and ranked 11 in importance.

4.C.3 Hazard Rating Criteria

A summary of the hazard rating criteria based on the HAZNY process is attached in the Appendix. We have ranked FEMA-recognized “generic” hazards including hazards that have been identified in Mamaroneck from the standpoint of likelihood of occurrence and prevalence.

Using the HAZNY Ground Rules we scored the major risk factors for the group of Mamaroneck hazards that are possible and prevalent. These factors can be used to examine and quantify other risk factors that may be identified in the future.

The HAZNY criteria also provide a basis to specify the relative scope or location of the hazard. For example: if the hazard occurs at a single location, several individual locations, throughout a small region or throughout a large region the score will reflect this scope. Of the prevalent hazards like coastal storms and floods, information on the location/size of the hazard is provided.

The HAZNY scores also incorporate the probability or likelihood of future occurrences. This is one of the specific quantified elements of input in the HAZNY process. The probability or likelihood of future occurrence has been specified for each of the hazards included in this analysis.

The extent or magnitude of each hazard can be expressed and quantified. Such factors as the extent of the area affected, the likelihood of a cascade effect, the frequency of the event and the impact of the hazard on the health and safety of people, the impacts on property and the impacts on infrastructure are all covered in this analysis.

4.D Hazard Profiles

We have assembled a comprehensive summary of past hazard events, which provides accounts that describe the potential impact of these events on the Village of Mamaroneck. These data together with firsthand accounts by members of the committee, historical meteorological reports of hurricanes, nor'easters and other storms completes the picture that the Village of Mamaroneck Planning Committee and the consultants will use as an important tool of the planning process.

Detailed hazard profiles are presented below for the three moderately high hazards and for seven moderately low natural hazards listed in Table 4-3 above. The hazard ratings were based on the New York State HAZNY analysis discussed in Section 4.D above. These hazards were considered to have a higher magnitude or severity of impact to the Village and include:

- Floods (Section 4.D.1)
- Coastal Storms (Section 4.D.3.2)
- Severe Storm and Thunderstorms (Section 4.D.3.3)
- Hurricanes (Section 4.D.2)
- Fire (Section 4.D.6.7)
- Severe Winter Storms (Section 4.D.4.1)
- Wind Storms (Section 4.D.3.5)
- Transportation Accidents (Section 4.D.6.6)
- Dam Failure (Section 4.D.5.1)
- Utility Failures (Section 4.D.6)

Other hazards considered less severe or low magnitude are describe in less detail but may be reevaluated in later updates to this Plan. These hazard profiles include summarize information and details on the following hazard features:

- Overall summary
- Definition
- Location
- Extent (magnitude/severity)
- Previous instances
- Future events
- Impact

4.D.1 Floods

Hazard Summary: A flood is a general and temporary condition of partial or complete inundation of normally dry land areas from (1) the overflow of inland or tidal waters, (2) the unusual and rapid accumulation of runoff or surface waters from any source or (3) from intense and severe rainfall. Flooding is a frequent occurrence in the Village of Mamaroneck at several locations shown on Figures 4-2, 4-3 and 5-2. Floods may cover large areas of several streets, the river flood plains around the Mamaroneck River and Sheldrake River, and shore line of the harbor. Floods of several feet deep occur regularly following rain events. A major flood occurred on April 15, 2007. (See Figures 4-4 and 4-5.) The most recent major flood was caused by Tropical Storm Irene August 28, 2011 followed by remnants of Tropical Storm Lee on September 4, 2011. Future flooding problems are expected to continue unless mitigation actions are implemented. A future 100-Year flood is a likely event for the areas identified. Floods are

costly from the damage they cause. Numerous homes and families have been impacted with flooded basements and impassible streets and highways. Details of the flood hazards in the Village are given below.

Sources of information on floods are included in Section 11, References Cited: Public meeting with residents; Local paper articles; The Loop, The Daily Mamaroneck, Larchmont-Mamaroneck Patch, Sound and Town, The Journal News, NY Times; Documents and Engineering reports supplied by the Village, NOAA websites, FEMA website, Westchester County Flood Insurance Study; Village of Mamaroneck Local Waterfront Revitalization Plan.

Profile Details: Flooding is a serious problem for the Village of Mamaroneck and ranked 1st with a HAZNY score of 302. It is a low lying shoreline community that is criss-crossed by a number of rivers and streams, thus making it susceptible to flooding from a variety of sources. Floods in the Village have been caused by hurricanes, coastal storms, windstorms, thunderstorms and melting snow and ice. Notable events that caused major damage were from Tropical Storms Floyd and Ernesto, the Nor'Easter of 2007, and most recently, Tropical Storm Irene in August 2011. Based on the past frequency of flooding, the probability of future floods is very high. The Mamaroneck and Sheldrake rivers flow through the Village. The neighborhoods of Orienta, Shore Acres, and Washingtonville (The Flats), and the industrial section lie directly within the 100 year floodplain and coastal flood zones. Even larger area is in the 500 year floodplain. Critical flooding occurs in these areas (See Figure 4-2). The Village lies at the bottom of the Mamaroneck River, the Sheldrake River, and Beaver Swamp Brook, thus these areas are often subject to flooding. These areas are also at high risk for personal safety, personal property damage, and severe damage to infrastructures such as utilities, storm and sanitary sewer lines and roads.

Floods are costly and cause extensive damage. According to FEMA, approximately \$16,227,400.28 was paid out in insurance claims for flood damage in the Village of Mamaroneck between January 1, 1978 and May 31, 2011. However, these flood insurance claims are likely underreported and actual flood damages are probably higher. This amount only covers 1197 losses, and only covers insured damages. (<http://bsa.nfipstat.com/reports/1040.htm#36>)

4.D.1.1 Flood Extent

The Flood Insurance Rate Map (FIRM) indicating flood zones effective September 28, 2007 (National Flood Insurance Program) for the Village of Mamaroneck is shown in Figure 4-2. This map illustrates the hazard areas related to flooding in the Village. This map shows the floodplain area that would be inundated by the 100-Year flood or Base Flood. Also shown are the areas that would be impacted by the 500-Year flood. Areas impacted by surges caused by hurricanes of categories 1, 2, 3 and 4 are shown on Figure 4-3. This map illustrates the inundation or SLOSH zones that would result under the various hurricane categories.

According to the FIRM, the most critical areas for flooding in the Village of Mamaroneck are along the neighborhoods of neighborhoods of Orienta, Shore Acres, Washingtonville (The Flats), and the industrial section. Flooding from hurricanes (Figure 4-3) is discussed in Section 4.D.2 below. The topography in these flood risk areas is relatively flat, with poor drainage and high chance for flooding (Figures 4-1 and 4-3).

4.D.1.2 Impact on Storm Sewer Backups

There have been many reports of storm drain and sanitary sewer manhole overflows. These backups have been a particular problem along First Street in the Village of Mamaroneck.

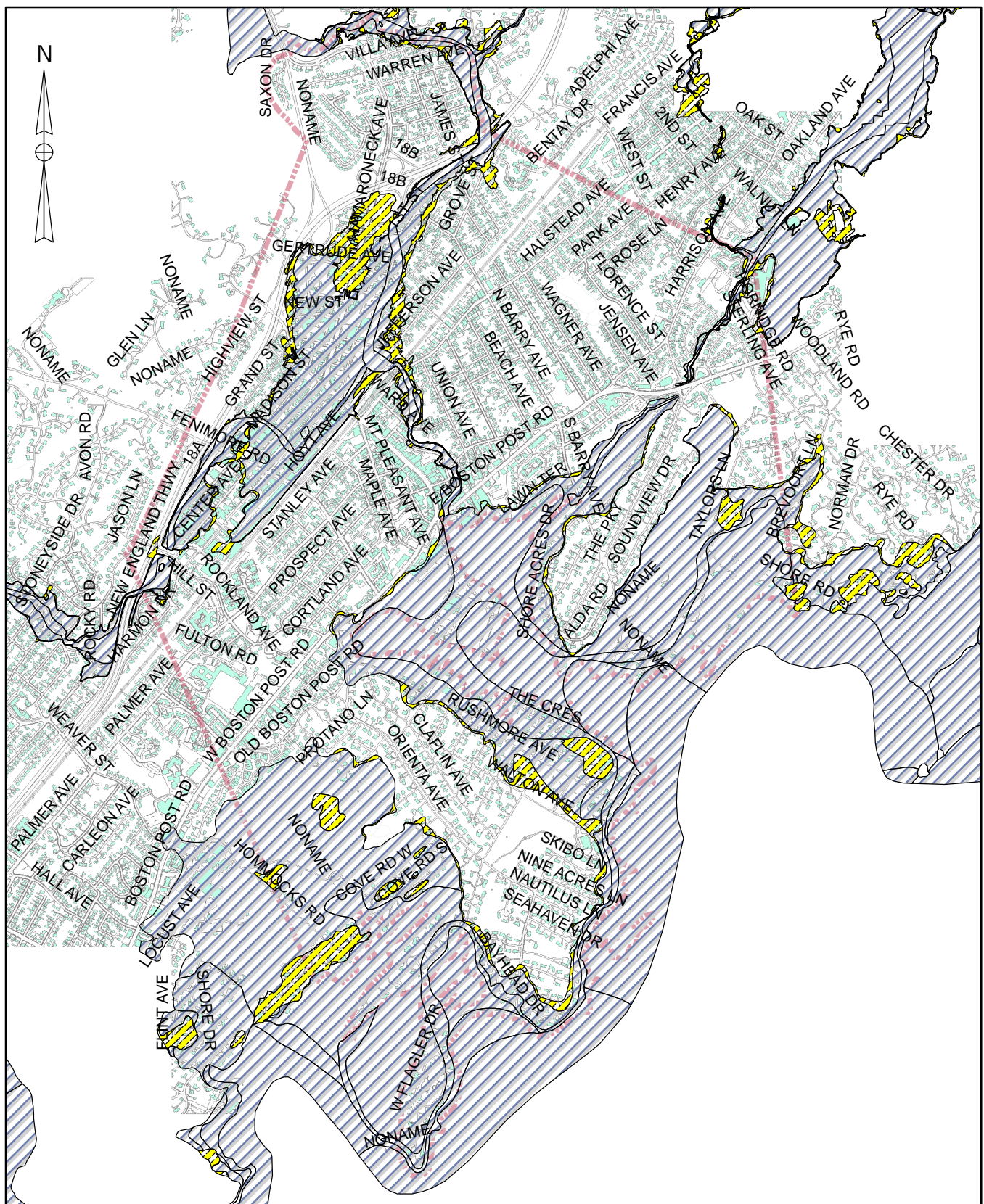


Figure 4-2
100 and 500-Year Floodplain
Incorporated Village of Mamaroneck
Multi-Hazard Mitigation Plan

Legend

FEMA Flood Mapping

100 Year Flood Line

500 Year Flood Line

DWN BY: YS

CHK BY: JB

SCALE: AS SHOWN

DATE: 03/21/12



Environmental
Technology
Group, Inc.

300 WHEELER ROAD, SUITE 307, HAUPPAUGE, NEW YORK 11788

0 1,250 2,500 3,750 5,000
Feet

Basemap information by Westchester County GIS

4.D.1.3 Frequent Local Flooding

Areas that have experienced the most damage from flooding (See Figures 4-2, 4-3, and 5-2) occur in:

- A portion of the Harbor Heights section of the Village of Mamaroneck bordering the Mamaroneck River, including:
 - Chestnut Avenue
 - North James Street
 - Urban Street
 - Winfield Street
- Washingtonville section of the Village, including:
 - Elliott Avenue
 - Madison Avenue
 - New Street
 - Ralph Avenue
 - Howard Avenue
 - Lester Avenue
 - Nostrand Avenue
 - Sheldrake Place
 - Depot Plaza
 - Station Plaza
 - Van Ranst Place
 - Jefferson Avenue (east of Mamaroneck Ave, bordering the Sheldrake River)
- West of Mamaroneck Avenue bordering Sheldrake River
 - Center Avenue
 - Fayette Avenue
 - Fenimore Road
 - Grand Street
 - Waverly Avenue
 - Plaza Avenue
 - East Plaza Avenue (Paper Street)
- Along the lower section of the Mamaroneck River
 - Ward Avenue
 - Spencer Place
 - Valley Place

- North Barry Extension
 - First Street
 - Second Street
- Beaver Swamp Brook
 - Stoneybrook Avenue
- The neighborhoods of Orienta and Shore Acres

Flooding has been a major issue in the Village of Mamaroneck, with documentation dating back to 1942, When the U.S. Department of War, New York District Engineer's Office began a Flood Control Study.

In 1945, the Westchester County Harding Report studied alternate approaches on the Mamaroneck and Sheldrake Rivers.

The United States Army Corps of Engineers (USACE) started the Mamaroneck and Sheldrake Rivers' mitigation studies in 1977. In 1987, they created a preliminary design for a flood control project to widen and deepen the Mamaroneck River, and reroute the Sheldrake River under Fenimore Road. This project was not completed due to high costs.

Most recently, in February 2010, a Federal, State, and County agreement was signed which authorizes the USACE to reexamine opportunities to curtail flooding from the Mamaroneck and Sheldrake Rivers drainage basin, thus reducing flood risks to the Village of Mamaroneck. The parties will reevaluate the flood mitigation project that was abandoned. Changes to the rivers' flows will require another study prior to forging ahead with the project. This project is a partnership between USACE, New York State Department of Conservation (NYSDEC), and Westchester County. The first draft of the USACE's report is expected to be completed by August 2013. This is halfway through the five year process.

**Figure 4-4. Village of Mamaroneck Street Flooding During The Nor'easter
April 15, 2007.**



New Street, Village of Mamaroneck. Photo by Sharon Keck, via Larchmont Gazette.



Mamaroneck Avenue School parking lot. Photograph by Sharon Keck via Larchmont Gazette

Figure 4-5. Village of Mamaroneck Street Flooding During Tropical Storm Irene August 29, 2011.



Fenimore Road and Waverly Avenue. Photo by L. Garcia via Larchmont-Mamaroneck Patch



Rising water at entrance of Harbor Island Park. Stemming from the Mamaroneck Reservoir at the northern most point of the village. Photo by Sarah Caldwell via Larchmont-Mamaroneck Patch

4.D.1.4 The Base Flood

The Base Flood is the 100-Year flood. This is not a flood that occurs once in 100 years but is a large flood elevation that has a one-percent chance of being equaled or exceeded in any given year. Therefore, the 100-Year flood could occur more than once in a relatively short period of time. The "100-Year" flood is a measure of the size of the flood, not how often it occurs. The 100-Year flood is the standard used by most federal and state agencies such as the National Flood Insurance Program (NFIP).

The FEMA 100-Year flood line for the Village of Mamaroneck along and affects the neighborhoods of Orienta, Shore Acres, Washingtonville, and the industrial section.

Properties along shorelines are vulnerable to storm damage during severe northeasters and hurricane conditions. Flooding can come with little warning. Even though they appear to move slowly (three feet per second) a flood two feet deep can knock a man off his feet and float a car. Properties that are susceptible border the banks of the Mamaroneck and Sheldrake Rivers, and the Long Island Sound, which are affected by tides and surges.

4.D.1.5 The 500-Year Flood

A 500-Year flood is a flood that has a 0.2-percent chance of being equaled or exceeded in any one year. While extensive portions of Mamaroneck – including the neighborhoods of Orienta, Shore Acres, and Washingtonville as well as the industrial area – lie directly within the 100-year floodplain and coastal flood zones, an even larger area is within the 500-year floodplain.

Numerous structures could potentially be impacted. The 500-Year flood is an infrequent event meaning that it can occur between once in eight years to once in fifty years. As with the 100-Year Flood, it does not mean a flood occurs once in 500 years.

4.D.2 Hurricanes

Hazard Summary: Hurricanes are major tropical cyclonic wind and rain storms with winds ranging from 75 to over 155 mph. The last major hurricane to cross Westchester County was the “Great Hurricane of 1938”. Since then, there have been no official hurricanes. Damage is not only from strong wind but also major flooding can occur from storm surges (see Figure 4-3). Hurricanes are among the most threatening and highest ranked natural disasters in the northeast.

The Village of Mamaroneck's close proximity to the coast line gives it greater exposure to the risk of hurricanes. Heavy rainfall would result in flooded areas shown in Figure 4-2. The extent of wind damage from hurricanes varies but this hazard would impact the entire village and the surrounding region. Wind and water damage from hurricanes include: serious flooding of streets and homes; utility failures; damage to buildings, roofs, windows and personal property; interruption of traffic and emergency, fire, police services; automobile accidents; food shortages; sewage impacts and economic loss business loss, loss of employment, downtime, loss of inventory. A major hurricane though infrequent could strike the Village of Mamaroneck.

Sources of information on Hurricanes are given in Section 11, References Cited and include: National Weather Service Hurricane website; US Landfalling Hurricane Project website; NOAA Hurricane Research Division website; NOAA National Climatic Data Center website and event record details; Accuweather website; Local papers: Journal News, NY Times, Daily Mirror. (September 23, 1938, pg. 3 &17)

Profile Details: The flood-producing hurricane has a moderately low risk with a HAZNY score of 212. Although hurricanes can produce extensive and devastating damage, the hazard was given a moderately low HAZNY score due to the rarity of occurrence, as most hurricanes have been downgraded to tropical storms by the time they have reached Westchester County. Based on historical records, the last hurricane to cross Westchester County was the "Great Hurricane of 1938". Since then, there have been no official hurricanes. There have been numerous storms that began as hurricanes, such as Hanna in 2008, Ernesto in 2006, and Floyd in 1999, which were downgraded to tropical storms by the time they reached Westchester County. The most recent hurricane that downgraded to tropical storm by the time it reached Westchester County is Irene, which occurred on August 27, 2011. These tropical storms will be discussed in detail in Section 4.D3.1. Damage is not only from strong wind but also major flooding can occur from storm surges (Figure 4-3). Figure 4-6 shows the paths of the hurricanes listed in Table 4-4 that have been tracked within 50 miles of the Village of Mamaroneck from 1861 to 2008. This map was generated from <http://maps.csc.noaa.gov/hurricanes/> on the NOAA (2011) web site.

Hurricanes are among the most threatening and highest ranked natural disasters in the northeast. Expected geographical extent of flooding of the river from a hurricane surge is indicated on

Figure 4-3. Heavy rainfall would result in flooded areas shown in Figure 4-2. The extent of wind damage from hurricanes varies but this hazard would impact the entire village and the surrounding region. Wind and water damage from hurricanes include:

- Serious flooding problems (streets and homes)
- Utility failures (electricity and telephone)
- Natural resource damage (trees, wetlands)
- Property damage (buildings, roofs, windows, personal property)
- Oil spills (floating and damaged underground tanks)
- Boat damage (destruction and capsizing)
- Serious traffic problems (interruption in emergency, fire, police services)
- Beach and shoreline erosion
- Public health and safety (automobile accidents, food shortages, sewage impacts)
- Economic loss (business loss, loss of employment, downtime, loss of inventory)

Hurricanes are rated according to the Saffir-Simpson Hurricane Scale based on the present intensity of the sustained wind speed. The scale ranges from 1 to 5 as follows:

CATEGORY

Category 1 (Weak)	74 to 95 mph	4-5 feet
Category 2 (Moderate)	96 to 110 mph	6-8 feet
Category 3 (Strong)	111 to 130 mph	9-12 feet
Category 4 (Severe)	131 to 155 mph	13-18 feet
Category 5 (Devastating)	Over 155 mph	Over 18 feet

Because the Village of Mamaroneck is in the northeastern U.S., Category 5 hurricanes are considered unlikely. Although possible, no category 4 hurricanes have directly hit Westchester County. The Village of Mamaroneck is located in Wind Zone 2, with wind speeds ranging up to 160 mph. It is also mapped in the Hurricane Susceptible region, which extends along the east coastline.

The Hurricane of 1938 for example, was one of the most damaging events on record. It was a Category 3 storm, but Mamaroneck did not suffer the brunt of the storm. According to news

archives, Mamaroneck suffered from flooded cellars, downed telephone and telegraph poles, downed trees along back roads, and power outages for only one half hour. (Daily Mirror, Friday September 23, 1938)

Climate models project increased rainfall rates, which can lead to stronger hurricanes and rising sea levels. This topic is discussed in Section 4.D.5.7, The Effect of Climate Change on Natural Hazards.

Summary of Search:

Location: 10543, postal code, Mamaroneck, New York, United States
 Buffer: 92600 Meters (50 Nautical Miles)
 Search was not refined

Summary of Storms

Category	Count
Category 5 (H5)	2
Category 4 (H4)	1
Category 3 (H3)	5
Category 2 (H2)	1
Category 1 (H1)	9
Trop./Sub. Storm (TS/SS)	7
Trop./Sub. Depression (TD/SD)	0
Extratropical (ET)	1
Unknown (N/A)	0

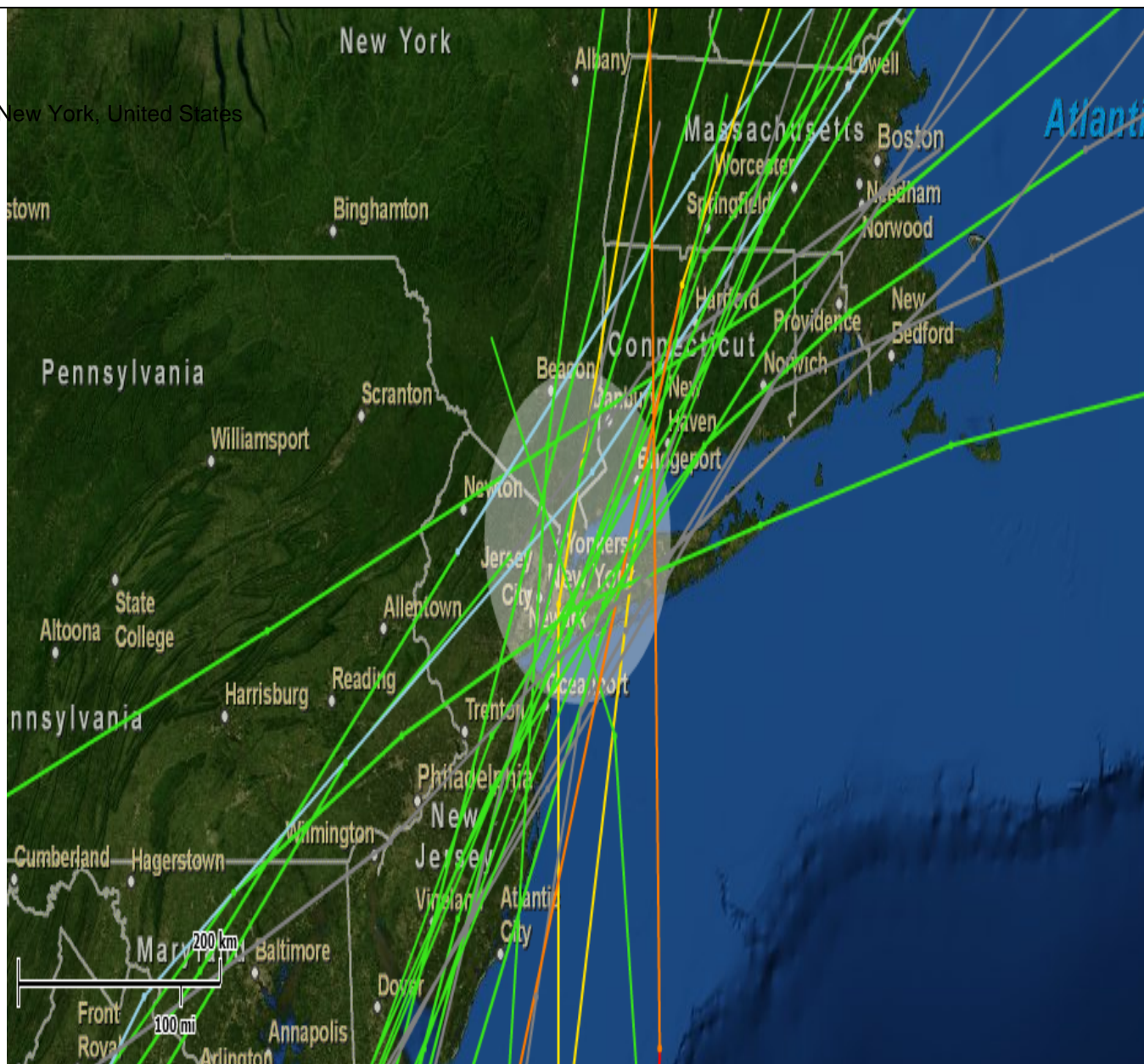


Table 4-4. Historical Hurricanes Storm tracks from 1861 - 2008 within 50 Miles of Mamaroneck NY.

Storm Name	Max Saffir-Simpson	Date
NOT NAMED 1861	H1	Sep. 27, 1861 to Sep. 28, 1861
NOT NAMED 1863	TS	Sep. 16, 1863 to Sep. 19, 1863
NOT NAMED 1866	H1	Oct. 28, 1866 to Oct. 30, 1866
NOT NAMED 1872	H1	Oct. 22, 1872 to Oct. 28, 1872
NOT NAMED 1874	H1	Sep. 25, 1874 to Oct. 1, 1874
NOT NAMED 1888	H3	Aug. 14, 1888 to Aug. 24, 1888
NOT NAMED 1888	TS	Sep. 6, 1888 to Sep. 13, 1888
NOT NAMED 1893	H3	Aug. 15, 1893 to Aug. 26, 1893
NOT NAMED 1900	TS	Oct. 10, 1900 to Oct. 15, 1900
NOT NAMED 1915	H1	Jul. 31, 1915 to Aug. 5, 1915
NOT NAMED 1924	ET	Sep. 27, 1924 to Oct. 1, 1924
NOT NAMED 1934	H1	Jun. 4, 1934 to Jun. 21, 1934
NOT NAMED 1938	H5	Sep. 10, 1938 to Sep. 22, 1938
ABLE 1952	H2	Aug. 18, 1952 to Sep. 2, 1952
DIANE 1955	H3	Aug. 7, 1955 to Aug. 21, 1955
BRENDA 1960	TS	Jul. 28, 1960 to Aug. 1, 1960
UNNAMED 1961	TS	Sep. 12, 1961 to Sep. 15, 1961
DORIA 1971	TS	Aug. 20, 1971 to Aug. 29, 1971
AGNES 1972	H1	Jun. 14, 1972 to Jun. 23, 1972
BELLE 1976	H3	Aug. 6, 1976 to Aug. 10, 1976
GLORIA 1985	H4	Sep. 16, 1985 to Oct. 2, 1985
CHRIS 1988	TS	Aug. 21, 1988 to Aug. 30, 1988
BERTHA 1996	H3	Jul. 5, 1996 to Jul. 17, 1996
FLOYD 1999	H5	Sep. 7, 1999 to Sep. 19, 1999
GORDON 2000	H1	Sep. 14, 2000 to Sep. 21, 2000
HANNA 2008	H1	Aug. 28, 2008 to Sep. 8, 2008

Source: <http://maps.csc.noaa.gov/hurricanes>

Note: Hurricane Irene formed on August 20, 2011 and dissipated on August 29, 2011. Its highest rank on the Saffir-Simpson Scale was a Category 3 Hurricane (H3). Irene was downgraded to a Tropical Storm before it reached Westchester County.

4.D.2.1 Notable Northeastern Hurricanes

All of the hurricanes listed below in Table 4-5 struck the northeast portion of the United States. Their total cost, death toll, and relative ranking are based on their overall impact along the Atlantic coast. The 1938 Hurricane (The Long Island Express) was a Category 3 storm when it hit landfall in the Northeast. The Category 4 hurricane such as Donna is a rare event largely because hurricanes generally lose force and intensity as they move into northern areas with colder ocean water.

Table 4-5. Major Northeast Hurricanes and Damage Costs.

National Ranking by Damage	Hurricane Name	Year	Hurricane Category	Total Damage Million Dollars*
9	Agnes	1972	1	11,760
14	Floyd	1999	2	9,225
17	Diane	1955	1	7,408
19	L.I. Express	1938	3	6,325
23	Great Atlantic	1944	3	5,706
26	Carol	1954	3	4,175
29	Donna	1960	4	3,215
30	Bob	1991	2	2,703

***Damage costs for east coast U.S. based on Year 2010 deflator.**

Source: NOAA Technical Memorandum NWS NHC-6. “The Deadliest, Costliest and Most Intense U.S. Tropical Cyclones From 1851-2010 (And Other Frequently Requested Hurricane Facts)”. National Weather Service, National Hurricane Center, August 2011.
www.nhc.noaa.gov/pdf/nws-nhc-6.pdf

4.D.3 Other Severe Storm Hazards

There are other severe storm hazards that produce damaging winds and flooding. This section discusses warmer season storms. Winter storm hazards are addressed in Section 4.D.4 below. The impact locations and extent of damage and flooding from other severe storms can be similar to hurricanes, and result in 100-Year and 500-Year floods that were discussed above in Section 4.D.1. The geographical extent of wind damage from severe storms may cover large areas and this hazard would likely impact the entire village. The damage to the Village of Mamaroneck from severe storms and coastal storms has been very significant.

Utility failures occur during severe storms such as nor’easters, tropical storms, wind and snowstorms. This is usually due to the breakage of utility poles or power lines causing electrical failures in local areas. This damage may be localized in several areas or impact the entire

village. Con Edison reports that during storm events several hundred thousand customers have been without power for several days. Storm related damage has sometimes required help from other utilities outside our region in order to restore power. Utility failure will be discussed in detail in Section 4.D.6.1. Structural damage for each of these storm hazards has not been quantified but can be assumed to be similar to less severe hurricanes.

4.D.3.1 Tropical Storms

Hazard Summary: Tropical storms are tropical cyclones with sustained winds between 39-73 mph. Hurricanes have sustained winds of 74 and up and are often downgraded to tropical storm status by the time they reach Westchester County. It is an organized rotating weather system that develops in the tropics and which has a warm center (or core) of low barometric pressure. The Village of Mamaroneck has felt the effects of many tropical storms. Because of their less severe wind speeds, wind damage is less than a hurricane. However, rainfall, wind, and storm surge from these storms has caused serious flooding in the Village. Areas flooded are shown in Figure 4-2, 4-4, 4-5 and 5-2. Damages are the same as those described for flooding discussed above. Future flooding from tropical storms can be expected.

Sources of information on tropical storms are given in see Section 11, References Cited and include: Public meeting with residents; Local papers and websites, including: Sound and Town, The Loop, The Daily Mamaroneck, Larchmont-Mamaroneck Patch, Journal News, and NY Times; Village Documents and Engineering reports; NOAA websites; FEMA website; Village of Mamaroneck Flood Insurance Study; NYS Office of the Governor Press releases; FEMA Press releases.

Profile Details: Tropical Storm Floyd wreaked havoc on Westchester County on September 16, 1999. Sustained 60 mph winds accompanied torrential rainfalls. Maximum rainfall rates ranges from 1 to 2 inches per hour for at least 3 consecutive hours across parts of Westchester. Total rainfall at the Westchester County Airport was measured at 6.26 inches. Damage in Westchester County was reported at \$6.6 million. (DR-1296).

Tropical Storm Ernesto brought strong winds and heavy rain to Westchester County on September 2, 2006. The hardest hit areas were the Southern Westchester towns, including

Greenburgh, Larchmont, Mamaroneck, Mount Vernon, New Rochelle, North Castle, Ossining, Port Chester, Rye, Scarsdale, Tarrytown, White Plains, and Yonkers. The storm caused power outages to approximately 80,000 customers in Westchester County, most located in Southern Westchester. According to Con Edison, approximately 100 trees were downed, and 900 wires fell. Residents of the Village of Mamaroneck experienced high winds, which downed power lines and trees, and caused power outages.

Tropical Storm Hanna hit Westchester County on September 6, 2008. Wind gusts ranges from 35 to 45 miles per hour, and rainfall totaled 4.41 inches of rain at Westchester County Airport.

Tropical Storm Irene hit Westchester County on August 27, 2011. The President declared an Emergency for the State of New York, Including Westchester County (DR-4020). This storm brought severe damage to the County. Over 7 inches of rainfall fell on the Village of Mamaroneck and flooded approximately 40 percent of the village, affecting approximately 3,300 homes. Hardest hit were Washingtonville, First Street, Second Street, and a section of Harbor Heights. River flooding impacted Washingtonville. A storm surge of over 3 feet occurred off the Long Island Sound, and tidal flooding impacted the Shore Acres and Orienta Neighborhoods. Between 400 and 500 homes in the Village of Mamaroneck's low lying areas and coastal and river flood zones were affected by an evacuation order. Trees and power lines were also downed. Wind gusts of 75–80 MPH knocked out power. Con Edison reported that the storm knocked out power to approximately 4,000 customers in the Village. An estimate of 280 people utilized the emergency shelter located in the gym at Mamaroneck High School. (DR-4020).

4.D.3.2 Coastal Storms

Hazard Summary: A coastal storm is a non-tropical storm that produces gale-force winds and precipitation in the form of heavy rain or snow. An intense extra-tropical coastal storm for the region is called the nor'easter. The Village of Mamaroneck has felt the effects of many coastal storms. Because of their less severe wind speeds, wind damage is less than a hurricane. However, rainfall and storm surge from these storms has caused serious flooding in the Village. In the winter these storms can cause blizzards. Flooding impacts several streets scattered over the Village. Areas flooded by these storms are the same as for other storms and are shown in

Figure 4-2, 4-4, 4-5 and 5-2. Damages are the same as those described for flooding and tropical storms discussed above.

The March 13, 2010 storm was the most recent storm to cause widespread flooding. (See Figure 4-4.) Future storms of this type are commonly expected. Future flooding from these storms can be expected.

Sources of information on coastal nor'easter storms are given in Section 11, References Cited and include: Public meetings with residents; Local papers and websites including: The Loop, The Daily Mamaroneck, Larchmont-Mamaroneck Patch, Sound & Town, Journal News, and NY Times; Documents and Engineering reports supplied by the Village; NOAA websites; FEMA website; Village of Mamaroneck Flood Insurance Study; NYS Office of the Governor Press releases; Consolidated Edison Press releases; Village of Mamaroneck Press releases.

Profile Details: Nor'easter storms move north along the east coast and have strong winds with heavy precipitation blowing off the Atlantic Ocean from the northeast. If a nor'easter moving up the coast follows a track westerly of New York City, rain is typically the result. However, if the storm maintains a track just off the eastern coast of the city, then snow or mixed precipitation is likely to occur. In the Mamaroneck area these storms have resulted in serious flooding of streets and homes, very high gale force winds, destruction of trees, utility poles, and damage to homes and other buildings. These storms are frequent and cover a large region including Westchester County, Long Island, and New England.

The presence of fronts and a drop in temperature at higher levels of the troposphere keep the storm from being classified as tropical. The most notable nor'easters that affect New York City and Westchester County have occurred as snowstorms during the winter weather months. Winter nor'easters are discussed below in Section 4.D.4. They may occur as heavy rainstorms or snowstorms. Severe storms have occurred in the Mamaroneck area that resulted in heavy precipitation, serious flooding of streets and homes, very high gale force winds, destruction of trees, utility poles, and damage to homes and other buildings.

These storms are frequent events and cover a large region including Westchester County, Long Island, and New England. Wind speeds can approach those of a Category 2 hurricane. These storms may last from one to a few days. There is a potential for serious injury and some deaths. Property damage may be moderate to severe. Damage to infrastructures such as electrical power lines may be moderate to severe. There is a high probability for a major future coastal storm.

The Nor'easter of December 10-13, 1992 caused torrential rains, gusting winds, massive flooding, power outages, and property damage. Basements were flooded, trees and utility poles were down, and traffic was seriously snarled. This storm caused about \$1-\$2 million in damages and costs and 19 deaths in the northeastern U.S. (NCDC/NOAA (1998), Billion Dollar Weather Disasters). (FEMA DR-974).

The Nor'easter of October 19-20, 1996 brought widespread flooding to the area. Approximately 5 inches of rain fell in Southern Westchester County, and there were 30-40mph winds with gusts up to 60 mph. This storm caused more than \$3.5 million in damages to Westchester and Suffolk Counties. (DR-1146). (NOAA, NESDIS, NCDC, Event Record, 19 Oct. 1996).

The Nor'easter of April 15, 2007 brought high wind gusts and approximately 8.05 inches of rain fell on Southern Westchester County within a 24 hour period, leaving scores of homes and businesses underwater. This resulted in what some people call the "worst flooding in half a century". The Village of Mamaroneck was one of the sections affected hardest. Con Edison turned off the power to scores of residents and businesses in the Village of Mamaroneck to protect against rising water coming into contact with equipment in basements and resulting in hazardous conditions. In Harbor Heights, the Mamaroneck River overflowed its banks. Over 220 Washingtonville residents had to be evacuated to the High School gym. (DR-1692).

The Nor'easter of March 13, 2010 brought rain and high wind gusts of up to 62 mph. Northeast winds brought coastal water from the Mamaroneck Harbor crashing onto the land, flooding the Orienta and Harbor Heights sections of the Village of Mamaroneck. Trees and power lines were downed, closed local roads, and basements flooded. Reports of downed trees came from Florence Street and Walton Avenue, where trees landed on homes; Bleeker Avenue; the Parway; South Barry Avenue; Madison Street; Center Avenue, where a tree fell on a vehicle; and

Mamaroneck Avenue. Power outages occurred to 650 customers in the Village of Mamaroneck (Con Edison). (DR-1899).

4.D.3.3 Severe Storms and Thunderstorms

Hazard Summary: Severe storms are atmospheric disturbances usually characterized by strong winds, frequently combined with rain, snow, sleet, hail, ice, thunder and lightning. A thunderstorm is an event that produces lightning strikes, thunder, high winds, heavy rains, flooding and hail. Other associated dangers of thunderstorms include tornadoes, and flash flooding. Flash flooding is responsible for more fatalities, more than 140 annually, than any other thunderstorm-associated hazard.

Because their winds can be strong and gusty, wind damage can be severe. Trees, roofs and utility lines are particularly vulnerable from wind and lightning throughout the entire village. Rainfall from these storms has caused serious flooding in the Village. Areas flooded by these storms are shown in Figure 4-2, and 5-2. Damages are the same as those described for flooding and tropical storms discussed above. Future storms of this type are commonly expected. Future flooding from these storms can be expected.

Sources of information on thunderstorms are given in see Section 11, References Cited and include: Public meeting with residents; Local papers and websites including: The Loop, The Daily Mamaroneck, Larchmont-Mamaroneck Patch, Sound & Town, Journal News, and NY Times; Documents and Engineering reports supplied by the Village; NOAA websites; FEMA website; Consolidated Edison Press releases.

Profile Details: A severe storm and thunderstorm can produce lightning strikes, high winds, heavy rains, flooding, hail, and cause damage to trees, utility poles, power lines, commercial structures and residential homes. Although damage from one these storms is localized, the damage could be anywhere in the Village. Such thunderstorms have a high probability of occurrence in the region.

Deaths from lightning strikes and other accidents occur in Westchester County. Such thunderstorms have a high probability of occurrence in the region. These storms are commonly

associated with frontal systems and may result in concentrated heavy down pours of rain. Rapid local flooding may occur without warning.

Hailstorms, which can accompany thunderstorms, occur in Westchester but they are not prevalent. Thunderstorms may also be associated with hurricanes discussed above and with tornados discussed below. This severe storm hazard is prevalent in Westchester County during the warmer months of the year.

Between January, 1, 1950 and April 30, 2011, 173 major thunderstorms were listed in the NCDC database for Westchester County. This is not a complete listing of all storms as thunderstorms are more frequent than indicated. These storms are very frequent events and may cover large area across Westchester County. Wind gusts of 50 to 75 mph are not uncommon. A storm may last from less than an hour to several hours. There is a potential for serious injury and limited deaths. Property damage may be moderate to severe. Damage to infrastructures such as electrical power lines is prevalent with downed power lines or damaged transformers or substations.

Westchester County was hit hard by a multitude of weather events, all of which were accompanied by severe thunderstorms. Most notable storms include one that occurred in August 1999, and a series of storms, which occurred during the summer of 2006, as described below.

A severe storm wreaked havoc on Southern Westchester County on August 26, 1999. Severe thunderstorms produced torrential rain that caused serious urban flooding in the area. Road closures occurred in the area. The storm dropped 3-5 inches of heavy rain in the Village of Mamaroneck in the time frame of just 90 minutes, and flooded streets and basements. Metro-North service was suspended. No injuries were reported.

Westchester County was hit hard in 2006 by a series of storms that occurred in the summer. They occurred closely together and were all accompanied by severe thunderstorms. Most notable thunderstorms include the ones that accompanied the microburst on July 18, 2006, which affected areas in Westchester County, South of I-287. Heavy rains, and wind gusts up to 60-70 mph knocked out power to 35,000 households. This storm damaged many trees in the County.

Another thunderstorm accompanied a microburst electrical storm which occurred just days later on July 21, 2006, which also affected areas south of I-287. The next day, another storm knocked out power to an additional 6,000 households.

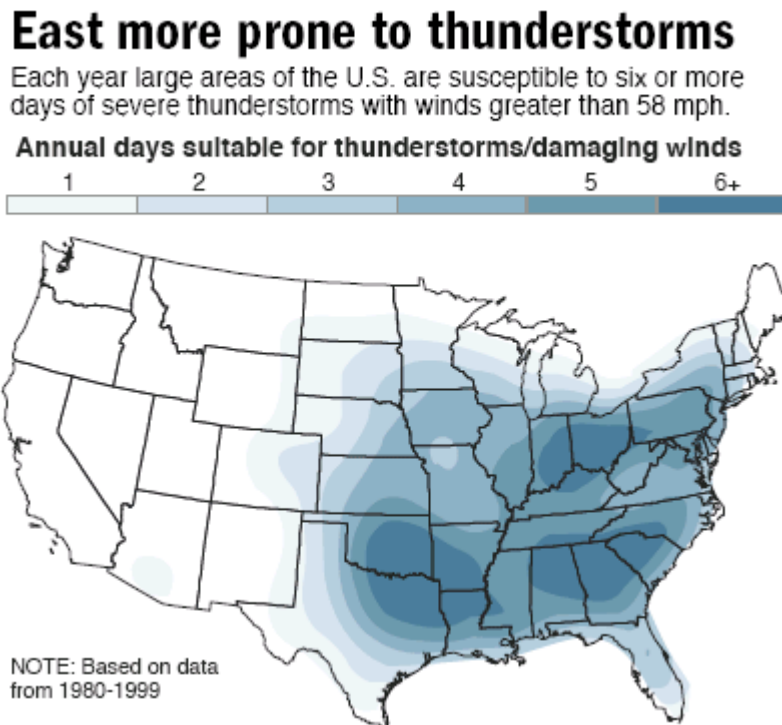
A severe storm dropped approximately 4 inches of rain in the Village of Mamaroneck on March 2, 2007. More than 85 homes were evacuated near the Mamaroneck River, as water flooded the streets and basements and garages in the area. Con Edison reported approximately 188 households had their power shut off in the Village of Mamaroneck.

Downed trees and power lines closed Weaver Street between Palmer and Howell Avenues due to winds from a severe thunderstorm on October 10, 2010. A downed tree also closed Halstead Avenue and Jefferson Street, near the Mamaroneck train station.

A severe thunderstorm caused a tree to fall on Shore Acres Drive, starting a small electrical fire on June 10, 2011. Power outages were reported to 20 households on Shore Acres Drive and 1 household on Fenimore Road.

There is a high probability for future damaging thunderstorms. NOAA scientists predict that more severe thunderstorms with lightning, hail and the potential for tornadoes will occur in the future due to climate change. Prepared by the National Weather Service, figure 4,7 below identifies the states most prone to these severe storms, including New York State.

Figure 4-7. States Most Prone to Thunderstorms.



Source: msnbc.com, NWS

4.D.3.4 Tornadoes

Hazard Summary: A tornado is a local atmospheric storm, generally of short duration, formed by winds rotating at very high speeds, in a funnel-shaped cloud striking the ground with whirling winds of up to 318 miles per hour or more. The vortex, up to several hundred yards wide, is visible to the observer as a whirlpool-like column of winds rotating about a hollow cavity or funnel. Winds may reach 300 miles per hour or higher.

They are infrequent and are scattered geographically over the County and cover a relatively narrow path that can produce severe damages. Wood frame building and other weakly constructed building, trees, and utility lines are particularly vulnerable from wind damage. There is no history of a tornado in the Village of Mamaroneck. There were 7 documented tornadoes in Westchester County between 1958-2004. Four scored an F1 on the Fujita Tornado Scale and 3 scored an F0. There was an 8th tornado on 7/12/2006 which was sighted over the Hudson River

and went through Sleepy Hollow, Mt. Pleasant, and the hamlet of Hawthorne. This was an F2 tornado. However, their unpredictable impact could strike any area in village. These storms are rare event in the County and future storms of this type are unlikely but possible. Hilly terrain such as that surrounding Mamaroneck has a lower risk and frequency of tornadoes. They are also associated with other severe storm hazards, so they are not evaluated further in the plan as a separate hazard.

Sources of information on tornadoes are given in see Section 11, References Cited and include: Tornado History Project website; Bergen SkyWarn website; Accuweather.com; Journal News; NOAA websites; FEMA website.

Profile Details: Although there have been several tornados reported in Westchester County, they are considered infrequent. There is no history of a tornado striking the Village of Mamaroneck. Figure 4-7 shows that significant tornado occurrences are scattered over the State. The database for storm events lists eight tornado events for Westchester County between 1950 and April, 2011 (NCDD/NOAA, 2011) with one death reported. None of the eight reported events have been in or near Mamaroneck. On July 12, 2006, the eighth tornado occurred in Westchester County. A tornado was sighted over the Hudson River near the Tappan Zee Bridge. It quickly moved east over the Village of Sleepy Hollow, then into the town of Mount Pleasant, where it did the most damage in the hamlet of Hawthorne. Winds exceeded 150 MPH along the path. A state trooper's patrol car was picked up in the air and spun around. A two-story brick building was critically damaged; seven large trees toppled onto the Metro-North railroad tracks; and 4,000 Westchester residents lost power due to the severe thunderstorms that accompanied the tornado. There were 6 injuries reported. The reported path width of the tornado was estimated at 200 to 300 yards based on the damage survey across Westchester County. (National Weather Service, Upton, NY, July 14, 2006).

The severity of a tornado is rated using the Fujita Tornado Scale. All reported tornados in the county were less than a magnitude of F3. The last tornado reached an F2 magnitude, four of the tornadoes were an F1 Magnitude, and three reached an F0 Magnitude.

Fujita Tornado Scale

- F0 = 40 to 72 mph – light damage
- F1 = 73 to 112 mph – moderate damage
- F2 = 113 to 157 mph – considerable damage
- F3 = 158 to 206 mph – severe damage
- F4 = 207 to 260 mph – devastating damage
- F5 = 261 to 318 mph – incredible damage

Although infrequent, these tornadoes can produce considerable damage in localized areas anywhere in the Village or County. The reported width of tornados in Westchester County ranged from 13 yards to 300 yards. However, the geographical occurrence could be anywhere in the Village or the county. Tornados are also associated with severe thunderstorms and with hurricanes for which hazards were discussed in Section 4.C.1. NOAA scientists predict that more severe thunderstorms with lightning, hail, and the potential for tornadoes will occur in the future due to climate change.

Because tornadoes are not a frequent hazard, are scattered geographically and are also associated with other severe storm hazards, they are not evaluated further in this plan as a separate hazard.

4.D.3.5 Wind Storms

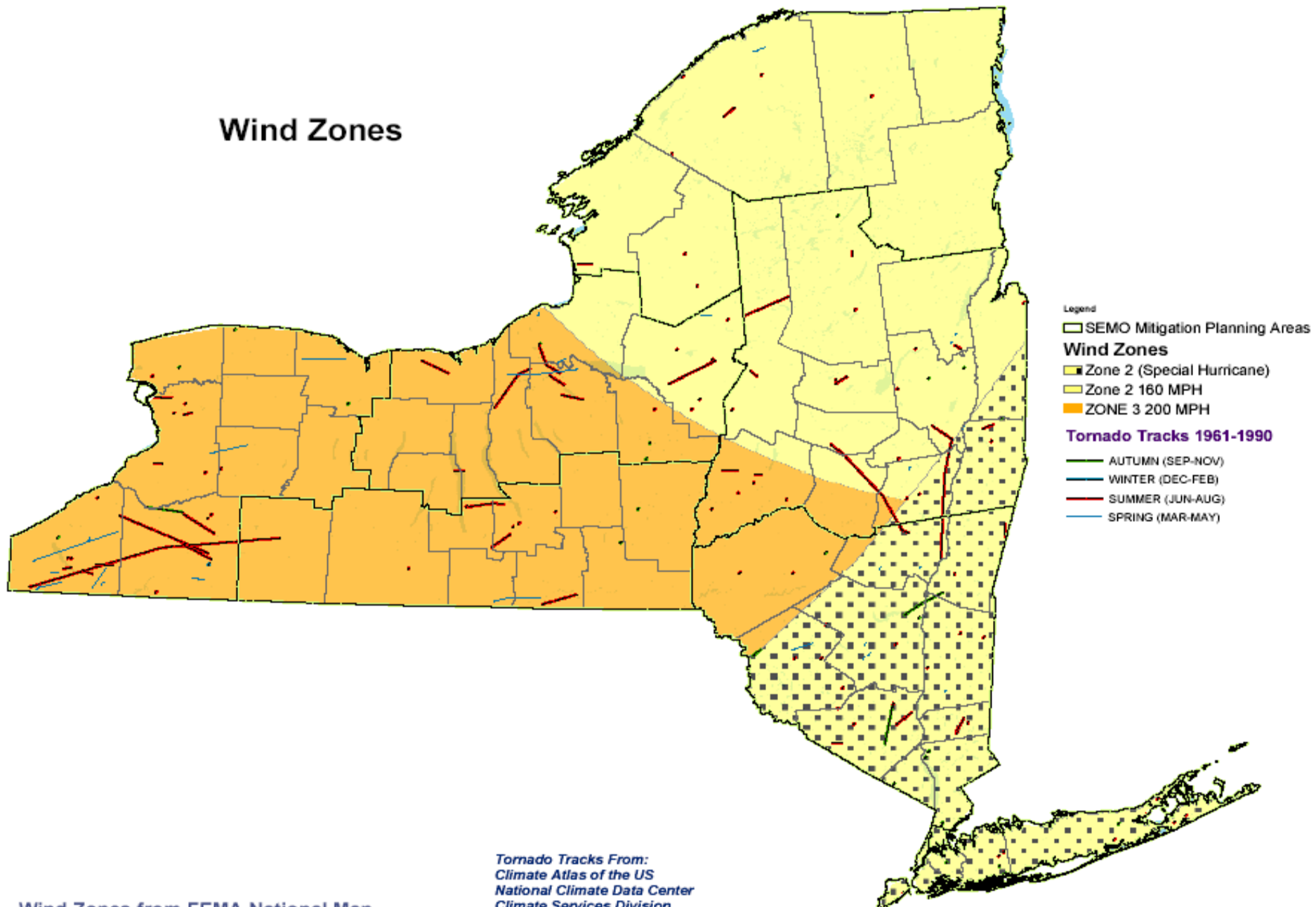
Hazard Summary: Wind storms are accompanied by strong gale force or stronger winds that may or may not include precipitation. These winds may be associated with tornadoes, thunderstorms, Nor'easters, tropical storms, and hurricanes. They are violent winds of high velocity and are commonly associated with frontal weather systems. They cover a relatively wide path in the region and they affect the entire geographical area of the Village. Wind storms can produce gale force gusts of wind and can cause severe damage to wood frame buildings, roofs, trees, utility lines and unsecured materials and items. Con Edison reported that severe windstorms occurred between January 18-22, 2006, which uprooted trees and caused scattered power outages across Southern Westchester. 61,486 households in Westchester lost power from those storms. NOAA reported a severe wind storm occurred on September 30th and October 1, 2010, with wind gusts ranging from 40 – 55 mph in Southern Westchester. Con Edison reported 1200 households in Southern Westchester lost power during that storm. Wind events are

common in the Village of Mamaroneck and they can strike any area in village. Future storms of this type are highly likely.

Sources of information on wind storms are given in see Section 11, References Cited and include: Bergen SkyWarn website; Accuweather.com; Journal News; NOAA websites; FEMA website; Wind zones of NY, NYSOEM website; NYS Multi-Hazard Mitigation Plan.

Profile Details: Windstorms can cause destruction of trees, toppling of power and telephone lines, and serious widespread damage to humans and property. Wind zones for New York State, which are used for construction standards, are shown in Figure 4-7. This hazard cannot be geographically determined but can affect the entire Village planning area. These storms have caused power failures, damage to property including window and roof breakage, human injuries from falling objects, and damage and capsizing of boats, beach erosion, and financial losses. Windstorms are similar to and commonly associated with the advance of other storm events such as thunderstorms and tornados.

Wind Zones



Wind Zones from FEMA National Map

*Design Wind Speeds (3- Second gust) consistent with ASCE 7-95

Tornado Tracks From:
Climate Atlas of the US
National Climate Data Center
Climate Services Division
<http://www.ncdc.noaa.gov/>

Figure 4 - 8
Wind Zones of New York State

4.D.4 Winter Storm Hazards

Winter weather for the Village of Mamaroneck is highly variable. Storm systems in winter may deposit snow, sleet or freezing rain, with a significant impact on transportation systems and public safety. These hazards also include severe snow storms and blizzards. Although there are several winter storm hazards, ice storms and snowstorms are the most prevalent. There are no mountains in the area that could produce avalanches. Although ice jams in the Village's rivers can occur in severely cold winters, they are not a hazard causing severe damage or significant loss of life, but some have caused localized flooding. Ice jams have occurred around the Jefferson Avenue Bridge, the Ward Avenue Bridge, and the Waverly Avenue Bridge in the past, causing localized flooding to nearby homes and businesses, and forcing the closure to roadways, and causing minor structural damage to the bridge.

The damage to the Village of Mamaroneck from severe winter storms, coastal storms, nor'easters, ice storms, and snowstorms has been very significant. Winter storms cover a relatively wide path in the region and they affect the entire geographical area of the Village. Average minimum winter temperatures for the area are approximately 28.6 degrees Fahrenheit. The lowest recorded temperature for New York City was -15 in 1934. (NYSCE 2006, Climate Summary)

4.D.4.1 Snow Storms

Hazard Summary: A severe snowstorm deposits heavy snow amounting to 12 inches in 12 hours or less. Snowstorms are common winter events for the region. The average annual snowfall for New York City region is 22.3 inches. Snow storms deposit several inches of snow over the entire Village and are often accompanied by strong gale force winds. Snow storms with high winds are referred to as blizzards. They blanket a relatively wide area locally and can produce severe damage to buildings, trees, and utility lines. Heavy snowfalls and blizzards affect the entire planning area since access to roads and highways is necessary for residents. In addition they disrupt train service, bus service and traffic as well as school, business and employment activities. The greatest daily snowfall since 1949 was 26.9 inches in February 2006 when a snowstorm occurred in the area. The blizzard of February 12, 2006 was the biggest snowstorm in the New York City region's history. Snow events are common in the Village of

Mamaroneck and they generally strike the entire village. Future storms of this type are highly likely.

Sources of information on snow storms are given in see Section 11, References Cited and include: Accuweather.com; Local newspapers papers and websites: Sound and Town, Larchmont-Mamaroneck Patch, The Loop, Journal News; NY Times; NOAA websites; FEMA website; NYSCE 2006, Climate Summary, NWS Forecast Office, Significant Weather Events Archive.

Profile Details: Heavy snowfalls and blizzards affect the entire planning area since access to roads and highways is necessary for residents to travel to work and school, obtain necessary foodstuffs for their families, and allow fire, public safety, and ambulances to reach their destinations when emergencies arise. These storms also cause dangerous situations from fallen electrical lines and trees falling on roofs. Coastal winter snowstorms or nor'easters can be particularly severe and hazardous. They can deposit large amounts of snow and produce strong winds that result in blizzard conditions.

A nor'easter in December 1992 was a blizzard that covered the eastern U.S. This storm cost \$1-\$2 billion and resulted in 19 deaths over the area impacted. \$1.6 - \$3.2 billion were reported in damages. These dollar amounts were adjusted to 2011 dollars by using the Consumer Price Index (CPI). (NCDC /NOAA, billion dollar U.S. Weather Disasters, 1980-August 29, 2011). www.ncdc.noaa.gov/oa/reports/billionz.html (DR-974).

A nor'easter on March 12-14 1993 was a blizzard that covered the eastern U.S. and was called the storm of the century. It affected 26 states and resulted in 270 fatalities. This storm cost \$7.8-\$9.4 billion adjusted 2011 dollars (NOAA/NCDC, 1993, Storm/Blizzard March 1993), In New York State the death toll was 23. Hundreds of roof collapses occurred in the northeast due to the weight of the heavy wet snow. Over 3 million customers were without electrical power in the region at one time due to fallen trees and high winds. At least 18 homes fell into the sea on Long Island due to the pounding surf. Winds of 71 mph were reported at La Guardia Airport, NY (NCDC/NOAA, 2006). Westchester County suffered approximately \$8.4 million dollars in damages, and received between 10 and 20 inches of snow. The National Weather Service

reported 16.5 inches of snow in Croton Falls with some wind gusts above 50 mph. Approximately 1,200 customers lost power in Mamaroneck and New Rochelle (NY Times, “The Blizzard of ‘93”, March 14, 1993). (EM-3107).

The blizzard of January 6-8, 1996 was the biggest snowstorm in the New York City region in 48 years. Over 27 inches of snow fell on some areas of the region. LaGuardia Airport reported 24 inches of snow. Seven deaths in New York State were associated with the storm. The impacts of the storm were compounded by a thaw and heavy rains on January 19. Ten flood fatalities resulted for New York State. According to the National Climate Data Center, “Billion Dollar U.S. Weather Disasters (NCDC/NOAA, 2011), the total impact from this event on the northeast was 187 fatalities and about \$4.3 billion in total damages and adjusted 2011 costs including snow removal. (DR-1083).

The blizzard of February 12, 2006 was the biggest snowstorm in the New York City region’s history. A classic Northeaster, the storm was 1,200 miles long and 500 miles wide on satellite images, and it had winds that gusted up to 60 miles per hour. It spanned across the Northeast from Virginia to Maine. According to the National Weather Service, a record 26.9 inches fell in Central Park, the most since record keeping began in 1869. The previous record was 26.4 inches set during the great snowstorm of 1947 (Dec 26-27) when 77 people were killed. Another record 25.4 inches fell at LaGuardia Airport. Areas in the Bronx had 24.5 inches of snowfall. NOAA reported accumulation of 16 to 25 inches of snowfall in Westchester County; 21.5 inches fell at Westchester Airport, and 24.5 inches fell in New Rochelle. Although no power failures were reported in Westchester County, winds downed many trees and power lines. The total impact from this event on the northeast was only 3 fatalities and about \$3 billion in total damages and costs.

Approximately 12 inches of snow fell on the Village of Mamaroneck during the February 25-26, 2010 snowstorm. The storm brought wind gusts as high as 45 mph to the Village.

The Blizzard of December 26-27, 2010 dropped 22 inches of snowfall on the Village of Mamaroneck. Extremely high winds knocked a high voltage wire loose from the transformer on Palmer Avenue, knocking out power to the block. (DR-1957).

During the heavy snow storm of January 26-27, 2011, 13 inches of snow fell on the Village of Mamaroneck, with wind gusts up to 43 mph.

4.D.5 Other Natural Hazards

Although other natural hazards occur in the Village of Mamaroneck only a few are of concern while most others may not be severe or prevalent events. The following three hazards were eliminated from further consideration. There are no expansive soils hazards in or near the Village. Tsunamis (tidal waves) and volcanoes do not occur in this region of the country. The following potential hazards are discussed below: Dam failure, Earthquakes, Epidemics, Extreme temperature, Drought and Landslides.

4.D.5.1 Dam Failure

Hazard Summary: A dam failure is the collapse or failure of an impoundment that causes downstream flooding. This failure could be caused by weakened dam structure or terrorist act, and would result in large volumes of water to rush downstream. The Kensico Dam, located near Valhalla in northern Westchester Co., (See Figure 0-2.) holds 30.6 billion gallons of water in a reservoir covering approximately 2000 acres. The Dam sits at the head of the narrow canyon of the Bronx River, stretching south from the dam and running throughout Westchester and the Bronx.

There are two other Dams in the area that would affect the Village of Mamaroneck, should either of the Dams fail. The Larchmont Dam is located on the Sheldrake River, and the Mamaroneck River Dam is located behind the Westchester Joint Waterworks. Failure of these dams could cause significant flooding to the Village.

Should the Kensico Dam fail, countless people would lose their lives, as well as structures in the floods path spanning from White Plains through the Bronx. The destruction would be extensive and impacts would be County wide, running from White Plains through the Bronx. Impacts to the Village of Mamaroneck would be less severe since it is not directly in the Bronx River valley. Approximately nine million people, including 85% of Westchester County would lose their water supply. It could impact the Village and surrounding areas by running down the Mamaroneck River, resulting damage to buildings and utility lines. In addition it would disrupt

train service, and traffic. Future event of this type is considered unlikely but with a potential for large impacts.

Since New York City and Westchester County are responsible for the dam safety and security, no further health and safety assessments and damage analysis will be performed in Section 5, and no mitigation measures will be proposed or evaluated.

Sources of information on dam failures are given in see Section 11, References Cited and include: Village officials, Planning Committee, Association of State Dam Safety Officials, Collins' Assessment of New York City's reservoirs, dams, and aqueducts.

Profile Details: Located in Valhalla, the Kensico Dam is 3,300 feet long, 307 feet high, and holds back 30.6 billion gallons of water in a reservoir covering approximately 2000 acres. 90% of New York City's drinking water is funneled through the Kensico Dam, along with 27 Westchester communities. (See Figure 0-2.)

According to the Association of State Dam Safety Officials, Dam failures are most likely to happen for the following reasons:

- Overtopping, caused by water spilling over the top of the dam
- Structural failure of materials used in dam construction
- Cracking, caused by movements such as the natural settling of the dam
- Poor maintenance and upkeep
- Poor piping, if seepage is not properly filtered, sink holes can form in the dam.

Since September 11, 2001, in today's society, another potential reason for dam failure is the possibility of terrorism.

The first comprehensive risk assessment of New York's network of reservoirs, dams, and aqueducts was done by Michael Collins, former head of the NYCDEP's Watershed Police Department, in conjunction with the Federal Bureau of Investigation in 1997. According to the analysis, if the Kensico Dam were to fail, the City of White Plains could encounter water depths of an estimated 70 feet within one hour of dam failure, which would dwindle to 3.5 feet four

hours after failure. This surge would be deadly. Table 4-6 shows the 9 worst dam failures in U.S. history.

Over 200,000 people live downstream of the Kensico Dam. Countless lives would be lost, as well as structures in the tidal wave's path spanning from White Plains through the Bronx. In addition, approximately nine million people, including 85% of Westchester County, would lose their water supply. A failure of the dam would be devastating.

Table 4-6. The Worst Dam Failures in U.S. History*

South Fork Dam Johnstown, PA	May 31, 1889	Located 9 miles upstream, City was devastated, 2,209 deaths
St. Francis Dam San Franciscuito Canyon, CA	March 12, 1928	450 deaths, 1,200+ homes destroyed, 10 bridges destroyed
Canyon Lake Dam Rapid City, SD	June 9, 1972	Dam failed during severe storm, widespread flooding, 237 deaths, 3,000+ injured, 1,300+ homes destroyed, \$60+ million in damages
Mill River Dam Williamsburg, MA	May 16, 1874	139 deaths, destroyed factories, Destroyed 740 homes in Leeds, Williamsburg, Skinnerville, & Haydenville
Buffalo Creek Dam Logan County, WV	February 26, 1972	125 deaths, 500+ homes destroyed, \$400+ million in damages
Laurel Run Dam Johnstown, PA	July 19-20, 1977	40 deaths, \$5.3 million in damages
Kelly Barnes Dam Toccoa Falls, GA	November 5, 1977	39 deaths, \$2.5 million in damages
Teton Dam Southeast Idaho	June 5, 1976	11 deaths due to adequate warning, \$1+ billion in damages
Baldwin Hills Dam Los Angeles, CA	December 14, 1963	5 deaths, 1000+ homes and apartment buildings destroyed.

*Association of State Dam Safety Officials, <http://new.damsafety.org>

The New York City Department of Environmental Protection (NYCDEP) protects the Kensico Reservoir in northern Westchester County at Valhalla (see Figure 0-2). After September 11, 2001, the Dept. of Public Safety created Westchester County's Office of Intelligence, Security, and Counter-Terrorism (ISCT). The ICST is working with the NYCDEP and has made significant security improvements at the Kensico Dam. Since this hazard is the responsibility of

NYCDEP and the County, no further health and safety assessments and damage analysis will be performed in Section 5, and no mitigation measures will be proposed or evaluated.

4.D.5.2 Earthquake

Hazard Summary: An earthquake is a shaking or trembling of the crust of the earth caused by underground breaking and shifting of rock faults beneath the land surface. This can be caused by surface faulting, ground shaking, landslides, liquefaction, tectonic deformation, tsunamis, and seiches. They are infrequent in this region and are scattered. Wood frame buildings and other weakly constructed building are particularly vulnerable to earthquakes. If an earthquake should occur it would impact the entire area of the village as well as the surrounding region. A measure of earthquake hazard is the peak ground acceleration (PGA) which for the Village of Mamaroneck is 3.757%. (See Figure 4-8) This rating places the entire area of the Village in a low risk category for earthquakes. There have been no reported earthquakes in the Village of Mamaroneck. No earthquakes have been reported with a magnitude greater than 5 on the Richter Scale in Westchester County since 1884. All reported incidents in Westchester Co. have been minor with no significant damage or injuries.

Sources of information on earthquakes are given in see Section 11, References Cited and include: New York Times; NOAA websites; FEMA website; NYS Multi-Hazard Mitigation Plan; USGS website; USGS Seismic Zoning Maps for NYS Seismic Bldg. Code; Lamont-Doherty Earth Observatory, Columbia University website, Bulletin of the Seismological Society of America.

Profile Details: Although earthquake tremors have been felt and recorded in the area, they are not considered a very big event in Westchester County. According to the United States Geological Survey (USGS), danger is generally from earthquakes that are rated 4.5 or higher on the Richter Scale. In addition, earthquakes are an infrequent event in Westchester County. On August 23, 2011, tremors were felt in Westchester County from an earthquake that whose epicenter was northwest of Richmond, Virginia. The earthquake registered 5.8 on the Richter Scale.

The largest quake in the New York area occurred on August 10, 1884. According to the Lamont-Doherty Cooperative Seismographic Network (LCSN) of Columbia University, it registered a 5.2 on the Richter Scale. Only minor tremors occurred from that time until October 19, 2005, when an earthquake and foreshock struck about two minutes apart and were centered in Ardsley, New York. The quake measured 4.0 on the Richter Scale, and the shock measured 2.0. An aftershock occurred on October 22, 1985 measuring 3.0 on the Richter Scale. Six minor aftershocks then followed. On April 23, a small quake measuring 2.7 occurred in the same area. On January 11, 2003 a quake occurred that measured 1.2, and on January 15, 2003 another occurred measuring 1.4. The fault line that runs southeast from Dobbs Ferry into Greenburgh was responsible for these earthquakes. Based on this information earthquake hazards causing significant damage, personal injury or death in the Village of Mamaroneck are not prevalent, significant or likely. However, if a large quake should strike, significant damage could result.

In 2008, the U.S. Geological Survey updated its National Seismic Hazard Maps. New seismic, geologic, and geodetic information on earthquake rates and associated ground shaking were incorporated into these revised maps, which supersedes the 1996 and 2002 versions. The USGS has determined that the 2008 map represents the best available data. The Peak Ground Acceleration (PGA) is a standard measure of potential earthquake hazard used by FEMA and the U.S. Geological Survey. This is a measure of the ground surface acceleration from an earthquake relative to gravity, which is recorded as %g. For the Village of Mamaroneck (Latitude: 40.948N, Longitude: -73.733W), the %g value is 3.757% (See Figure 4-8). According to the current USGS Seismic Hazard Map for the region Mamaroneck would be included in that PGA zone. This indicates a low hazard due to earthquakes. There is a 10% chance in 50 years that the PGA would exceed 4%.

Based on historical evidence, the risk of a damaging earthquake event was thought to be highly unlikely. However, new studies suggest that the probability of such an event may be more prevalent than previously thought. A study published in the Bulletin of the Seismological Society of America analyzed past earthquakes, 383 earthquakes from 1677 to 2007 in a 15,000 square mile area around New York City. New data was also analyzed. The study suggests a

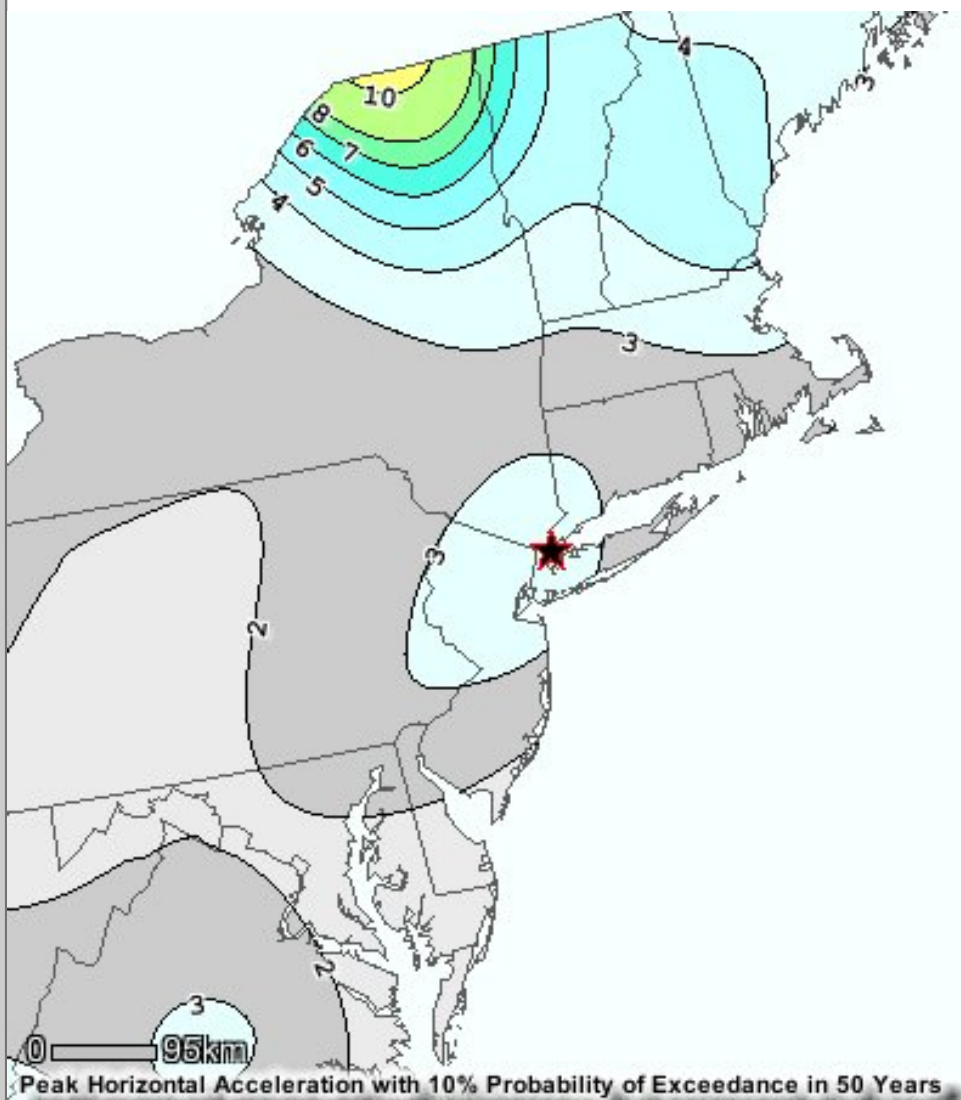
pattern of subtle, yet active faults, which increases the risk of earthquake to the New York City area.

The study suggests that although earthquakes are an infrequent occurrence in the New York City area, the risk is greater due to the extremely high concentration of people and infrastructure. The population in the New York area is denser than in earthquake-prone areas. In the event a damaging earthquake did occur in the area, the losses would be far more catastrophic.

Based on their research, an earthquake with a Magnitude of 5 is estimated to occur every 100 years. In addition, it is estimated that a Magnitude 6 earthquake will occur every 670 years, and a Magnitude 7 earthquake will occur every 3,400 years (The corresponding probabilities of occurrence in any 50-year period would be 7% and 1.5%).

In addition, the study revealed that the Indian Point Nuclear Power reactor is situated in a very precarious position. A newly discovered seismic zone, that runs from Stamford, Connecticut, to Peekskill, New York, runs less than one mile north of Indian Point. In addition, the Ramapo Seismic Zone, that runs from Eastern Pennsylvania to the Mid-Hudson Valley, passes within two miles northwest of Indian Point. The Indian Point Nuclear Reactor sits on the banks of the Hudson River in Buchanan, New York. It was built to withstand a Magnitude 7 on the Mercalli Scale, or 6.1 on the Richter Scale.

USGS Seismic Hazard Maps 2008



Legend

%g contour labels

%g contours

States

%g intervals

> 80

40-80

30-40

20-30

15-20

10-15

8-10

7-8

6-7

5-6

4-5

3-4

2-3

1-2

0-1

Figure 4-9
Seismic Hazard Zones
in New York State

Table 4-7. Largest Earthquakes Near New York City.

DATE yr/mo/day	TIME hh:mm: sec	LAT. (°N)	LONG. (°W)	LOCATION	MAGNITUDE Richter (ML)	Max. Intensi ty (MM)	Remarks
1884 Aug 10	19:07	40.45	73.90	Greater N.Y. City area	5.2	VII	Threw down chimneys - felt from Virginia to Maine;
1737 Dec 19	03:45	40.80	74.00	Greater N.Y. City area*	5.2	VII	Threw down chimneys
1783 Nov 30	03:50	41.00	74.00	N. Central N.J.*	4.9	VI	Threw down chimneys
1847				Greater N.Y. City area*	4.5	V	Probably Offshore
1848 Sep 09		41.11	73.85	Greater N.Y. City area*	4.4	V	Many people in the NY City area felt the earthquake
1895 Sep 01	11:09	40.55	74.30	N. Central N.J.	4.3	VI	Location determined by fire and aftershock
1985 Oct 19	10:07	40.98	73.83	Ardsey, N.Y.	4.0	IV	Many people in the NY City area felt this earthquake
1927 Jun 01	12:23	40.30	74.00	Near Asbury Park, N.J.	3.9	VI-VII	Very high intensity in Asbury Park, NJ - perhaps shallow event
1845 Oct 26	23:15	41.22	73.67	Greater N.Y. City area*	3.8	VI	
1938 Aug 23	05:04:53	40.10	74.50	Central N.J.	3.8	VI	
1951 Sep 03	21:26:24	41.25	74.00	Rockland Co., N.Y.	3.6	V	
1937 Jul 19	03:51	40.60	73.76	Western Long Is., N.Y.	3.5	IV	One or few earthquakes beneath Long Island
1957 Mar 23	19:02	40.60	74.80	Central N.J.	3.5	VI	
1874 Dec 11	03:25	41.05	73.85	Near Nyack and Tarrytown, N.Y.	3.4	VI	
1885 Jan 04	11:06	41.15	73.85	Hudson Valley	3.4	VI	
1979 Mar 10	04:49:39	40.72	74.50	Central N.J.	3.2	V-VI	Felt by some in Manhattan [it is called Chesequake earthquake]
2001 Oct 17	01:42:21	40.79	73.97	Manhattan, New York City	2.6	IV	Felt in Upper West Side of Manhattan, Astoria and Queens, NYC

(*) Location very poorly determined; may be uncertain by 50 miles., ML=Richter local magnitude

Source: Lamont-Doherty Earth Observatory of Columbia University, 1999

www.ldeo.columbia.edu/lcsn/big-ny-eq.html

4.D.5.3 Epidemic

Hazard Summary: An epidemic is the occurrence or outbreak of disease in a large number of individuals or proportion of human or animal populations. An epidemic affects many people at the same time in an area and spreads from person to person in a locality where the disease is not permanently prevalent. An epidemic would impact the entire Village of Mamaroneck. West Nile Virus is a current threat to the NY area through exposure by mosquito bites. Another epidemic concern is Flu epidemic spread by human contact. Lyme disease is borne by the deer tick, but is seldom fatal, is easily treated through antibiotics and is not an issue in the Village. The probability of future epidemic event in the County and in the Village is low. The expected magnitude and severity of an epidemic is expected to be low. No further health and safety assessments and damage analysis will be performed, and no mitigation measures will be proposed or evaluated.

Sources of information for epidemic hazards are given in Section 11, References Cited and include: Westchester County Health Department; USGS Disease Maps and website; Local Papers; NY Times; Journal News.

Profile Details: A current epidemic threat is the possibility of being exposed to the West Nile virus contracted from mosquitoes. This has been a concern in the Westchester area since the mosquito vector breeds in wet areas, flooded areas, streams and shoreline areas in the region. Potential epidemics also relate to the failure of the sewage treatment plant and pumping stations that could cause sewage backups in homes and streets. This would place the residents at risk of contracting disease from the untreated raw sewage. Another major epidemic concern is a Flu epidemic which can spread quickly worldwide. Lyme disease, which is borne by the deer tick, is a concern in the County but is seldom fatal, is easily treated with antibiotics and deer as vectors are not common in the Village.

Table 4-8 lists the number of cases of West Nile Virus contracted in humans for the last three years. The number of cases in Westchester County is minimal.

Table 4-8. Cumulative Human Disease West Nile Virus Cases by County.

County	2008	2009	2010
Bronx County	1	1	7
Kings County	3	1	6
Nassau County	20	1	57
New York County	1	1	6
Queens County	5	1	14
Richmond County	5	1	9
Suffolk County	9	1	24
Westchester County	2	1	4
Total:	46	8	127

Source: U.S. Geological Survey

<http://diseasemaps.usgs.gov>

As of August 30, 2011, there were only 2 reported cases of West Nile Virus in humans in 2011. One case reported in Yonkers, Westchester County, and one case in Suffolk County.

Epidemics, although a concern for the entire planning area, are not considered to be a prevalent or severe hazard and are most likely to result from damage to treatment facilities, sewers or other infrastructure that are caused by other flooding hazard discussed above. Such health hazards are handled through our current Westchester County Health Department and the Federal health advisory system.

If an epidemic should occur, it would likely cover a wide regional area and not be restricted to the Village geographical. However, an epidemic has a potential for serious illness and a large number of deaths. There is a low probability for a future epidemic event in the Village of Mamaroneck. No unique epidemic hazards were identified as significant or prevalent.

No special mitigation measures beyond current state or county public health activities are called for. No further health and safety assessments and damage analysis will be performed, and no mitigation measures will be proposed or evaluated.

4.D.5.4 Extreme Temperature

Hazard Summary: Extreme temperatures include extended periods of excessive cold or hot weather with a serious impact on human populations, particularly the elderly and/or persons with respiratory ailments. Heat waves are the primary hazard of concern. The NWS defines a “heat wave” as three consecutive days of temperatures exceeding 90°F. Temperature hazards are region wide and include the entire Village area. The magnitude and severity of cold stress hazard would be low. The magnitude and severity of heat stress would be high when temperatures exceed 100 degrees, particularly when humidity is high. A previous occurrence in 1999 brought a series of heat waves to the NY metropolitan region. The summer of 1999 brought 27 days of 90+ degree days, causing rolling blackouts to the area. The North American heat wave of 2001 brought 32 reported heat related deaths to NYC. Heat hazards can cause heat stroke and death particularly to the chronically ill and elderly. The probability of future events is high. A warning system is handled through the National Weather Service. No further health and safety assessments and damage analysis for extreme temperatures will be performed, and no mitigation measures will be proposed or evaluated.

Sources of information for temperature hazards are given in see Section 11, References Cited and include: Local Papers: Larchmont-Mamaroneck Patch, Journal News, NY Times; Climate change documents; National Climate Data Center website; Accuweather website; Westchester County Health Department.

Profile Details: Although extreme cold temperature is a concern, heat waves are the primary hazard of concern. Extreme heat hazard is associated with summer weather and is typified by a combination of high temperatures and humid conditions. Extreme heat can be a life-threatening condition, affecting senior residents and those with health problems.

In 1999, New York was hit with a series of heat waves that imposed heat stress and extra energy demands on the New York metropolitan region. High temperatures were widespread throughout most of the eastern portion of the United States in July. During the summer, New York City experienced 27 days of 90 degree temperature or higher. Rolling blackouts occurred in area-wide system failures. More than 80,000 households and businesses in northern Manhattan and the Bronx experienced a blackout for 19 hours. 33 people died from heat-related causes.

In 2001, New York was hit with another heat wave, along with the rest of the east coast. Temperatures in New York City reached a peak of 103 degrees, and Newark, New Jersey reached a record 105 degrees.

In 2006, the North American heat wave spread throughout most of the United States killing at least 225 people. 14 people died in Queens, 10 in Brooklyn, 6 in Manhattan, and 2 in the Bronx; totaling at least 32 reported heat-related deaths in New York City. Blackouts occurred throughout the entire tri-state area, most notably in Astoria Queens, and Westchester County.

In July, 2010 a hot air mass developed and settled over the New York City area. Temperatures were in the mid to upper 90s and low 100s. The NYSDEC issued an ozone advisory for the New York metropolitan area. The Westchester County Health Department issued a heat advisory on July 6th due to 101 degree temperature. More than 1300 were without power during this heat wave.

In July 2011, the New York metropolitan area was hit with another heat wave. Temperatures in New York City reached 104 degrees. There were 11 reported deaths in New York City from this heat wave.

The National Weather Service (NWS) defines a “heat wave” as three consecutive days of temperatures exceeding 90°F. In addition, there is little wind, and abundant sunshine during the entire day and heat is retained during the humid nights. Heat waves occur when an area of high atmospheric pressure stalls over a region. Westchester County with its warm summer seasons is susceptible to heat waves of this type.

High temperature hazard has occurred frequently in recent years for the entire planning area during the hot summer months, and affects senior residents and those with health problems. The highest recorded temperature since 1869 was 106.5° in 1936 for New York City. The summer of 1999 was one of the hottest periods on record for the New York City area, when they experienced 27 days of 90 degree weather or higher.

Extreme high temperatures also result in power failures due to the high demand for air conditioning during heat waves (See Section 4.D.6.1 below). Power outages during heat waves have become a common occurrence in New York City and Westchester County. Although blackouts and brownouts may be frequent, their direct effect on health, safety and structures is not severe. During extended power failures, the lack of refrigeration results in food spoilage in homes and markets, transportation problems, closing of schools and businesses, as well as great financial losses. Power failures can put the sick or infirmed at risk. Extended power failures associated with brownouts and blackouts have resulted in significant property damage in New York City and Westchester County. The probability of power failures due to heat or storms is high for the Village.

Although heat hazards may be frequent, its direct effects on health, safety is limited. It often has impacts on infrastructures such as utilities. Heat waves cover a wide regional area and are not restricted to the Village. However extreme temperatures have a potential to cause illness and death for sensitive populations such as the chronically ill and elderly. There is a high probability for future heat events in Westchester County. A warning system for this hazard is handled through the National Weather Service.

No significant property damage has been reported from past heat waves. Interruption of services and businesses is limited and primarily due to electrical utility failures. No further health and safety assessments and damage analysis for extreme temperatures will be performed, and no mitigation measures will be proposed or evaluated.

4.D.5.5 Drought

Hazard Summary: A drought occurs when a long period of time passes without any substantial precipitation. Droughts can occur at any time of the year. A prolonged drought can have serious economic impacts on an area. Agricultural production can be damaged or destroyed by loss of crops or livestock, resulting in food shortages. Increased demand for water and electricity can result in shortages of these resources particularly those serving the Village area. Lack of precipitation, accompanied by extreme heat can increase the risk of wildfires and heat stress. Health impacts are worse on the elderly, small children, and immune deficient. A drought is a regional hazard and would impact the entire Village area. A severe drought during the summer

of 1999 affected most of the northeast. Damage of over 1 billion in agricultural losses and 502 deaths occurred in the eastern US. There is a high probability of a future drought. The magnitude and severity on the Village area would be low if water conservation measures are enforced.

Sources of information related to drought are given in see Section 11, References Cited and include: Local Papers; Journal News, NY Times; Climate change documents; National Climate Data Center website; Accuweather website.

Profile Details: Drought impacts are regional and Village wide. The heat wave during the summer of 1999 (see above) led to a major drought, which affected most of the Northeast. It was reportedly the worst drought in the United States since the Dust Bowl of the late 1930s. In New York City, combined rainfall amounts were almost 8 inches below normal for the summer months, and reservoir levels were 15% below normal.

Homeowners were requested not to water their lawns, wash cars, or refill their swimming pools in the New York area. Widespread ground fires broke out in the Hudson Highlands. This drought was blamed for over \$1 billion in agricultural losses and an estimated 502 deaths in the eastern United States. (NOAA/NCDC, 2006) a drought is an emergency that can lead to untamed fires. The intense summer drought and responses to it may also have contributed to the outbreak of the West Nile Virus, by affecting the habitat of mosquitoes and crows carrying the virus.

There is a high probability of future drought event: A warning system is handled through the National Weather Service. No significant property damage in the Village of Mamaroneck was reported from drought. Interruption of services and businesses is regional and primarily due to electrical utility failures and water shortage. Due to its low hazard rating, no further health and safety assessments and damage analysis will be performed, and no mitigation measures will be proposed or evaluated.

4.D.5.6 Landslides

Hazard Summary: A landslide is a downward and outward movement of loosened rocks or earth down a hillside or slope. According to the NYS Hazard Mitigation Plan, the landslide is identified as a hazard of concern for New York State. However, most of Westchester County is

located in a low landslide incidence area. 11 landslides occurred from 1837 to 2007 in the County. According to the USGS, the Village of Mamaroneck has a low landslide incidence.

This hazard was ranked as a moderately low hazard. No further health and safety assessments and damage analysis will be performed in Section 5, and no mitigation measures will be proposed or evaluated.

Sources of information on landslide hazards are given in see Section 11, References Cited and include: Village Officials; NY State Hazard Mitigation Plan; USGS Landslide Hazards Program.

4.D.5.7 The Effect of Climate Change on Natural Hazards

Heavier rainfall events have occurred in the United States over the last few decades with increasing incidence of devastating floods. Although no single storm can be attributed directly to global warming, changing climate conditions have affected weather trends. Warmer air can hold more moisture so that the atmosphere will have more water available for rain. Therefore heavier and more precipitation is expected in the future. Climate models project increased rainfall rates in hurricanes. This increased rainfall can lead to stronger hurricanes and rising sea levels for the U.S. Gulf and Atlantic Coasts. In addition, snowfall pattern shifts and river ice melting changes may exacerbate flooding risks.

Although there are conflicting reports on the extent of the impact of climate change, models suggest heavier rainfall, stronger hurricanes, rising sea levels, more extreme heatwaves, and an increase in droughts and wildfires.

Sources of information on the effects of climate change are given in Section 11. References Cited and include: U.S. Environmental Protection Agency, “Climate Change Indicators in the United States” EPA 430-R-10-007, April 2010. www.epa.gov/climatechange/indicators.html ; NY State Climate Action Council, “New York State Climate Action Plan Interim Report”, November 9, 2010. <http://www.nyclimatechange.us/InterimReport.cfm>

4.D.6 Technological Hazards

Technological hazards such as regional utility blackouts, hazardous material releases, oil spills, air contamination, explosions, fires, civil unrest and terrorism are a community concern.

4.D.6.1 Utility Failures

Hazard Summary: Utility Failure refers to periodic cessation of electrical or communication services due to adverse weather conditions, human error or mechanical failure. These failures can cover an entire region such as northeastern United States, the Village or just a few blocks of the Village. The most frequent causes of outages are severe storms that damage power lines or heat waves that overload power equipment. In 2006 a multitude of utility failures occurred in Westchester County. The summer of 1999 brought 27 days of 90+ degree days, causing rolling blackouts to the area. Impacts from power outages are severe and affect businesses, emergency services, health and safety of the elderly and the ill, rail transportation, communication, food preservation and numerous other impacts. The probability of future events is high. The magnitude and severity of utility failures can be high depending on the area covered by a blackout, the population affected and its duration. Con Edison is in the process of upgrading their distribution system, and has been coordinating their efforts with local municipal officials.

Sources of information are given in Section 11, References Cited and include: Con Edison website, press releases and studies; Larchmont-Mamaroneck Patch, Sound and Town, NY Times, Journal News.

Profile Details: Consolidated Edison is the primary supplier of electricity to the Village. Con Edison has significant problems related to electricity supply and demand. Utility failures have occurred during severe storms such as hurricanes, northeasters, electrical storms, windstorms, tornados, heat waves, and snowstorms (See Sections 4.D.3 and 4.D.5 above). Power outages due to heat waves are a common occurrence in NYC and Westchester County. The breakage of utility poles or power lines is a major cause of electrical failures in local areas during storms. Storm related damage has sometimes required help from other utilities outside our region in order to restore power.

Con Edison serves approximately 349,000 residential and commercial electric customers, and 232,000 residential and commercial gas customers in Westchester County. It is estimated that there are approximately 8,000 electrical customers in the Village of Mamaroneck. Their service area encompasses 310 square miles, 15,089 miles of overhead wires, 6452 miles of underground cable, and 91,593 utility poles. Most notable outages are listed below.

On August 14, 2003, there was a mass power outage that swept across the entire Northeastern United States. FEMA declared an emergency declaration for New York State allotting \$5 million for public assistance relief. (EM-3186).

In 2006 alone, a multitude of utility failures occurred in Westchester County:

- January 18-22, 2006: Thunderstorm, wind and rain storms occurred in Westchester County which uprooted trees and 61,486 Con Edison customers lost power. (Con Edison: January 18-22, 2006 Westchester County Severe Wind and Rain Storm.
www.dps.state.ny.us/conediso-january2006stormreport.pdf)
- July 12, 2006: Severe thunderstorms that accompanied a tornado caused approximately 4,000 households in Westchester County to lose power.
- July 17, 2006: Heat wave caused 10,000 households in Westchester County to lose power. High-energy consumption and an overloaded transformer were blamed for this power outage.
- July 18, 2006: Severe storm caused an additional 35,000 households in Westchester County to lose power.
- July 21, 2006: Storm caused an additional 9,500 households in Westchester to lost power.
- July 22, 2006: An additional 6,000 Westchester households lost power.
- September 2, 2006: The remnants of Tropical Storm Ernesto caused approximately 80,000 households in Westchester County to lose power.

On September 14, 2006, Con Edison representatives met with several Westchester municipal officials to discuss Con Edison's response to the 2006 power outages, and to discuss solutions and future plans. Con Edison agreed to work with the municipal officials on improving response to power outages.

Regarding structural improvements, Con Edison was asked about the feasibility of moving the power lines underground. Con Edison replied that this can be accomplished by a) burying the existing system underground at an estimated cost of \$5 billion; or b) Installing a new underground system costing \$50 billion, plus the additional cost of burying the telephone and cable lines. Every street in Westchester County would have to be excavated, which would create major construction disruptions, environmental, and safety issues. Con Edison stated that neither method is being considered.

On June 27, 2007 a series of violent storms occurred in the area. Heavy rain and wind toppled trees and power lines causing severe damage to the electrical system, resulting in power outages throughout New York City and Westchester County. Con Edison reported that Mamaroneck, New Rochelle, White Plains, Rye, Rye Brook, Scarsdale, Greenburg, and Harrison were among the hardest hit communities of Westchester County, estimating up to 10,000 households lost power in those areas. Several homes were reported to be struck by lightning in Mamaroneck, New Rochelle, and Rye.

The Nor'easter of March 2010 knocked out power to approximately 173,000 households in Westchester County and New York City. Con Edison reported 650 households without power in the Village of Mamaroneck.

Tropical Storm Irene, which occurred on August 23, 2011, knocked out power to approximately 183,000 households in Westchester County and New York City. Con Edison reported approximately 4,100 households without power in Mamaroneck.

The Village of Mamaroneck has auxiliary power supplied by generators at the police, fire, EMS, and DPW facilities. Their fuel pumps also have auxiliary generators to allow vehicles to function during an emergency.

Con Edison is reported to be upgrading their distribution system, and is coordinating their efforts with local municipal officials. No further health and safety assessments and damage analysis will be performed related to utility failures, and no mitigation measures will be proposed or evaluated.

4.D.6.2 Hazardous Materials Fixed Site Releases

Hazard Summary: This hazard is the release of any substance or material that when involved in an accident and released in sufficient quantities, poses a risk to people's health, safety, and/or property. These substances and materials include explosives, radioactive materials, flammable liquids or solids, combustible liquids or solids, poisons, oxidizers, toxins, and corrosive materials. Release of these materials from a business or industrial operation can impact the health and safety of workers and people near the facility. There are a few commercial enterprises that require the storage of chemicals and generate hazardous wastes in the Village of Mamaroneck (See Figure 4-10). Most of the reported materials and wastes are small quantities and are not likely to result in major loss of property and life. Therefore, the magnitude and severity of the hazard would be restricted to local sites in the Village. The location of these sites is mostly in the industrial and manufacturing sections of the Village. These areas likely have the highest risk of a hazardous materials incident. Relatively few significant releases that would affect the public and require evacuation have been reported in the Village. The risk is considered to be moderately low. No further health and safety assessments and damage analysis will be performed, and no mitigation measures will be proposed or evaluated.

Sources of information are given in Section 11, References Cited include: Conversations with Village Officials; Incident Reports from Village of Mamaroneck Fire Department; Westchester County GIS website; EPA Enviromapper website.

Profile Details: The Federal Community Right-to-Know law is enforced by New York State and requires businesses and industries to maintain inventories of hazardous materials. The USEPA and NYS Department of Environmental Conservation closely regulate hazardous wastes and require the reporting of these wastes that are stored on-site. Should there be any dangerous releases of these materials; the Village of Mamaroneck's Police Department is the first notification for all emergencies. The Fire Department, Ambulance, and Village Administration are also integrated with the Village's Police Department's Major Incident Response Plan.

Hazardous materials can be explosive, inflammable and combustible, toxic, and radioactive. Hazardous materials are manufactured, used or stored at an estimated 4.5 million facilities in the United States, and the "hazardous materials label" can be applied to more than 500,000 products.

Hazardous material release from fixed facilities is a hazard of concern. There are a number of commercial enterprises that require the storage of chemicals and generate hazardous wastes in the Village of Mamaroneck (See Figure 4-9).

The Village of Mamaroneck has seen relatively few occurrences of the release of hazardous materials from a fixed site. According to the Village of Mamaroneck Fire Department, there were only three occurrences in the past several years. All releases were controlled and confined, with no major injuries.

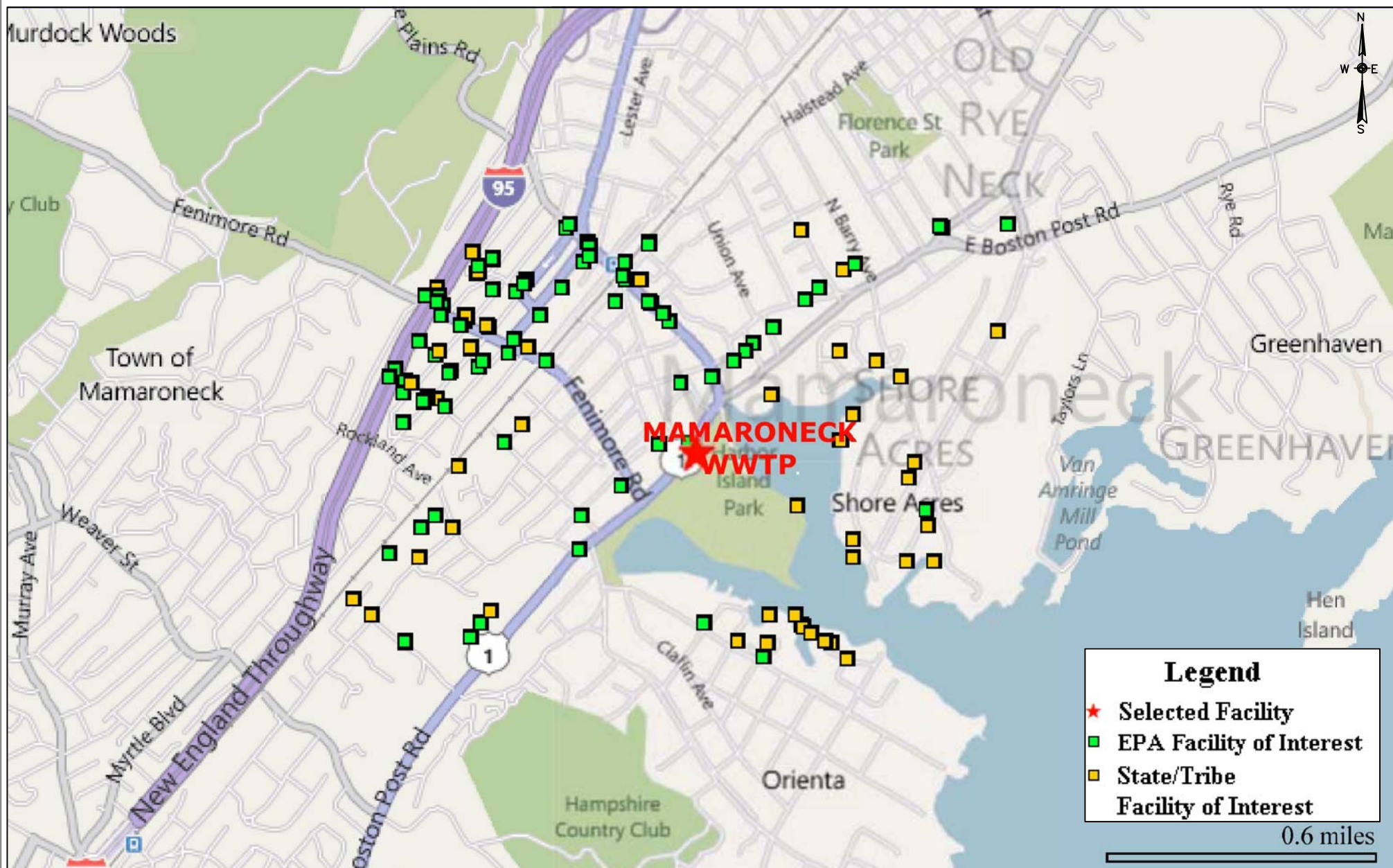
On August 24, 2005 there was a small chemical spill at Mamaroneck High School, located at 950 Mamaroneck Avenue. Nitric acid, turpentine, and sodium bicarbonate were spilled when a cart was knocked over.

On August 3, 2006 there was a small fire in the chemical cabinet of National Photocolor Corporation, located at 428 Waverly Ave. A small release of toxic byproducts occurred.

On April 16, 2009 there was a chemical leak at Arctic Glacier Ice, located at 500 Fenimore Road. An ammonal leak occurred from a storage tank on the premises.

Most of the reported materials and wastes are small quantities and are not likely to result in major loss of property and life. The location of these sites is mostly in the industrial and manufacturing area of the Village. These areas likely have the highest risk of a hazardous materials incident.

Hazardous material releases in the Village of Mamaroneck can occur from activities such as dry cleaning, auto repair and repainting, home building and maintenance, and small quantity home use of chemicals. There is no major manufacturing of hazardous materials in the Village. There could be a problem if materials used in commercial facilities and homes are spilled, a tank or pipe breaks or leaks, a fire occurs in a facility containing hazardous substances, or if an accident occurs during transportation and delivery of fuels. This transportation issue is discussed below with oil spills.



Environmental
Technology
Group, Inc.

300 WHEELER ROAD, SUITE 307, HAUPPAUGE, NEW YORK 11788

Project Name
Incorporated Village of Mamaroneck
Multi-Hazard Mitigation Plan

Figure Title
Hazardous Materials Locations
Village of Mamaroneck, NY

Figure 4-10
DWN BY: AJZ
CHK BY: JB
SCALE: AS SHOWN
DATE: 4/27/12

The frequency of hazardous materials distributed in the Village is an important community concern. However, the quantities involved would not result in significant property damage or result in significant injury, illness, or mortality to the public. No further health and safety assessments and damage analysis will be performed, and no mitigation measures will be proposed or evaluated.

4.D.6.3 Hazardous Materials Transport Releases

Hazard Summary: Hazardous materials can be explosive, flammable and combustible, toxic, and radioactive. Release of these materials during transport within or through the Village can impact the health and safety of Village residents. Trucks carrying hazardous materials are likely most at risk at one of the established transportation routes that traverse the Village of Mamaroneck. These routes include I-95 on the western border, Boston Post Road, which runs parallel to the Long Island Sound; and Mamaroneck Avenue, which runs through the middle of the village. Metro-North commuter tracks run through the Village of Mamaroneck and are also used by CRX to transport hazardous materials through the village. Hazardous materials spills or accidents could also occur at one of the many fixed sites located throughout the village where hazardous materials are used or stored, such as in the marinas and boat yards. No significant releases that would affect the public and require evacuation have been reported in the Village of Mamaroneck. Therefore, the magnitude and severity of the hazard is expected to be limited to local areas.

Sources of information are given in Section 11, References Cited include: Westchester County GIS website; Incident Reports from Village of Mamaroneck Fire Department; Metro-North Website; Conrail website; Village of Mamaroneck Emergency Preparedness Plan.

Profile Details: There are nearly 7,000 hazardous material incidents every year in the United States on average, most of which are on the highway. U.S. Department of Transportation regulates the transport of hazardous materials and has procedures in place to mitigate hazardous spills. These procedures involve the local fire and public safety departments.

Trucks carrying hazardous materials are likely most at risk at one of the established transportation routes that traverse the Village of Mamaroneck. These routes include I-95 on the

western border, Boston Post Road, which runs parallel to the Long Island Sound; and Mamaroneck Avenue, which runs through the middle of the village. Metro-North commuter tracks run through the Village of Mamaroneck and are also used by CRX to transport hazardous materials through the village. Hazardous materials spills or accidents could also occur at one of the many fixed sites located throughout the village where hazardous materials are used or stored, such as in the marinas and boat yards. No significant releases that would affect the public and require evacuation have been reported in the Village of Mamaroneck. Therefore, the magnitude and severity of the hazard is expected to be limited to local areas.

The Village of Mamaroneck would rely on the Westchester County Hazardous Materials Response Team as its primary agency to respond to and coordinate the control and cleanup of any hazardous materials event.

The risk is considered to be moderately low. No further health and safety assessments and damage analysis will be performed, and no mitigation measures will be proposed or evaluated.

4.D.6.4 Fuel Oil Spills

Hazard Summary: Fuel oil spills are defined as the uncontrolled or accidental discharge of petroleum into water and/or onto land or sea. Fuel oil spills during transport within or through the Village or during filling operations, can impact the health and safety of Village residents. Trucks carrying fuels are likely most at risk on the commercial roads, such as I-95. No significant releases that have affected the public and required evacuation have been occurred in the Village. The primary concern would be fire and explosion incidents. There are no major fuel storage or processing facilities in the Village. Therefore, the magnitude and severity of the hazard is expected to be limited to local areas in the Village.

The risk is considered to be moderately low. No further health and safety assessments and damage analysis will be performed, and no mitigation measures will be proposed or evaluated.

Sources of information are given in see Section 11, References Cited and include: EPA Enviromapper website; Westchester County GIS website; USDOT website;

Profile Details: Local oil spill problems have typically only occurred during deliveries to residences or in one of the marinas. The U.S. Department of Transportation regulates the transport of hazardous materials and has procedures in place to mitigate hazardous spills. These procedures involve the local Police, fire and public safety departments.

Fuel oil spills would result in limited damage to property, buildings and limited injury, illness, and mortality. The primary concern would be fire and explosion incidents. The risk is considered to be moderately low. No further health and safety assessments and damage analysis will be performed, and no mitigation measures will be proposed or evaluated.

4.D.6.5 Air Contamination

Hazard Summary: Air contamination is the result of emissions chemicals from industry, transportation into the air. Air contamination events in the Village, due to local sources, are small and isolated and do not represent a major increase in health and safety risks to local residents. The primary risks are related to regional problems, rather than local sources. Air contamination in the Village is considered to be a low risk hazard. Region wide ozone alerts are generated by the National Weather service. No further health and safety assessments and damage analysis will be performed, and no mitigation measures will be proposed or evaluated.

Sources of information are given in Section 11, References Cited and include: EPA Enviromapper website; Westchester County GIS website; Accuweather website.

Profile Details: The small commercial and light manufacturing establishments in the Village of Mamaroneck would not cause an air pollution problem of significant concern. Regional air episodes such as ozone alerts occur over the New York City Metropolitan area that does affect Mamaroneck. These alerts are often associated with hot weather. These episodes would have the greatest impact on senior residents and those that have respiratory, heart or other problems.

Events in the Village, due to local sources, are small and isolated and do not represent a major increase in health and safety risks to local residents. These risks are related to regional problems, rather than local sources. No further health and safety assessments and damage analysis will be performed, and no mitigation measures will be proposed or evaluated.

4.D.6.6 Transportation Accidents – Highway

Hazard Summary: A transportation accident is defined as a mishap involving one or more conveyances on land, sea, and/or in the air that results in mass casualties and/or substantial loss of property. Transportation accidents happen on a regular basis on most highways. However, an abundance of accidents have occurred on Interstate I-95 between mile marker 9.5 and mile marker 10, both Northbound and Southbound. This area is a stretch of curving roadway from Mamaroneck Avenue down to Old White Plains Road. Mile marker 9.8 is in the middle of the curve, and has been particularly dangerous. There are identical curves on the northbound and southbound sides of I-95.

Sources of information are given in Section 11, References Cited and include: Conversations with Village Officials; local newspapers and websites: Larchmont-Mamaroneck Patch, The Loop, Sound and Town, NY Times, Journal News; NYS Thruway Authority via NYS Freedom of Information Law (FOIL)

Profile details: There have been an abundance of transportation accidents on I-95 between Mile Markers 9.5 and 10.0, particularly at the curve of Mile Marker 9.8. When it rains or snows, these sections of I-95 become extremely slippery, causing many accidents. The stretch of roadway is difficult to navigate even when the road conditions are dry.

According to statistics obtained through the New York State Freedom of Information Law (FOIL) from the NYS Thruway Authority, 13 accidents took place between mile markers 9.5 and 10.0 on the Northbound side of I-95, and 25 accidents took place on the Southbound side of I-95 in 2010. 4 of the 13 accidents on the Northbound side occurred when the road was wet; 6 of the 25 accidents on the Southbound side occurred when the road was wet. From January 1st to June 30, 2011, 8 accidents took place between mile markers 9.5 and 10.0 on the Northbound side of I-95, and 12 accidents took place on the Southbound side. 5 of the 8 accidents on the Northbound side occurred when the road was wet; 1 of the 12 accidents on the Southbound side occurred when the road was wet.

It is reported that the surface of the curved roadway was resurfaced some years ago using concrete instead of blacktop. The road got noisier and instead of resurfacing with blacktop, they

used diamond grinding, which cut grooves into the road that was supposed to quiet things down. When the diamond grinding wore down, it created a smooth surface which would become extremely slick when wet.

The NYS Thruway Authority laid down a coating of pavement at the 9.8 mile marker on the Southbound side of I-95. The Northbound side, however, has not been repaved. The roadway is owned by the NYS Thruway Authority.

4.D.6.7 Fires

Hazard Summary: Fire hazards result from uncontrolled combustion of materials, buildings or other structures that threaten human life and property. Fires have occurred in residences and commercial establishments in the Village. Based on the frequency of calls and alarms and the likelihood that a fire would affect more than one building and that there is a strong chance that serious injury or death could occur, the hazard was ranked moderately low. Since the incidents are localized to individual buildings the magnitude and severity of large village area fire is considered to be low. Although most fires that have occurred are structural fires, there have been incidences of wildfire hazard, in the form of a brush fire at Saxon Woods Park. No further health and safety assessments and damage analysis will be performed, and no mitigation measures specific to fire hazards will be proposed or evaluated.

Sources of information: Village officials, Planning Committee; Incident Reports from Village of Mamaroneck Fire Department; NYS Division of Homeland Security and Emergency Services, Office of Fire Prevention and Control Summary of All Calls by Type of Situation Found for Mamaroneck Village.

Profile Details: Fire can always occur in residences and commercial establishments. This hazard was rated 240 with a rank of 4 in the HAZNY analysis. Most fires occurring in the Village of Mamaroneck are structural fires. There are limited incidences of fires occurring in natural areas in the village, which could be a concern as a wildfire hazard. A brush fire occurred in Saxon Woods Park on April 21, 2011. A small brushfire broke out behind the track area of Mamaroneck High School. Village fires are random occurrences that are routinely handled by the Fire Department. Fire was ranked high in the HAZNY because of the likelihood that a fire

would affect more than one building and that there is a strong chance that serious injury or death could occur. In addition, fire would cause severe property damage.

According to the Village of Mamaroneck Fire Department, the following fires have occurred in the Village in the last five years:

Type of Situation	2006	2007	2008	2009	2010
Building Fires:	80	54	99	30	30
Vehicle Fires:	9	15	16	15	13
Other Fires:	21	22	9	14	35
Total Fires:	110	91	124	59	78

No further health and safety assessments and damage analysis will be performed, and no mitigation measures specific to fire hazards will be proposed or evaluated.

4.D.7 Human-Caused Hazards

4.D.7.1 Civil Unrest

Hazard Summary: Civil unrest may include unruly or violent crowds during public events, and political protests. Civil unrest could include racial, ethnic or political group protests or demonstrations. Although such events can occur any place, the likelihood of civil unrest occurring in the Village of Mamaroneck is low, given the suburban demographics. Historically, civil unrest has not been an issue for the Village. The local Police, Fire and Public Safety Departments can handle the potential for civilians causing local damage. Random events can be a potential concern. There have been limited incidences of very minor civil unrest, relating to the issue of the pickup site for illegal immigrant workers. The Village Police Department controlled the situation. There is no history of significant civil unrest that would cause damage to property and injury to numbers of people is low. No further health and safety assessments and damage analysis will be performed, and no mitigation measures will be proposed or evaluated.

Sources of information: Conversations with Village Officials; Village of Mamaroneck Hazard Mitigation Plan, February 2008

4.D.7.2 Terrorism

Hazard Summary: Although acts of terrorism are possible anywhere in Westchester County, this hazard would be less likely in the Village of Mamaroneck. There are no major terrorist targets of interest identified in the Village such as key target populations, high profile historical landmarks, airports, significant infrastructures, important facilities, critical industries or major government institutions and structures. Possible targets for terrorism located in the Village include the Westchester County Department of Environmental Facilities Wastewater Treatment Plant, four Thruway bridges, and six Metro North bridges. The rail station in the Village of Mamaroneck is a possible target. Railroad facilities have been targets in recent years in European cities. Another target is the Kensico Dam located further north near Valhalla. The effects of failure of the Dam are discussed in section 4.D.5.1 of this report. Because of the absence of important target facilities and key populations, this hazard was not considered significant enough for further evaluation or analysis.

Sources of information: Discussions with Village officials; NY Times; Journal News.

4.E Elimination of Hazards

Several Hazards were eliminated from a detailed risk and damage assessment and evaluation of mitigation measures after an initial profile assessment and discussions with the Committee. These include:

Tornadoes: Tornadoes are not a frequent hazard. Only 8 tornadoes documented since 1958, and they are scattered geographically. None of the 8 occurred in Mamaroneck. Tornadoes have a moderately low hazard rating and are also associated with other severe storm hazards, so they were not evaluated separately from other wind hazards in this plan.

Dam Failure: The New York City Dept. of Environmental Protection (NYCDEP) protects the Kensico Reservoir. After September 11, 2001, the Dept of Public Safety created Westchester County's Office of Intelligence, Security, and Counter-Terrorism (ISCT). The ICST is working with the NYCDEP and has made significant security improvements at the Kensico Dam. The Larchmont Dam is located on the Sheldrake River, and the Mamaroneck River Dam is located behind the Westchester Joint Waterworks. Should either of these dams fail, flooding would

occur to the Village. No further health and safety assessments and damage analysis will be performed, and no mitigation measures will be proposed or evaluated. Updates to this plan will evaluate mitigation measures for this hazard as necessary.

Earthquakes: Based on information given in the hazard profile, an earthquake event in Westchester would cause only minor damage and would be a relatively rare event. An event is unlikely to have any impact on the critical facilities, local economics, or key cultural or historical resources. This hazard has a low hazard rating. No further health and safety assessments and damage analysis will be performed, and no mitigation measures will be proposed or evaluated. Updates to this plan will evaluate mitigation measures for this hazard as necessary.

Epidemic: Should an epidemic occur, it would most likely be affect the region and not just the Village. No special mitigation measures beyond current state or county public health activities are called for. This hazard has a low hazard rating. No further health and safety assessments and damage analysis will be performed, and no mitigation measures will be proposed or evaluated.

Extreme Temperatures: No significant property damage was reported from heat waves. Interruption of services and businesses is limited and primarily due to electrical utility failures. This hazard has a moderately low hazard rating. No further health and safety assessments and damage analysis will be performed, and no mitigation measures will be proposed or evaluated.

Drought: No significant property damage in the Village of Mamaroneck was reported from drought. Interruption of services and businesses is regional and primarily due to electrical utility failures and water shortage. Due to its low hazard rating, no further health and safety assessments and damage analysis will be performed, and no mitigation measures will be proposed or evaluated.

Hazardous Material Releases (Fixed and In transit): The frequency of hazardous materials distributed in the Village is an important community concern. However, the quantities involved would not result in significant property damage or result in significant injury, illness, or mortality to the public. These hazards have moderately low hazard ratings. No further health and safety assessments and damage analysis will be performed, and no mitigation measures will be

proposed. Mitigation measures will be evaluated in Section 7 since they are needed as part of the Village emergency planning requirements.

Fuel Oil Spills: These spills would result in limited damage to buildings and limited injury, illness, and mortality. Hazard issues are the same as those for hazardous material releases. This hazard has a moderately low hazard rating. No further health and safety assessments and damage analysis will be performed, and no mitigation measures will be proposed or evaluated.

Air contamination: Events in the Village due to local sources are small and isolated and do not represent a major increase in health and safety risks to local residents. These risks are related to regional problems, rather than local sources. This hazard has a low hazard rating. No further health and safety assessments and damage analysis will be performed, and no mitigation measures will be proposed or evaluated.

Explosions: Information provided indicate explosion hazards are primarily related to handling and transport of fuels and are discussed under fuel spills and hazardous material hazards. Explosion hazards were ranked moderately low. Therefore, no further health and safety assessments and damage analysis will be performed, and no mitigation measures will be proposed or evaluated.

Fire: Building fire hazards are not considered significantly different from neighboring communities. No further health and safety assessments and damage analysis will be performed, and no mitigation measures will be proposed or evaluated.

Civil Unrest: Random events can be a potential concern. There is no history of significant civil unrest that would cause damage to property and injury to numbers of people is low. This hazard has a low hazard rating. No further health and safety assessments and damage analysis will be performed, and no mitigation measures will be proposed or evaluated.

Terrorism: There is an absence of important target facilities and key vulnerable populations in the Village. No further health and safety assessments and damage analysis will be performed, and no mitigation measures will be proposed or evaluated.

Section 5 - Assess The Impacts

5.A Introduction

The possible hazards affecting the Village of Mamaroneck were identified, profiled and ranked in Section 4 above. The rating and ranking of the hazards used the HAZNY method with input from the local experience of the Village of Mamaroneck's All Hazard Committee. The primary purpose of the current section is to identify and assess the Village of Mamaroneck's assets and evaluate the impacts from these hazards.

This section is based largely on the recommended organization and methods outlined in the FEMA "How-to Guides" and the State and Local Mitigation Planning guidance manual called "Understanding Your Risks". These documents provide an approach to identifying hazards and estimating the losses produced by these hazards. This section was also guided by the FEMA Activity Worksheet: "510 Floodplain Management Planning" under Section 511, Credit Points, and follows the outline given in the guides under Section 5, "Assess the Problem".

The hazard assessment began with the identification and ranking of all hazards that affect the Village of Mamaroneck (See Section 4.B above). The Hazards New York (HAZNY) method was used to identify and rank hazards based on input from the community with the experience of emergency services professionals. The results of these analyses are shown in Table 5-1A and are discussed above in Section 4.C. The HAZNY ranking analysis includes the probability or frequency of occurrence of a given hazard and refers to how often a hazard will occur in the future. The HAZNY analysis distinguishes between the following frequencies of occurrences:

- Rare Event Occurs less than once every 50 years.
- Infrequent Event Occurs between once every 8 years to once in 50 years.
- Regular Event Occurs between once a year to once every 7 years.
- Frequent Event Occurs more than once a year.

Table 5-1A. Summary of Hazards Scores Based on HAZNY Analysis.

High Hazards	HAZNY Score Village of Mamaroneck
None	321-400
<u>Moderately High Hazard</u>	241-320
Flood	302
Coastal Storm*	253
Severe Storm & Thunderstorm**	246
<u>Moderately Low Hazard</u>	161-240
Fire	240
Winter Storm (Severe)	230
Wind Storm	230
Transportation Accident	230
Dam Failure	224
Utility Failure	221
Terrorism	219
Ice Storm	217
Storm Surge/Wave Action	216
Hurricane	212
Hazardous Materials (in Transport)	210
Earthquake	202
Oil Spill	201
Landslide (Rockslide)	199
Extreme Temperatures (Hot)	196
Explosion	192
Water Supply Contamination	182
Hazardous Materials (Fixed Site)	168
Structural Collapse	164
<u>Low Hazard</u>	44-160
Epidemic	160
Hailstorm	159
Tornado	155
Fuel Shortage	142
Radiological (Fixed Site)	140
Air Contamination	132
Blight	128
Ice Jam	123
Food Shortage	119
Fuel Oil Spill	114
Drought	101
Civil Unrest	96
Wildfire	94

* Including tropical storms, nor'easters.

** Including severe and gale force winds as well as other non-winter storms listed. Hurricanes and coastal storms not included

No quantitative assessment was prepared for the hazards showing a low impact or risk. Where quantitative data were available, the future likelihood of the hazard was based on the information available. For several hazards, where the probability of future events was not quantified, a qualitative assessment of the likelihood is based on the HAZNY criteria and an evaluation of the current extent of the problem.

An impact and damage analysis is provided in Section 5.E for major hazards impacting the Village of Mamaroneck. This analysis is not given for hazards evaluated in Section 5.C below that were judged to be not significant enough, or found to have a very low probability of occurring in a given year.

5.B Inventory of Assets

The Village of Mamaroneck is a largely built-out residential suburban community, and there is a limited amount of vacant land with room approved for new development. The commercial districts comprise approximately 10% of the village. The central business district is located on Mamaroneck Avenue and runs between the Boston Post Road and the I-95 Overpass. The other major business area runs along the Boston Post Road. There are also much smaller neighborhood commercial areas on Old White Plains Road, Halstead Avenue, and North Barry Avenue. Two general commercial marine districts are situated in the Village. One located on Rushmore Avenue, Southeast of Harbor Island Park, and the other along the harbor, just east of the Mamaroneck Avenue and the Boston Post Road intersection. The industrial area in the Village of Mamaroneck consists of approximately 70 acres. The major industrial areas run along Fenimore Road, Hoyt Avenue, and Waverly Avenue.

The following studies were prepared for the Village of Mamaroneck:

- Comprehensive Master Plan, adopted 1986
- Gateway Study, 1988
- Mamaroneck Village Industrial Area Study, 1997
- Waverly Avenue Design Study, 2004
- Fenimore Road Improvement Report, 2004
- Harbor Island Park Master Plan, 2004

- Comprehensive Master Plan Update, DRAFT, 2011

The general assets of the village are evaluated according to the property use code or the category of the building occupied. This breakdown however does not consider the importance of impacts on certain facilities. In addition, there are groups of assets that are evaluated in this section including:

- Critical Facilities
- Key Assets
- Infrastructures
- Resident Populations

5.B.1 Inventory of Buildings According to Property Use

Table 5-1 provides an estimate of residential, commercial, education, recreation, government, religious and other buildings in the Village based on the Village of Mamaroneck tax assessments. The number of structures by property use code is listed in Table 5-1. For the most current year 2011, the predominant buildings in the Village are 2,818 single residential properties out of total 4,984 structures. There are 818 multi-residential structures.

Commercial buildings are located in use class codes 400-486. Recent tax assessment records show a total of 1,270 commercial buildings. Commercial apartment buildings are also included in this class. The major concentration of commercial activity is located along Mamaroneck Avenue and along the Boston Post Road.

The industrial areas run along Fenimore Road, Hoyt Avenue, and Waverly Avenue, comprising approximately 70 acres in the Village of Mamaroneck. Although there is industry in the Village, all buildings are coded as Commercial (400-486) rather than Industrial (700-749). Therefore, commercial and industrial properties are combined for the hazard and vulnerability assessment.

Table 5-1. Residential, Commercial, Industrial and other Buildings in the Village of Mamaroneck.

Property Class Code	Building Type by Property Class	Number of Buildings*
210	Single Residential	2,818
220-283	Multi-residential	818
400-486	Commercial	1,270
546-570	Sports facilities	15
600-649	Community Services & Education	26
620	Religious	21
650-662	Government & Protection	16
	Total	4,984

*** Data provided by Village of Mamaroneck Manager's Office.**

“Community Services” include education, government, health services and religious properties. The Mamaroneck Library and the Emelin Theatre are included in this category. These are not broken out on Map 5 and will be combined for the hazard and vulnerability assessment.

“Sports facilities” include building stock from indoor sports facilities, country clubs, and marinas.

5.B.2 Critical Facilities

The principal critical facilities identified in the Village of Mamaroneck are given in Table 5-2. The location of these facilities is shown in Figure 5-1. They include the Village Offices, Village Hall, fire and emergency response facilities, Town Hall, schools and other buildings to be used as emergency shelters, Metro-North Railroad. A full-service hospital is not located in the Village of Mamaroneck. The closest hospitals are located in New Rochelle, White Plains, and Greenwich, CT.

Table 5-2. Critical Facilities in The Village of Mamaroneck.

<u>Facility Name</u>	<u>Facility Function</u>	<u>Address</u>	<u>Facility Vulnerability to Hazards</u>
Village of Mamaroneck Offices	Village Administrative Services, Emergency Response	123 Mamaroneck Avenue	Loss of village records. Interruption of services & communication. Loss of emergency & rescue services. Emergency Shelter
Town of Mamaroneck Offices	Town Administrative Services, Emergency Response	740 West Post Road	Loss of town records. Interruption of services & communication. Loss of emergency & rescue services. Emergency Shelter
Village Hall, Court, Police, Bldg Dept	Village Administrative Services, Emergency Response	169 Mt. Pleasant Avenue	Loss of village records. Interruption of police services. Interruption of communication. Loss of emergency & rescue services. Emergency Shelter
VMFD HQ & Fire Station	Emergency Response , Storage of Emergency Response Vehicles & Equipment	146 Palmer Avenue	Interruption of fire emergency services. Interruption of emergency & rescue services. Emergency Shelter
Columbia Fire Station	Emergency Response , Storage of Emergency Response Vehicles & Equipment	605 North Barry Avenue	Interruption of fire emergency services. Interruption of emergency & rescue services. Emergency Shelter
Volunteer Firehouse	Emergency Response , Storage of Emergency Response Vehicles & Equipment	643 Mamaroneck Avenue	Interruption of fire emergency services. Interruption of emergency & rescue services. Emergency Shelter
Halstead Manor Firehouse	Emergency Response , Storage of Emergency Response Vehicles & Equipment	1400 Halstead Avenue	Interruption of fire emergency services. Interruption of emergency & rescue services. Emergency Shelter
EMS Rescue Squad Bldg	Emergency Response , Storage of Emergency Response Vehicles & Equipment	200 North Barry Avenue Ext	Interruption of emergency & rescue services. Emergency Shelter
Dept of Public Works Garage	Emergency Response, Storage of Village Vehicles & Equipment	313 Fayette Street	Interruption of emergency services.

Westchester Joint Waterworks	Water Delivery System	1625 Mamaroneck Avenue	Interruption of municipal water supply.
Wastewater Treatment Plant	County Facility	199 West Boston Post Road	Interruption of water pollution control services
U.S. Post Office	Post Office	309 Mount Pleasant Avenue	Interruption of communications. Emergency Shelter.
FE Bellows Elementary School	Grade School 3-5	200 Carroll Avenue	Emergency Shelter
Daniel Warren Elementary School	Grade School K-2	1310 Harrison Avenue	Emergency Shelter
Rye Neck Middle School	Grade School 6-8	300 Hornridge Road	Emergency Shelter
Rye Neck High School	Grade School 9-12	310 Hornridge Road	Emergency Shelter
French-American School	Private School 6-12	145 New Street	Emergency Shelter
Mamaroneck Avenue School	Grade School K-6	850 Mamaroneck Avenue	Emergency Shelter
Mamaroneck High School	Grade School 9-12	1000 West Boston Post Road	Emergency Shelter
Westchester Day School	Religious Yeshiva	856 Orienta Avenue	Emergency Shelter
Mamaroneck School Garage	School Transportation Facility	119 Gertrude Avenue	Loss of school transportation services.
Metro North Railroad Station	Metro North Commuter RR, Amtrak, CRX, Metro-North	Station Plaza	Loss of major transportation thoroughfare.

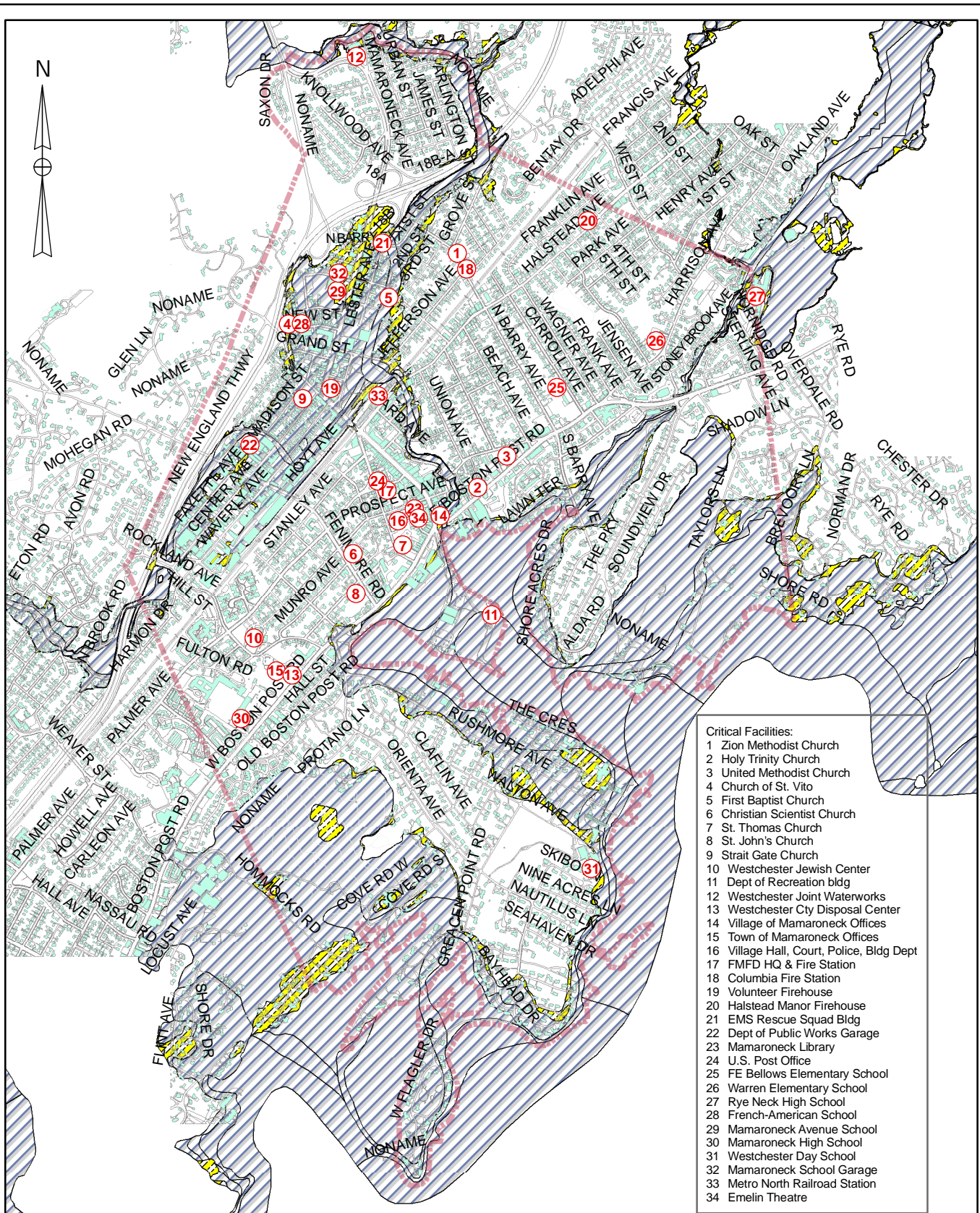


Figure 5-1
Location Of Critical Facilities
Incorporated Village of Mamaroneck
Multi-Hazard Mitigation Plan

Legend

- Municipal Boundaries
- FEMA Flood Mapping
- 100 Year Flood Line
- 500 Year Flood Line

DWN BY: YS
CHK BY: JB
SCALE: AS SHOWN
DATE: 03/21/12



300 WHEELER ROAD, SUITE 307, HAUPPAUGE, NEW YORK 11788

0 1,250 2,500 3,750 5,000 Feet

Basemap information by Westchester County GIS

5.B.3 Key Assets

The Village of Mamaroneck has several economic, cultural and recreational facilities of concern. Key assets in the Village of Mamaroneck are listed in Table 5-3. These include buildings that, if damaged or destroyed, would have significant cultural, economic or social impact on the village.

Table 5-3. Key Assets in the Village of Mamaroneck

Type of Asset	Key Asset	Location	Priority Need
Economic/Key Employers	Mamaroneck Union Free School District	Village of Mamaroneck	Major employer
	Rye Neck Union Free School District	Village of Mamaroneck	Major Employer
	Town of Mamaroneck	Town of Mamaroneck	Major Employer
	Village of Mamaroneck	Village of Mamaroneck	Major Employer
	Sarah Neuman Center for Healthcare	845 Palmer Avenue	Major Employer
	Commercial Business District	Mamaroneck Avenue. Boston Post Road	Commercial Retail Centers
	Industrial Areas	Fenimore Road. Hoyt Avenue. Waverly Avenue	Industrial & Manufacturing Centers
Cultural, Historical and Natural Areas	Emelin Theatre	153 Library Lane	Arts & Entertainment Cultural Center
	Mamaroneck Library	136 Prospect Avenue	Historical building Cultural Center
	U.S. Post Office	309 Mt. Pleasant Avenue	Historical building
	Zion Methodist Church	645 North Barry Avenue	Historical building House of Worship
	Holy Trinity Church	320 East Post Road	Historical building House of Worship
	United Methodist Church	546 East Post Road	Historical building House of Worship
	Church of St. Vito	816 Underhill Avenue	Historical building House of Worship
	First Baptist Church	817 Howard Avenue	Historical building House of Worship
	Christian Scientist Church	155 Fenimore Road	Historical building House of Worship
	St. Thomas Church	168 West Boston Post Road	Historical building House of Worship
	St. John's Church	122 Fenimore Road	Historical building House of Worship
	Strait Gate Church	120 Madison Street	Historical building House of Worship
	Westchester Jewish Center	175 Rockland Avenue	Historical building House of Worship
	Dept of Recreation bldg..	Beach Pavilion, Harbor Island Park	Recreation

	Harbor Island Park	Mamaroneck Ave & Boston Post Road	Recreation
	Florence Park	Florence Street	Recreation
	Columbus Park	Van Rans Place	Recreation
	Hampshire Country Club	1025 Cove Road	Recreation
	Mamaroneck Beach & Yacht Club	555 South Barry Avenue	Recreation
	Oriente Beach Club	1054 Walton Avenue	Recreation
	Beach Point Club	900 Rushmore Avenue	Recreation
Education * (Noncritical facility)	Mamaroneck Community Nursery	501 Tompkins Avenue	Preschool
	Little Flower Nursery School	310 East Boston Post Road	Preschool

* See Table 5-2 for other education facilities.

5.B.4 Infrastructure

Infrastructure needs for the Village of Mamaroneck are provided and maintained by State, County, Town, Village and several private organizations (See Table 5-4). For example, Con Edison Company of New York is responsible for supplying electrical power, maintaining the power grid and electrical substations, and providing emergency services for downed power lines, damaged transformers and controlling brownouts. Verizon provides telecommunication infrastructure. The Metro-North Railroad, which maintains the rail and Mamaroneck Station provides public rail transportation services. The Westchester County Bee Line Bus system provides intercommunity bus transportation.

Table 5-4. Village of Mamaroneck Key Infrastructures.

Service Provider	Facility Type	Key Locations of Concern	Importance/Function
NY State	Highway/Roads/Streets	I-95, NE Thruway	Evacuation Route
NY State	Highway/Roads/Streets	US-1, The Boston Post Road	Evacuation Route
County/Town/Village	Roads/Streets	Palmer Avenue	Evacuation Route
County/Town/Village	Roads/Streets	Mamaroneck Avenue	Evacuation Route
County/Town/Village	Roads/Streets	Fenimore Road	Evacuation Route
County/Town/Village	Roads/Streets	Harrison Avenue	Evacuation Route
County/Town/Village	Roads/Streets	Old White Plains Road	Evacuation Route

Westchester County	Bus Service	Intercounty & local bus routes	Public Transportation
Metro-North Railroad	Rail Service	Station Plaza	Commuter & Public Transport
Verizon	Telecommunication Service	Village wide	Telecommunications Infrastructure
Con Edison Company of NY	Power Service	Village wide	Electric Power

5.B.5 Vulnerability of Critical Facilities and Key Infrastructures

Critical facilities and vulnerabilities in the Village of Mamaroneck are given in Table 5-2 and include government buildings, fire and emergency response facilities, and emergency shelters. The loss of any of these from a catastrophic event would be a major setback for the Village. Critical facilities should be designed to withstand the flood plain elevation caused by a 500-Year storm. Table 5-5a gives the vulnerabilities for the Village critical facilities and the geographical extent of the hazard. Table 5-5b gives the vulnerabilities for the key infrastructure facilities and the geographical extent of the hazard.

Table 5-5a Vulnerability of Critical Facilities to Selected Hazards

Critical Facility	Vulnerability	Moderately High Hazard						Moderately Low Hazard											Low Hazard									
		Hurricane	Flood	Utility Failure	Dam Failure	Fire	Coastal Storm *	Wind Storm	Terrorism	Thunderstorm	Fuel Oil Spill	Severe Storm **	Winter Storm	Tornado	Extreme Temps	Ice Storm	Haz. Materials (transport)	Explosion	Landslide	Hailstorm	Haz. Materials (fixed)	Epidemic	Radiological (fixed)	Drought	Earthquake	Air Contamination	Water Supply Contam.	Civil Unrest
Village of Mamaroneck Offices	Loss of village records. Interruption of services & communication. Loss of emergency & rescue services. Emergency Shelter	V	V	V	C	H	V	V	C	V	U	V	V	V	V	V	U	U	U	V	U	C	U	V	V	U	U	U
Town of Mamaroneck Offices	Loss of town records. Interruption of services & communication. Loss of emergency & rescue services. Emergency Shelter	V	V	V	C	H	V	V	C	V	U	V	V	V	V	V	U	U	U	V	U	C	U	V	V	U	U	U
Village Hall, Court, Police, Bldg Dept	Loss of village records. Interruption of police services. Interruption of communication. Loss of emergency & rescue services. Emergency Shelter	V	V	V	C	H	V	V	C	V	U	V	V	V	V	V	U	U	U	V	U	C	U	V	V	U	U	U
VMFD HQ & Fire Station	Interruption of fire emergency services. Interruption of emergency & rescue services. Emergency Shelter	V	V	V	C	H	V	V	C	V	H	V	V	V	V	V	H	U	U	V	H	C	U	V	V	U	U	U
Columbia Fire Station	Interruption of fire emergency services. Interruption of emergency & rescue services. Emergency Shelter	V	V	V	C	H	V	V	C	V	H	V	V	V	V	V	H	U	U	V	H	C	U	V	V	U	U	U
Volunteer Firehouse	Interruption of fire emergency services. Interruption of emergency & rescue services. Emergency Shelter	V	V	V	C	H	V	V	C	V	H	V	V	V	V	V	H	U	U	V	H	C	U	V	V	U	U	U
Halstead Manor Firehouse	Interruption of fire emergency services. Interruption of emergency & rescue services. Emergency Shelter	V	V	V	C	H	V	V	C	V	H	V	V	V	V	V	H	U	U	V	H	C	U	V	V	U	U	U

Continued next page

Table 5-5a Vulnerability of Critical Facilities to Selected Hazards (Continued)

Critical Facility	Vulnerability	Moderately High Hazard						Moderately Low Hazard												Low Hazard								
		Hurricane	Flood	Utility Failure	Dam Failure	Fire	Coastal Storm *	Wind Storm	Terrorism	Thunderstorm	Fuel Oil Spill	Severe Storm **	Winter Storm	Tornado	Extreme Temps	Ice Storm	Haz. Materials (transport)	Explosion	Landslide	Hailstorm	Haz. Materials (fixed)	Epidemic	Radiological (fixed)	Drought	Earthquake	Air Contamination	Water Supply Contam.	Civil Unrest
EMS Rescue Squad Bldg	Interruption of emergency & rescue services. Emergency Shelter	V	V	V	C	H	V	V	C	V	H	V	V	V	V	V	H	U	U	V	H	C	U	V	V	U	U	U
Dept of Public Works Garage	Interruption of emergency services.	V	V	V	C	H	V	V	C	V	H	V	V	V	V	V	H	U	U	V	H	C	U	V	V	U	U	U
Westchester Joint Waterworks	Interruption of municipal water supply.	V	V	V	C	H	V	V	C	V	H	V	V	V	V	V	H	U	U	V	H	C	U	V	V	U	U	U
Wastewater Treatment Plant	Interruption of water pollution control services	V	V	V	C	H	V	V	C	V	H	V	V	V	V	V	H	U	U	V	H	C	U	V	V	U	U	U
U.S. Post Office	Interruption of communications. Emergency Shelter.	V	V	V	C	H	V	V	C	V	H	V	V	V	V	V	U	U	U	V	U	C	U	V	V	U	U	U
FE Bellows Elementary School	Emergency Shelter	V	V	V	C	H	V	V	C	V	H	V	V	V	V	V	U	U	U	V	U	C	U	V	V	U	U	U
Warren Elementary School	Emergency Shelter	V	V	V	C	H	V	V	C	V	H	V	V	V	V	V	U	U	U	V	U	C	U	V	V	U	U	U
Rye Neck Middle School	Emergency Shelter	V	V	V	C	H	V	V	C	V	H	V	V	V	V	V	U	U	U	V	U	C	U	V	V	U	U	U
Rye Neck High School	Emergency Shelter	V	V	V	C	H	V	V	C	V	H	V	V	V	V	V	U	U	U	V	U	C	U	V	V	U	U	U
French-American School	Emergency Shelter	V	V	V	C	H	V	V	C	V	U	V	V	V	V	V	U	U	U	V	U	C	U	V	V	U	U	U
Mamaroneck Avenue School	Emergency Shelter	V	V	V	C	H	V	V	C	V	U	V	V	V	V	V	U	U	U	V	U	C	U	V	V	U	U	U

Continued next page

Table 5-5a Vulnerability of Critical Facilities to Selected Hazards (Continued)

Critical Facility	Vulnerability	Moderately High Hazard						Moderately Low Hazard												Low Hazard							
		Hurricane	Flood	Utility Failure	Dam Failure	Fire	Coastal Storm *	Wind Storm	Terrorism	Thunderstorm	Fuel Oil Spill	Severe Storm **	Winter Storm	Tornado	Extreme Temps	Ice Storm	Haz. Materials (transport)	Explosion	Landslide	Hailstorm	Haz. Materials (fixed)	Epidemic	Radiological (fixed)	Drought	Earthquake	Air Contamination	Water Supply Contam.
Mamaroneck High School	Emergency Shelter	V	V	V	C	H	V	V	C	V	U	V	V	V	V	U	U	U	V	U	C	U	V	V	U	U	U
Westchester Day School	Emergency Shelter	V	V	V	C	H	V	V	C	V	U	V	V	V	V	U	U	U	V	U	C	U	V	V	U	U	U
Mamaroneck School Garage	Loss of school transportation services.	V	V	V	C	H	V	V	C	V	H	V	V	V	V	H	U	U	V	H	C	U	V	V	U	U	U
Metro North Railroad Station	Loss of major transportation thoroughfare.	V	V	V	C	H	V	V	C	V	H	V	V	V	V	H	U	U	V	H	C	U	V	V	U	U	U

* Including tropical storms and nor'easters.

** Including severe and gale force winds as well as other non-winter storms listed.
Hurricanes and coastal storms not included.

Key: V = Village Wide
C = County Wide
U = Highly Unlikely
H = Hazard Localized

Table 5-5b Vulnerability of Key Infrastructure to Selected Hazards

Key Infrastructure	Vulnerability	Moderately High Hazard						Moderately Low Hazard														Low Hazard						
		Hurricane	Flood	Utility Failure	Dam Failure	Fire	Coastal Storm *	Wind Storm	Terrorism	Thunderstorm	Fuel Oil Spill	Severe Storm **	Winter Storm	Tornado	Extreme Temps	Ice Storm	Haz. Materials (transport)	Explosion	Landslide	Hailstorm	Haz. Materials (fixed)	Epidemic	Radiological (fixed)	Drought	Earthquake	Air Contamination	Water Supply Contam.	Civil Unrest
Metro-North Railroad. Commuter & Public Transport	Loss of major transportation thoroughfare	V	V	V	C	U	V	V	C	V	H	V	V	V	V	V	H	U	U	V	U	C	U	V	V	U	U	U
Verizon. Telecommunications Infrastructure	Interruption of telecommunications system	V	V	V	C	U	V	V	C	V	U	V	V	V	V	V	U	U	U	V	U	C	U	V	V	U	U	U
Consolidated Edison. Electric Power service	Interruption of electric power service	V	V	V	C	U	V	V	C	V	U	V	V	V	V	V	U	U	U	V	U	C	U	V	V	U	U	U
Westchester County Bus Service (Bee Line) Commuter & Public Transport	Loss of major transportation service	V	V	V	C	U	V	V	C	V	H	V	V	V	V	V	H	U	U	V	U	C	U	V	V	U	U	U
I-95 - NE Thruway, US1 – Boston Post Road	Loss of NYS evacuation routes	V	V	V	C	U	V	V	C	V	H	V	V	V	V	V	H	H	U	V	U	C	U	V	V	U	U	U
Palmer Avenue, Mamaroneck Avenue, Fenimore Road, Harrison Avenue, Old White Plains Road	Loss of County/Town/Village evacuation routes	V	V	V	C	U	V	V	C	V	H	V	V	V	V	V	H	H	U	V	U	C	U	V	V	U	U	U

* Including tropical storms and nor'easters.

** Including severe and gale force winds as well as other non-winter storms listed. Hurricanes and coastal storms not included.

Key: V = Village Wide
C = County Wide
U = Highly Unlikely
H = Hazard Localized

Other key facilities shown in Table 5-3 such as schools, religious institutions, major employers and commercial businesses are important to the village since damage to any of these would result in loss of important services to the community. Important infrastructures shown in Table 5-4 provide needed transportation, energy and communication services.

The loss of the Village Hall would result in the following impacts:

- Interruption of services.
- The loss of critical plans and management tools.
- The loss of critical records.
- The loss of an emergency shelter.

The loss of any of the schools listed in Table 5-2 would result in loss of shelter space during an emergency evacuation. The loss of any fire and emergency response facilities would reduce the ability of these services to respond and help the areas of the village that are impacted.

The loss of the electrical and telecommunications infrastructure would result in the following problems:

- The whole or partial loss of the community telephone system.
- The whole or partial loss of the electrical service.
- The loss of transportation signals.
- Cascade impacts on other needed services, infrastructure and facilities.

5.B.6 Vulnerable Populations

According to the 2010 Federal Census, the population of the Village of Mamaroneck was 18,929 with a median age of 40. According to the U.S. Census Bureau, the area of the village is approximately 6.7 square miles, with 3.5 square miles underwater, leaving approximately 3.2 square miles of land area. There were 1,169 residents under the age of 5 and 2,262 over the age of 65. The percentage of minority populations consists of 24.3% Hispanic, 4.8% Asian, and 3.7% African American. The Village of Mamaroneck is considered to be an upper-middle income community. The median household income was reported to be \$105,139 and the per capita income was \$56,807.

Much of the village lies in the 100-year flood plain. Vulnerable populations to storms and flooding (Figure 5-2 and 4-2) include those residences and businesses located in the following areas:

- A portion of the Harbor Heights section of the Village of Mamaroneck bordering the Mamaroneck River, including:
 - Chestnut Avenue
 - North James Street
 - Urban Street
 - Winfield Street
- Washingtonville, aka “The Flats” section of the Village, including:
 - Elliott Avenue
 - Madison Avenue
 - New Street
 - Ralph Avenue
 - Howard Avenue
 - Lester Avenue
 - Nostrand Avenue
 - Sheldrake Place
 - Depot Plaza
 - Station Plaza
 - Van Ranst Place
 - Jefferson Avenue (east of Mamaroneck Ave, bordering the Sheldrake River)
- West of Mamaroneck Avenue bordering Sheldrake River
 - Center Avenue
 - Grand Street
 - Waverly Avenue
 - Plaza Avenue
 - Fayette Avenue
 - Fenimore Road
- Along the lower section of the Mamaroneck River
 - Ward Avenue
 - Spencer Place
 - Valley Place
 - First Street
 - Second Street
 - North Barry Extension
 - Stoneybrook Avenue
- The neighborhoods of Orienta and Shore Acres

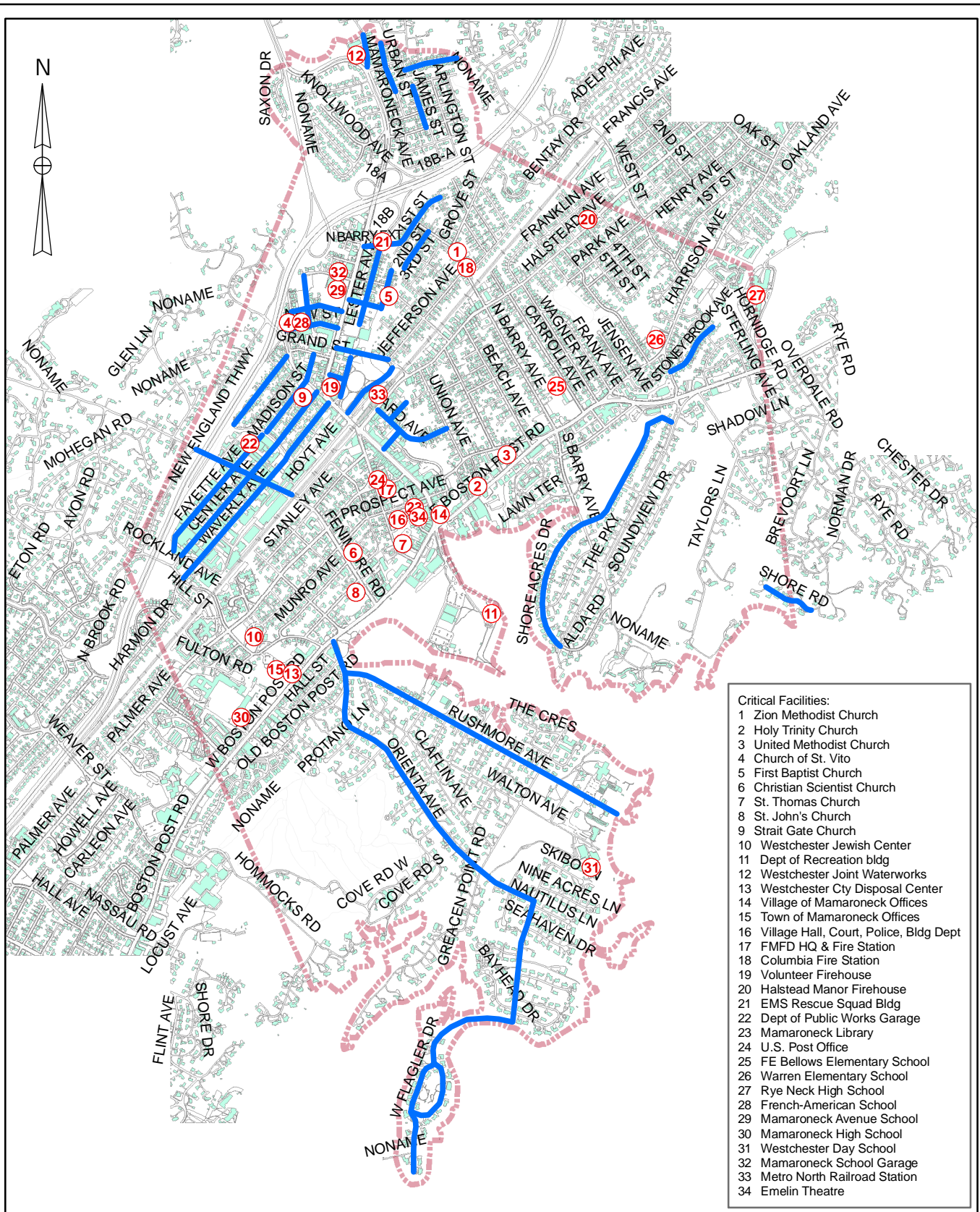


Figure 5-2
Frequently Flooded Streets
Incorporated Village of Mamaroneck
Multi-Hazard Mitigation Plan

Legend

- Municipal Boundaries
- Frequently Flooded Streets

ETG Environmental
Technology
Group, Inc.

300 WHEELER ROAD, SUITE 307, HAUPPAUGE, NEW YORK 11788

0 1,250 2,500 3,750 5,000
Feet

Basemap information by Westchester County GIS

DWN BY: YS
CHK BY: JB
SCALE: AS SHOWN
DATE: 04/23/12

Senior citizens are also at higher risk. The chronically ill are vulnerable since they lack mobility. With the growing numbers of senior citizens this vulnerability to hazards may increase in the Village of Mamaroneck in the future.

The impact of hazards to the life, safety and health of people in the Village of Mamaroneck depend on several vulnerability factors. These include:

- Location of the population relative to the hazard (persons in flood prone areas or shoreline areas are at greater risk).
- Age of the population (very young and elderly tend to be more vulnerable).
- Current health of the population (persons with chronic illnesses are more vulnerable)
- Mobility of individuals (persons who can't walk or drive have special needs for evacuation and are at higher risk).

Of all the hazards discussed in Section 4 and assessed below in Section 5.C, the population of the Village of Mamaroneck in general and vulnerable populations specifically, are most at risk to severe storm hazards such as flooding and wind damage.

5.C Assessment of Primary Hazards

The following is an assessment of probable hazards identified in Section 4 above and vulnerability to these hazards. Based on this assessment, primary hazards are screened for a more detailed impact assessment on community property and structures. Only some of the hazards evaluated in Section 4 are considered a primary concern to the community. In screening the primary hazards of concern, several criteria were used including:

- HAZNY rating and rank
- Likelihood of a damaging event
- Potential extent of the hazard in the village
- Likelihood of significant damage
- Severity of damage
- Vulnerable populations
- Impact on safety of people

Hazards considered to have a low impact rating or probable occurrence by these criteria were not considered further for quantitative assessment of damages or for developing objectives and mitigation measures. Therefore the focus of this plan is to assess damages only for those hazards likely to cause significant impacts and to propose remediation measures that will provide the greatest benefit to the community.

5.C.1 Flood Related Hazards

Flooding was rated moderately high with a HAZNY score of 302 and rank of one. Most flooding is due to storms, heavy or extended rainfall and snow melt. The geographical extent of the 100-Year flood, the 500-Year flood and hurricane inundation is shown in Figure 4-2 and Map 2. These events may be compounded from the concurrence of the moon coupled with high tide events with heavy rains and high winds.

The probability of future flood events is high for a 100-Year flood. It has a 1% probability of occurring in any given year. A 500-Year flood is infrequent, and has a likelihood of occurrence of 0.2% in any given year. Based on past events, the probability for local flooding in the Village of Mamaroneck for any given year is very high. Maps 2 and 3 show the extent of flooding from major events that may span the neighborhoods of Orienta, Shore Acres, Columbus Park, Washingtonville, the industrial area, some sections of Harbor Heights, and the Northern part of the central business district. (See Figure 5-3.) Due to the extent and potential depth of flooding there is a high likelihood of significant damage. Severity of damage along the Mamaroneck and Sheldrake rivers could be significant. Impact on safety of people could be significant if advance warning is insufficient and evacuation routes are blocked.



Photograph by Grannel Knox, via Larchmont Gazette



Photo by Westchester County Legislator Judy Myers, via Larchmont Gazette

Figure 5-3. Photos of Local Flooding in the Village of Mamaroneck. Top taken at North James Street in Harbor Heights, adjacent to the Mamaroneck River. Bottom taken of flooded parked cars near Columbus Park. These routes can be cut off for use by emergency vehicles and persons needing to escape to high ground.

Figure 4-2 and Map 2 show the expected extent of flooding for a 100-Year and 500-Year flood. Vulnerable populations include those residences and businesses in the neighborhoods of Orienta, Shore Acres, Columbus Park, Washingtonville, the Industrial area, some sections of Harbor Heights, and the northern part of the central business district.

The impacts on health and safety from floods include injuries and deaths caused by:

- Street flooding which would cut off critical emergency access and escape routes from the Village of Mamaroneck.
- Collapsing buildings from water-weakened foundations.
- Falling trees caused by reduced strength of water-saturated soil.
- Infiltration and inflow to storm and sanitary sewers causing backup and overflow of infectious sanitary waste.
- Drowning in low-lying flooded areas.
- Exposure to waves and strong currents in rivers and shoreline areas subject to storm surges.

The following flood impacts have been identified for the Village of Mamaroneck:

- Storm water could exceed the drainage capacity of the natural and manmade drainage systems causing flooding of basements and roads.
- Groundwater levels would rise, causing flooded basements.
- High groundwater levels would cause significant seepage into storm and sanitary sewers.
- Clogged or ineffective storm and sanitary sewers would fail to drain floodwaters.
- Surges could flood and erode natural barriers along the Sheldrake and Mamaroneck Rivers
- Surges could flood and erode natural barriers along the Long Island Sound.
- Damage to buried fuel tanks, building foundations and swimming pools.
- Isolation of critical facilities and village infrastructure; The Village of Mamaroneck's operations center and emergency centers could be impacted or isolated.
- Repetitive damage to structures in the floodplain and significant flood insurance claims.
- Weaken structural strength of soil resulting in susceptibility to falling trees.

Flooding therefore is one of the major natural hazards facing the Village of Mamaroneck. Based on this evaluation, a damage assessment for flood hazards is provided below in Section 5.D.

5.C.2 Hurricane Hazards

Hurricanes ranked number thirteen and were rated moderately low with a HAZNY score of 212. Although hurricanes can produce extensive and devastating damage, the hazard was given a moderately low HAZNY score due to the rarity of occurrence, as most hurricanes have been downgraded to highly damaging tropical storms by the time they have reached Westchester County. They are a regular event on Long Island, yet are usually downgraded to Tropical Storm or Tropical Depression status by the time they near Westchester County. Most damage from hurricanes is from high winds, and heavy rains. The extent of the flooding depends on the hurricane category and inundation of the river from storm surges. The potential extent of flooding is shown in Map 3 folder at the end of Part I.

The high winds and heavy rains in Westchester County in recent years have resulted in floods, downed trees and power lines. According to the NOAA, based on current weather patterns, the National Weather Service predicts that the upcoming years will show increased hurricane activity, yet the odds of a category 4 or higher hurricane hitting the New York City and vicinity area is one every 500 years.

According to the United States Landfalling Hurricane Probability Project, prepared by the Tropical Meteorology Project at Colorado State University, the probabilities of a hurricane hitting landfall in Westchester County have increased in the last five years. Based on 2011 data, the probability of a named Tropical Storm hitting landfall in Westchester County in 50 years is 18.6% (from 11.3% in 2006). The 50 year probability of a hurricane with sustained winds of 75-114 mph is 11.2% (from 3.2% in 2006), and an intense hurricane with sustained winds over 115 mph is 5.4% (from 0.7% in 2006). (<http://typhoon.atmos.colostate.edu>).

Should a hurricane strike the Village of Mamaroneck, the severity of flood damage throughout the village would be extensive. The impact on safety of people could be significant if advance warning is insufficient and evacuation routes are blocked.

The following damage impacts from hurricanes are likely to affect the Village of Mamaroneck:

- Wind-driven storm surges could raise the level of the Mamaroneck and Sheldrake Rivers, causing flood damage.
- Water may go overtop land barriers and be driven through storm sewers.
- The shorelines of the Village on the Long Island Sound may be inundated by wind-driven storm surges.
- Substantial wind damage to homes and businesses are likely.
- Substantial wind damage to boats in the Marinas is likely.
- Downed power lines would cause power outages and a safety hazard.
- Downed trees would damage homes and vehicles.
- High velocity winds would damage or destroy homes and businesses.

Safety hazards from hurricanes are considered significant. Major hurricanes that strike low-lying areas with limited egress, such as the 1938 Hurricane, can cause drowning. High velocity winds of 74 miles per hour or more will cause significant damage to buildings and property over the entire community and injuries and loss of life by flying debris, wind-propelled glass shards, falling trees and tree limbs, falling poles and downed power lines.

The Village of Mamaroneck Community consists of a population of 18,929 people (2000 US Census). Vulnerable populations include those residents and businesses along and below the Mamaroneck and Sheldrake Rivers, and bordering the Long Island Sound. People in more than 1/3 of the village would be at risk of being exposed to storm surges from hurricanes.

Probable causes of injury and mortality include:

- Downed trees could be the cause of a few deaths and injuries in a major hurricane.
- Downed power lines can cause electrocution.
- Persons near the rivers and sound are at high risk of drowning from a storm surge.
- Strong winds can blow people to the ground or into flooded areas.
- An increase in motor vehicle accidents is likely to occur.
- Death and injury would result from wind damage to buildings and homes from broken glass and other flying debris.

Hurricanes are one of the most damaging natural hazards facing the Village of Mamaroneck. Storm surges along the Mamaroneck River, the Sheldrake River, and the Long Island Sound along with high intensity winds can cause extensive wide spread damage and fatalities. Based on this evaluation a detailed damage assessment for hurricanes is provided below in Section 5.D.

5.C.3 Severe Storm and Wind Related Hazards

Coastal storm hazard was given a score of 253 in the HAZNY analysis and ranked number 2 in importance. Severe storm events other than hurricanes also cause flooding which was discussed previously in Section 5.C.1. These storm hazards include tropical storms, severe storms, thunderstorms and nor'easter coastal storms. The Severe storm and thunderstorm hazard was given a score of 246 in the HAZNY and ranked number 3 in importance.

Thunderstorms are frequently accompanied by lightning, heavy rains, and heavy winds. Flooding could occur, which would affect the residences and businesses along the flood prone areas (in the neighborhoods of Orienta, Shore Acres, Columbus Park, Washingtonville, the Industrial area, some sections of Harbor Heights, and the northern part of the central business district). Floods could also affect the Village's Key Infrastructures, such as Evacuation Routes (Interstate 95, The Boston Post Road, etc.). Another key infrastructure that could be affected is Con Edison; severe storms could knock out power. It is difficult to determine the extent of the vulnerability.

Severe storm events also generate high velocity wind hazards that can approach hurricane or tornado force. It is this wind hazard that is a primary concern in this section. Tornadoes were ranked 25th with a HAZNY score of 155 and are also included in this storm category. They are relatively uncommon events and will not be analyzed separately. When they do strike, they can cause extensive local damage across a narrow path. Although they periodically occur in Westchester County, no records were found for a tornado strike in or near the Village of Mamaroneck. The probability of significant yearly damage from severe storms is very high. The following severe wind concerns include:

- High winds can cause structural damage to commercial buildings and homes.
- Wind and waves cause erosion of the riverbanks.
- Wind and waves can cause structural damage to boats in the Marinas

- Falling trees damage homes and cars, break overhead power, telephone and cable lines.
- Fallen trees, utility poles and lines can block escape routes.

Individual severe storms tend to cause local and isolated damages and impacts are over a short period of time. New structures are required to meet criteria for withstanding severe winds as shown in Figure 4-7. Unless wind speeds approach those of a category 1 hurricane or a class F1 tornado, damage is expected to be light. Tropical storms, severe thunderstorms, nor'easters, coastal storms and tornados will not be analyzed separately. A quantitative damage assessment will be made, where applicable, with assessment for windstorm damage provided below in Section 5.D.3.

5.C.4 Winter Storms, Snow and Ice

The HAZNY score for winter snowstorms and ice storms, which ranked 5th and 11th, were moderately low hazards and had final scores of 230 and 217 respectively. While major snowstorms may not occur every year, those that do occur can cause considerable local damage. The most significant of these storms are winter nor'easters.

Also notable are ice storms that occur occasionally which can be more damaging than snowstorms. Damaging winter storms have a high probability of occurring every year or two with a high likelihood of damage. They can be regarded as frequent events since they may occur more than once a year.

The impacts associated with these winter storm events include:

- Problems of heavy snow accumulation causing interruptions in private and public transportation, schools and businesses.
- Snow and ice damage to public roads and walkways.
- Roofs collapsing under the weight of snow.
- Damage to trees in parks and on streets stemming from falling branches and blow down of trees.
- A utilities failure from breaks in overhead lines caused by weight of snow/ice and by falling trees and limbs.
- Damage to trees caused by the build-up of ice during ice storms.

- Limited access to escape and rescue routes.

Health and safety impacts from winter storms, ice and snow result in breakdowns in communication, transportation, emergency services, motor vehicle accidents, falling limbs and power lines. Risks to people from winter storms can be significant. The key safety impacts include:

- Downed trees can cause deaths and injuries.
- Downed power lines can cause electrocution.
- An increase in motor vehicle accidents due to slippery roads.
- Back injury and cardiac problems in residents due to shoveling snow.
- Limited visibility conditions while driving.
- Frost bite.

A quantitative damage assessment for winter storms will not be made. Property damage compared with other major storm events is limited and localized. Interruption of services and business is mostly limited to a few days or less. The primary hazards include structurally inadequate roofs, fallen trees and limbs, downed power lines and traffic accidents. Data and analysis are not readily available to conduct a separate analysis for snow and ice damage. Economically these impacts fall most heavily on the Village public works and Con Edison repair crews. Wind impacts are considered more significant than snow and ice and will be considered in Section 5.D.3.

5.C.5 Utility Failure Problems

The hazard level associated with utility failure was ranked 9th and was classified as Moderately Low with a HAZNY Score of 221. Utility failures are both local in the Village of Mamaroneck and regional (from county wide to the entire northeast). Power failures may be caused by downed power lines from wind storms, snowstorms, ice storms, fallen trees, heat waves, power grid system failures, substation failures, fires, or terrorism. The local concerns include downed power lines and poles caused by high winds, ice, snow and fallen limbs and trees. The regional utility problems due to far-ranging power grid, regional control and distribution problems are beyond the control of the local community. Regional and local problems are also often related to heat waves. Whatever the cause, the impacts on the community are the same. The probability of

local power failures in a given year is high. The probability of a major grid failure or brownout is high over the next several years. The problems associated with utility failures include:

- Loss of life sustaining equipment.
- Loss of refrigeration and spoilage of food.
- Loss of air conditioning in the summer during a heat wave.
- Loss of heating in winter and freezing of water pipes.
- Loss of rail service for the village.
- Traffic problems from loss of signal lights.
- Economic losses for local businesses.

The summer of 2006 showed record setting peak electricity demand. On September 14, 2006, Con Edison representatives met with several Westchester Municipal Officials to discuss Con Edison's less than optimal response to previous power outages, and to discuss solutions and future plans. Con Edison agreed to work with the municipalities on improving their response to power outages. Con Edison also announced that it would invest 1.2 Billion dollars beginning in 2007 to upgrade and reinforce its electric delivery system in New York City and Westchester County. (www.coned.com/publicissues, Con Edison).

For several years Con Edison brought its Tree Maintenance Program to Westchester, including the Village of Mamaroneck. Their objective was to create safer distances between electric lines and surrounding trees. They performed systematic tree trimming in order to prevent damages and outages during heavy winds and storms.

Since Con Edison is already in the process of upgrading their system, as well as coordinating their efforts with local municipal officials, further health and safety assessments and a damage analysis from utility failure will not be performed nor will mitigation measures be proposed or evaluated.

5.C.6 Dam Failure

Dam Failure was ranked 8th in the moderately low range with a HAZNY score of 224. Located in Valhalla, failure of the Kensico Dam could occur for several reasons; including overtopping, structural failure, cracking, poor maintenance, poor piping, and terrorism.

Failure of the Kensico Dam would be devastating, with little or no warning, resulting in catastrophic damages and fatalities. Approximately nine million people would lose their water supply. A tidal wave would ensue which would affect hundreds of thousands of people. Countless lives would be lost, as well as structures and critical facilities in the tidal wave's path, which would span from White Plains through the Bronx.

There are two other Dams in the area that would affect the Village of Mamaroneck, should either of the Dams fail. The Larchmont Dam is located on the Sheldrake River, and the Mamaroneck River Dam is located behind the Westchester Joint Waterworks. Failure of the Mamaroneck River Dam would result in the flooding of neighborhoods along the Upper Mamaroneck River.

The Kensico Reservoir is protected by the New York City Department of Environmental Protection (NYCDEP). After September 11, 2001, the Department of Public Safety created Westchester County's Office of Intelligence, Security and Counter-Terrorism (ISCT). The ISCT is working with the NYCDEP and has made significant security improvements at the Kensico Dam. Further health and safety assessments and a damage analysis from dam failure will not be performed, nor will mitigation measures be proposed or evaluated.

5.C.7 Fire

Fire hazard was ranked 4th in the moderately low range with a HAZNY Score of 240. According to incident reports from the Village of Mamaroneck Fire Department, the following fires have occurred in the Village from 2006 to 2010:

Type of Situation	2006	2007	2008	2009	2010
Building Fires:	80	54	99	30	30
Vehicle Fires:	9	15	16	15	13
Other Fires:	21	22	9	14	35
Total Fires:	110	91	124	59	78

There are approximately 1270 commercial/industrial facilities and 3,636 residential buildings in the Village of Mamaroneck (See Table 5-5). Vulnerable fire prone locations include gas stations, restaurants and schools. Densely developed residential areas likely to be fire risks,

including single family and multi-residential buildings, and has the likelihood to affect more than one building. There are approximately 2,818 single family homes and 818 multi-residential buildings in the Village of Mamaroneck. There have been minimal occurrences of wildfire in the Village. Identified fire risks and concerns in the Village that need attention include:

- Single-Family residences
- Multi-family residences
- Light Industry and commercial

Risks to human health and safety, although a major concern, appear to be controlled. Based upon this assumption, further health and safety assessments and a damage analysis due to local fires will not be performed.

5.C.8 Extreme Temperatures

This hazard was ranked 18th in the moderately low range with a HAZNY Score of 196. Summer temperatures have become gradually higher in recent years and may continue to increase in the near term. A heat event between July 4 and 6, 1999 in the New York metropolitan area had temperatures ranging from 100 to 105 degrees F with peak at 110 degrees. This resulted in 33 fatalities in the New York metropolitan area. Rolling electrical blackouts occurred across the region (National Climate Data Center, ncdc.noaa.gov).

In 2001, New York was hit with another heat wave, along with the rest of the east coast, resulting in 4 deaths. Temperatures in New York City reached 103 degrees F. In 2006, the North American Heat wave spread throughout most of the United States, killing more than 225 people. At least 32 deaths were reported in New York City. Massive blackouts occurred in the Tri-state area and Westchester County.

In July of 2010, a hot air mass developed and settled over the New York City area. Temperatures were in the mid to upper 90s and low 100s. The NYSDEC issued an ozone advisory for the New York metropolitan area. The Westchester County Health Department issued a heat advisory on July 6th due to 101 degree temperature. More than 1300 were without power during this heat wave.

In July of 2011, the New York City area was hit with another heat wave which lasted for 8 days. Temperatures in New York City reached 104 degrees, and 11 deaths were reported.

Since, most homes are air-conditioned there is a growing tendency for power failures and brownouts to occur during the warmest weeks of the year. The primary impact of high temperatures is the increased electrical demand and its stress on electrical utilities (see Utility Failure Section 5.C.5 above). Additional concerns are related to health and safety of people sensitive to heat stress and air pollution (see Section 5.C.12). Heat-related problems have a high probability of occurring in the future. Specific structure or facility damage related to high temperatures is limited. In extremely hot weather roads and bridges can buckle. An increase in safety risks to pedestrians and car passengers is probable.

The July 4-6, 1999 heat event resulted in 33 fatalities in the New York metropolitan area. Four deaths in the region were attributed to an August 2001 excessive heat event. 32 deaths in New York City resulted from the heat event in 2006. 11 deaths in New York City resulted from the heat event in 2011. Health impacts from elevated temperatures depend on the population of people sensitive to heat stress. For example, senior citizens are at-risk for heat stroke. The chronically ill are vulnerable to sudden high temperature heat waves. With the growing populations of the senior citizens in Westchester County, this is the sort of problem that could increase in the Village of Mamaroneck in the future. Although limited, there is a moderate to low likelihood that the elderly and chronically ill would be impacted.

There is no significant property damage from heat waves. Interruption of services and businesses is limited and primarily due to electrical utility failures. Health and safety of vulnerable populations is a concern. Based on this assessment, further health and safety assessment and a damage analysis from extreme temperatures will not be performed nor will mitigation measures be proposed or evaluated for this hazard.

5.C.9 Hazardous Material Releases

This hazard covers materials, which, if released or if not used in a safe manner, could pose a threat to people, property and the environment. This hazard was evaluated from two perspectives. The release of hazardous materials during transit ranked 14th and was rated a

moderately low score of 210. Released from fixed locations, hazardous materials were rated moderately low with a HAZNY Score of 168 and a rank of 21.

Trucks carrying hazardous materials are likely most at risk at one of the established transportation routes that traverse the Village of Mamaroneck. These routes include I-95 on the western border, The Boston Post Road, which runs parallel to the Long Island Sound; and Mamaroneck Avenue, which runs through the middle of the village. Metro-North commuter tracks run through the Village of Mamaroneck and are also used by CRX to transport hazardous materials through the village.

Based on the probable sources and quantities of hazardous materials stored and used in village, the likelihood of significant damage or injury is low from the release of hazardous materials from a fixed site. The potential releases from small businesses would likely be small quantities and would have a limited local impact. Local fire and emergency response teams and local police can manage this hazard with current resources. In fact, there have only been 3 reported releases from a fixed site since 2005. According to the Village of Mamaroneck Fire Department Incident Reports, all incidents were controlled and confined.

Releases may occur from activities such as dry cleaning, auto repair and repainting, marina activities, gasoline and home fuel distributors, home building and maintenance services, compressed gas distributors, painting and cleaning and small quantity home use. The following problems from release of hazardous materials include:

- Releases from accidents during handling of chemicals.
- Spill of materials during use.
- Accidental air emission
- Release of toxic chemicals during a fire or explosion.
- Release from improper storage or disposal.
- Release from a truck in an accident.
- Rail car accident.

The frequency of hazardous materials distributed in the Village of Mamaroneck is an important community concern. However, the quantities involved would not result in significant property damage or result in significant injury, illness or mortality to the public.

Based on this assessment, further health and safety assessment and a damage analysis from hazardous material releases (fixed or in transit) will not be performed and mitigation measures will not be proposed or evaluated.

5.C.10 Explosion

Explosion hazard was ranked in the moderately low range with a HAZNY Score of 192 and a rank of 19. Fueling activities at gasoline stations and Marinas and natural gas use in homes are risks. Handling and refilling gas cylinders at a local compressed gas distributor requires adherence to strict safety procedures. Accidents from use of flammable solvents in paint shops can cause explosions. Accidents from use of natural gas or propane at commercial and industrial facilities are a concern.

The problem is sporadic and the likelihood and magnitude is considered low. However, explosions though low in occurrence can cause major damage to a facility and surrounding properties and can injure or kill people. At present the Mamaroneck Fire and Police Departments oversee the protection of the community from these hazards and provide emergency fire response for sites with potentially explosive hazards.

Based on this assessment, further health and safety assessment and a damage analysis from explosion hazards will not be performed and mitigation measures will not be proposed or evaluated.

5.C.11 Oil Spills

Oil spills were ranked 16th in the moderately low range with a HAZNY score of 201. Fuel oil spills were ranked 32 in the low range with a HAZNY Score of 114. Fuel oil spills during transport within or through the Village or during filling operations, can impact the health and safety of Village residents. Trucks carrying fuels are likely most at risk on the commercial roads, such as I-95. No significant releases that have affected the public and required evacuation

have been occurred in the Village. The primary concern would be fire and explosion incidents. There are no major fuel storage or processing facilities in the Village. Therefore, the magnitude and severity of the hazard is expected to be limited to local areas in the Village.

Oil spills can also occur as a result of failed underground storage tanks at gas stations and home-heating oil businesses. Other than fuel/oil services at local gas stations, marinas, and heating oil businesses, there are no significant commercial or industrial oil storage or transfer facilities in the Village of Mamaroneck. Fuel oil spills can also occur as a result of fuel transportation and delivery. Flooding can cause fuel tanks to become buoyant causing oil spills. Fuel oil spills can cause contamination of groundwater and surface water resources. Incidences of oil spills have been sporadic in the village. Spills within the village are most likely to be local and their impacts small.

Although these are important environmental contamination issues that could result in local property damage, this hazard would result in limited damage to buildings and limited injury, illness or mortality. Based on this assessment, further health and safety assessment and damage analysis from oil spills will not be performed nor will mitigation measures be proposed or evaluated.

5.C.12 Air Contamination

This hazard was ranked in the low range ranking 28th with a HAZNY Score of 132. No major industrial sources of air pollution were identified within the Village of Mamaroneck. Mamaroneck is within the USEPA Non Attainment area that has been designated for ozone. This means that the regional baseline air quality does not meet USEPA requirements and that certain activities with the potential for causing air pollution are not permitted. Therefore, there is a very high probability for the occurrence of air contamination problems. These problems include:

- Air contamination resulting from commercial/light manufacturing businesses.
- Air contamination resulting from local homes or sources such as wood burning fireplaces and stoves in winter.
- Local contamination resulting from outside regional sources.
- Local automobile emissions in the Village of Mamaroneck.

- Local diesel emissions in the Village of Mamaroneck from trucks, busses, and diesel/electric hybrid trains.
- Regional truck transport and commuter travel through the area and its perimeter and surrounding areas.

Air contamination events in the Village of Mamaroneck due to local sources are small and isolated and do not represent a major increase in health and safety risks to local residents. The primary health and safety concern is among the elderly, infirmed and sensitive individuals with respiratory problems. These risks are related regional problems rather than local sources.

These problems, though important air pollution issues, would not result in significant property damage or result in significant injury, illness or mortality. Based on this assessment, further safety assessment and a damage analysis from extreme temperatures will not be performed nor will mitigation measures be proposed or evaluated.

5.C.13 Earthquakes

This hazard was ranked 15th in the moderately low hazard range and has a HAZNY Score of 202. Chances of an earthquake occurring in the Village of Mamaroneck are low. None of the 4,984 structures in the Village are particularly at risk. Earthquakes in excess of 5.0 on the Richter Scale are extremely rare in the Northeast while events of lower magnitude occur periodically and minor damage may occur. According to the USGS, the peak ground acceleration (PGA) rating for Mamaroneck is 3.757%g. (<http://gldims.cr.usgs.gov>). This rating places the Village in a low risk category for earthquakes. According to the Lamont-Doherty Cooperative Seismographic Network (LCSN) of Columbia University, no earthquakes have been reported with a magnitude greater than 5 since 1884 in the Greater New York City area. However, in October 1985, an earthquake occurred in Westchester County which was centered in Ardsley and measured 4.0 on the Richter Scale. There have been other minor earthquakes reported in the White Plains and Dobbs Ferry areas. In addition, tremors were felt in Westchester County from an earthquake that occurred on August 23, 2011 and measured 5.8 on the Richter Scale. The epicenter was Northwest of Richmond, Virginia. There is no particular elevated safety risk linked to earthquakes of Richter Scale 5.0 or less.

In 2008 the USGS updated their National Seismic Hazard Maps. The peak ground acceleration (PGA) rating for the Westchester County ranges between 3– 4%g, and represents a moderately low risk category for earthquakes (See Figure 4-8). All reported events in Westchester County have been minor with no significant damage or injuries. Based on this information, there is a low probability that a damaging earthquake would occur in the Village of Mamaroneck.

However, a study published in the Bulletin of the Seismological Society of America analyzed 383 earthquakes from 1677 to 2007 in a 15,000 square mile area around New York City, along with new data. The study suggests a pattern of subtle, yet active faults, which increases the risk of earthquake to the New York City area.

Although earthquakes are an infrequent occurrence in the New York City area, the risk is greater due to the extremely high concentration of people and infrastructure. The population is denser than in more earthquake-prone areas. In the event a damaging earthquake did occur in the area, the losses would be far more catastrophic.

Based upon research in this study, an earthquake with a Magnitude-5 is predicted to occur every 100 years. In addition, it is estimated that a Magnitude-6 will occur every 670 years, and a Magnitude-7 will occur every 3,400 years (The corresponding probabilities of occurrence in any 50-year period would be 7% and 1.5%, respectively).

In addition, the study has uncovered new seismic zones that have not previously been identified, thereby increasing the risk of a damaging earthquake in the area. For example, a newly discovered seismic zone was identified which runs from Stamford, CT, to Peekskill, NY. This zone runs less than one mile north of the Indian Point Nuclear Power Plant. In addition, the Ramapo Seismic Zone, that runs from Eastern Pennsylvania to the Mid-Hudson Valley, passes within two miles northwest of Indian Point, placing the power plant in a very precarious position.

Indian Point sits on the banks of the Hudson River in Buchanan, New York. It is situated 23.65 miles from the Mamaroneck, and was built to withstand a Magnitude-7 on the Mercalli Scale, or 6.1 on the Richter Scale.

The higher-level events could cause substantial damage to structures that are not specifically designed to withstand earthquakes. Beyond damage to structures there would also be damage to underground utilities.

FEMA has run vulnerability assessment studies using HAZUS-MH software. Damage analysis from earthquakes will be discussed in section 5.D.4.

5.C.14 Terrorism

Terrorism was ranked in the moderately low range with a HAZNY score of 219 and a rank of 10. As discussed in Section 4.D.7, this human caused hazard would be low risk in the Village of Mamaroneck since there are no major terrorist targets of interest identified in the Village of Mamaroneck. Key target populations, high profile historical landmarks, airports, significant regional infrastructures, important manufacturing facilities, critical industries or key government institutions and structures are not present in the Village. The commuter rail station in the Village of Mamaroneck was identified as a possible target but it is only one of several commuter lines feeding into the greater metropolitan area. Another potential target is the Kensico Dam located in Valhalla. Because of the absence of important target facilities and key vulnerable populations, this hazard will not be considered for further evaluation or analysis.

5.C.15 Other Hazards

The following hazards were rated as low hazards and were ranked the lowest. They are not expected to cause significant damage or have substantial health or safety impacts. They are either rare events - occurring less than once every 50 years or infrequent events occurring between once every 8 years to once in 50 years. They have a low likelihood of causing a significant damaging event and the extent of the hazard in the Village of Mamaroneck is limited. They are unlikely to have any significant impact on the critical facilities, infrastructure, local economics, or key cultural or historical resources. These hazards judged to have a low impact or risk include:

- Civil Unrest
- Epidemic
- Radiological releases

Civil unrest has a low HAZNY ranking of 96 although it is a potential risk (Section 4.D.7.1). The community has a very stable and upwardly mobile profile and has no history of significant civil strife or unrest that would cause significant damage to the community. Therefore the likelihood for civil unrest that would cause damage to property or injury to numbers of people is low.

Epidemics are a very low risk in the Village of Mamaroneck. Epidemic hazard was ranked in the low range with a HAZNY score of 160. Based on the hazard profile given in Section 4.D.5.3, epidemics are a real concern but rare or infrequent. Epidemics are more likely to be a regional problem than a local one.

Should an epidemic, such as west Nile virus occur, none of the 4,984 structures would be affected. There are no hospitals located in the Village. The schools may need to be used as emergency shelters. There would be heavy demand on the Village of Mamaroneck's rescue services.

However, there are several concerns over potential outbreaks of disease. When an epidemic occurs, the health impacts can be severe. Some concerns include the occurrence of the mosquito borne West Nile Virus Disease, events stemming from failures in the wastewater treatment systems with resulting backups into homes, events stemming from drinking water quality failures, food poisoning, and from failures of marine water to meet swimming, clamming and fishing standards. Although epidemics are rare, the impact on the community can be large. Should an epidemic occur, it would most likely affect the region and not just the Village of Mamaroneck. Epidemics are not likely to be a common problem in the Village of Mamaroneck. Public health concerns related to epidemics in the Village of Mamaroneck include:

- Problems deriving from food poisoning.
- Insect and tick-borne diseases such as West Nile virus, Rocky Mountain spotted fever and Lyme disease, among others.
- Diseases caused by exposure to untreated sewage.
- Diseases caused by drinking contaminated drinking water.
- Biohazards resulting from terrorist missions.
- Epidemics caused by new contagious diseases such as SARS.

- Epidemics can overwhelm healthcare facilities and cannot treat all who are affected.

No special mitigation measures beyond current state or county public health activities are called for. These issues are currently handled by the Westchester County Department of Health. Based on this assessment, further health and safety assessment and a damage analysis from these hazards will not be performed and potential mitigation measures will not be evaluated.

5.D Impact and Damage Analysis of Major Hazards on Village Facilities

5.D.1 Vulnerability and Value of Buildings Subject to Hazards

The Village of Mamaroneck is essentially a residential community and about 73 percent of the total buildings are single-family and multi-family residences (Table 5-6). Commercial properties, including apartment buildings, represent about 25% of the buildings in the Village.

Table 5-6. Residential, Commercial, Industrial and other Buildings Potentially Exposed to Hazards in the Village of Mamaroneck.

Property Class Code	Building Type by Property Class	Total Number of Buildings *	% of Total Buildings
210	Single Residential	2818	56.5%
220-283	Multi-Residential	818	16.4%
400-486	Commercial	1270	25.5%
546-570	Sports Facilities	15	0.3%
600-649	Community Services & Education	26	0.5%
620	Religious	21	0.4%
650-662	Government & Protection	16	0.3%
	Total	4984	100.0%

*** Data provided by Village of Mamaroneck Manager's Office.**

The valuation of the buildings at risk is based on the Village of Mamaroneck's tax assessments. The Village tax assessment information is given in Table 5-7A. The Residential Assessment Ratio (RAR) to determine the value of residential properties for the Village of Mamaroneck is 1.72 for 2011. The Equalization Rate for the Village of Mamaroneck is 1.82. The total valuation of all occupied properties in the Village of Mamaroneck is approximately \$83.4 million (\$4,753 million, adjusted by RAR and Equalization Rate). For the purpose of this assessment, residential and multi-residential were combined. Since the total number of

properties was small, community services, education, religious and government services were combined. Apartment buildings are assigned to a commercial code. Entertainment and Sports facilities were combined with commercial properties since these activities have similar commercial functions in the community.

Table 5-7A shows the percent of building number exposure to hazards by occupancy type. Property values were based on the assessed value of the property and the tax assessment rate. About 64% of the value is residential and multi-residential property. About 21% of the exposed value is from commercial properties. About 10% of the exposed value is from community services and education. These three property types represent a total of 95% percent of the number of the Village of Mamaroneck buildings.

Table 5-8A shows the replacement value of buildings exposed to hazards by occupancy type. Property values were based on the assessed value of the property and the tax assessment rate in Table 5-7A.

Table 5-7A. Village of Mamaroneck Property Tax Assessments and Property Values. *

Property Occupancy Class	Total Number Buildings	Total Assessed Value \$	Average Property Value \$	Percent Total Value
Single Residential	2818	43,795,626	15,541	52.5%
Multi-Residential	818	9,616,525	11,756	11.5%
Commercial	1270	17,570,656	13,835	21.1%
Sports Facilities	15	1,456,871	97,125	1.7%
Community Services & Education	26	8,156,570	313,714	9.8%
Religious	21	1,945,500	92,643	2.3%
Government & Protection	16	869,000	54,313	1.0%
	4984	83,410,748	598,927	100.0%

*** Data provided by Village of Mamaroneck Manager's Office.**

Residential values were adjusted using the Residential Assessment Rate (RAR) of 1.72. Other building types were adjusted using the Equalization Rate of 1.82. Adjusted values are represented below in Table 5-7B.

Table 5-7B. Property Values adjusted by RAR and Equalization Rate.

Property Occupancy Class	Total Number Buildings	Total Assessed Value \$	Average Property Value \$	Percent Total Value
Single Residential	2818	2,546,257,326	903,569	52.5%
Multi-Residential	818	559,100,291	683,497	11.5%
Commercial	1270	965,420,659	760,174	21.1%
Sports Facilities	15	80,047,857	5,336,524	1.7%
Community Services & Education	26	448,163,187	17,237,046	9.8%
Religious	21	106,895,604	5,090,267	2.3%
Government & Protection	16	47,747,253	2,984,203	1.0%
	4984	4,753,632,177	32,995,279	100.0%

Table 5-8A. Building Exposure by Occupancy type. *

Property Class Code	Occupancy Class	Total Value Properties *	Replacement Value
210	Single Residential	43,795,626	32,053,076
220-283	Multi-Residential	9,616,525	7,374,125
400-486	Commercial	17,570,656	11,400,779
546-570	Sports Facilities	1,456,871	612,030
600-649	Community Services & Education	8,156,570	6,541,350
620	Religious	1,945,500	1,472,600
650=662	Government & Protection	869,000	639,300
	Total	83,410,748	60,093,260

* Based on data provided by Village of Mamaroneck Manager's Office.

Table 5-8B. Adjusted Building Exposure by Occupancy type. *

Property Class Code	Occupancy Class	Total Value Properties *	Replacement Value
210	Single Residential	2,546,257,326	1,863,550,930
220-283	Multi-Residential	559,100,291	428,728,198
400-486	Commercial	965,420,659	626,416,429
546-570	Sports Facilities	80,047,857	33,628,022
600-649	Community Services & Education	448,163,187	359,414,835
620	Religious	106,895,604	80,912,088
650=662	Government & Protection	47,747,253	35,126,374
	Total	4,753,632,177	3,427,776,875

* Values adjusted by RAR and Equalization Rate.

5.D.2.1 Flood Insurance Claims

There was limited information available on insurance claims data for the Village of Mamaroneck. According to the NFIP, as of 9/30/2011, there are currently 1052 flood insurance policies for the Village. The total insurance coverage is \$279,140,100 and since 1978 there were 1429 claims made for \$16,751,541.57. However, these flood insurance claims are likely underreported and actual flood damages are probably higher. (<http://bsa.nfipstat.com>).

Please see the Appendix for a complete list of the Village of Mamaroneck's Repetitive Loss properties, along with the number of losses and total paid. There are currently 23 properties designated as Severely Repetitive Loss Properties. FEMA defines a severe repetitive loss (SRL) Property as a residential property that is covered under an NFIP flood insurance policy and:

- a) That has at least four NFIP claim payments (including building and contents) over \$5,000 each, and the cumulative amount of such claims payments exceeds \$20,000; or
- b) For which at least two separate claims payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building.

For both (a) and (b) above, at least two of the referenced claims must have occurred within any ten-year period, and must be greater than 10 days apart.

5.D.2.2 100-Year and 500-Year Flood Hazards

The 100-Year flood is defined as the base flood standard and the 500-Year flood is a probable worst-case. Flood levels for these events are summarized in the Flood Insurances Study (FIS) for the Village of Mamaroneck, Westchester County, NY (All jurisdictions), by the Federal Emergency Management Agency (FEMA), September 28, 2007. Inundation floods from hurricanes, which may cause more severe wave surges, are evaluated in Section 5.D.2.3.

Flooding in the Village of Mamaroneck has been associated with high stream states and with high tidal stages during all seasons. The most severe riverine floods have been associated with the heavy rains from storms or landfalling hurricanes originating in the Caribbean Sea. Wind-driven storm surges particularly from hurricanes and Nor'easters cause severe flooding and backup of storm water (See Map 3 at end of Part I).

The Village of Mamaroneck was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

Flood Insurance Zone	Description
Zone AE	Corresponds to the 1-percent annual chance floodplains that are determined by detailed methods. Base flood elevations determined.
Zone VE	Corresponds to the 1-percent annual chance coastal floodplains that have additional hazards associated with storm waves. Coastal flood zone with velocity hazard (wave action); Base flood elevations determined.
Zone X	Corresponds to areas outside the 0.2-percent annual chance floodplain, areas within the 0.2-percent annual chance floodplain, and to areas of 1-percent annual chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percent annual chance flood by levees. No base flood elevations or depths are shown within this zone.

Source: Flood Insurance Rate Map 36119C0361F, Village of Mamaroneck, New York, Westchester County. FEMA. September 28, 2007.

According to the FIS, wave heights in Zone VE were computed along transects that were located along the coastal areas of the Village of Mamaroneck. The transects were located with consideration given to the physical and cultural characteristics of the land so that they would closely represent conditions in the locality. The transects were taken perpendicular to the shoreline and extended inland to a point where the wave action ceased. Stillwater starting elevations and wave crest elevations for the village of Mamaroneck on the FIRM are detailed as follows:

TRANSECT Zone VE	LOCATION	ELEVATION (FEET NAVD) STILLWATER	ELEVATION (FEET NAVD) WAVE CREST
13	Western corporate limits to approximately 1500 ft east of western corporate limits	11.6	18.0
14	Approximately 1500 ft east of western corporate limits to Seven Oaks Lane, extended	11.6	18.0
15	Seven Oaks Lane, extended, to Orienta Point	11.5	17.0
16	Orienta Point to mouth of Otter Creek	11.5	17.0
17	Mouth of Otter Creek to approximately 1400 feet east of mouth of Otter Creek	11.5	17.0
18	Approximately 1400 feet east of mouth of Otter Creek to eastern corporate limits	11.5	15.0

Source: FEMA Letter of Map Revision Determination Document, Effective April 6, 2010, corresponding to Flood Insurance Rate Map 36119C0361F, Village of Mamaroneck, New York, Westchester County. FEMA. September 28, 2007.

Because of the expanse of the area, there are several base flood elevations for the 100-year flood for FIRM Map Zone AE. Elevation reference marks were measured, resulting in several different base flood elevations along each flooding source. Base flood elevations are shown for several cross sections of the 100-year flood spanning the Village of Mamaroneck.

Base flood elevations are shown below for several cross sections of the 100- year flood spanning throughout the Village of Mamaroneck along the Beaver Swamp Brook and the Mamaroneck and Sheldrake Rivers:

Flooding Source Cross Section: Beaver Swamp Brook	Base Flood Water Surface Elevation
A	11.5
B	22.8
C	23.2
D	27.2
E	28.4
F	31.3
G	32.3
H	32.5
I	32.8

Flooding Source Cross Section: Mamaroneck River Lower Reach	Base Flood Water Surface Elevation
A	11.5
B	11.5
C	11.5
D	16.7
E	16.9
F	20.3
G	20.5
H	22.2
I	22.3
J	33.1
K	34.8
L	38.1
M	38.7
N	38.7
O	40.8

Source: (Flood Insurance Study, Village of Mamaroneck. September 28, 2007).

Base flood elevations are shown below for 4 cross sections of the Sheldrake River, spanning from the confluence with the Mamaroneck River to the New England Thruway.

Flooding Source Cross Section: Sheldrake River	Base Flood Water Surface Elevation
A	25.8
B	25.8
C	28.5
D	28.6

Source: (Flood Insurance Study, Village of Mamaroneck, September 28, 2007).

For purposes of this assessment, the referenced base flood elevations were averaged to determine the mean base flood elevation for each zone. Therefore, the mean base flood elevation in the 100-year flood plains is 21 feet.

The impacts of flooding from 100-Year and 500-Year events were assessed counting buildings on properties for the various categories of property use (Maps 1 and 5) (i.e. residential, commercial, industrial and community services). Counts made using overlays for each of the two flood zones from Map 2, and information supplied from the Village Manager's office are summarized on Table 5-9. Based on the average assessed value for each property type the total assessed value for each category was estimated and is given in Table 5-10. The total dollar value can be viewed as the amount of the total property and buildings at risk. This value does not represent the actual damages or losses of the property since in most cases only a portion of the building is damaged from a flood.

Table 5-9 shows that about 13.4% and 6.1% of the properties in the Village of Mamaroneck would be at risk from a 100-Year and a 500-Year flood event, respectively. The major impacts would be from flooding of single residential homes. For the 100-Year flood, the total value of properties at risk from damage in the Village is about \$579 million (Table 5-10). The 500-Year flood resulted in a risk of about \$266 million (Table 5-10). This compares to a total adjusted property value of \$4,753.6 million.

The largest potential loss values for these two classes of floods are single residential homes at nearly \$459 million and \$238 million respectively. Commercial capital risks are also substantial at nearly \$117 million and \$25 million for 100 and 500-Year events. Community services face a smaller risk with about \$3.2 million and 3.6 million for 100 and 500-year flood year events.

Table 5-9. Number of Buildings in the Village of Mamaroneck Subject to Flood Hazards

Category	Single & Multi Residential	Commercial/Industrial	Community Services*	Total Properties at Risk	% Properties at Risk
100-Year flood	508	154	8	670	13.4
500-Year flood**	263	33	9	305	6.1
Total Village Properties	3636	1285	63	4984	

* Includes Education, Government, other community services and Religious facilities.

** Total properties in the 100-Year and 500-Year floodplain.

Table 5-10. Value of Buildings and Properties in the Village of Mamaroneck Subject To Flood Hazards

Flood Zone	Property Classes	Number of Structures Impacted*	Average Property Value** (\$1,000)	Total Value at Risk (\$1,000)
100 Year	Residential	508	903.5	458,978
	Commercial/Industrial	54	760	117,040
	Community Services**	8	402	3,216
	Totals	670		579,234
500 Year***	Residential	263	903.5	237,621
	Commercial/Industrial	33	760	25,080
	Community Services**	9	402	3,618
	Totals	305		266,319

* Estimates based on manual counts from Westchester County Base Maps and Land Use Designation Map (See Maps 2, 3 & 5). Single-Residential and Multi-Residential structures combined.

** Based on assessed rates given in Table 5-7. Includes the market value of the property and structure.

** Includes education, government, healthcare, other community services and religious properties.

*** Number of structures is inclusive of 100-Year flood.

An estimate of building damages and losses due to flooding is presented in Table 5-11 and 5-12 using the methodology from FEMA's Mitigation Planning Guide 386.2. These capital and economic loss estimates assume an average depth of flooding for a given event, the percentage of the structure damaged, a percentage of building contents damaged and an estimate of downtime costs for businesses. The average depth of flooding was calculated by subtracting the estimated low floor elevation from the 100-Year flood and 500-Year flood elevations from the FIRM map and the Village of Mamaroneck FIS, 2007.

The total structural damage to buildings for a 100-Year flood event was about \$133.2 million and nearly \$88 million for a 500-Year event (Table 5-11). However, when contents losses and economic losses such as downtime (Table 5-12) are considered, the impacts increase to nearly \$255 million and nearly \$161 million, respectively.

Table 5-12 provides an estimate of downtime losses for commercial/industrial properties. Commercial downtime from flood damages was approximately \$1,012,115 in the 100-year flood zone and \$275,220 in the 500-year flood zone. These losses are likely low since FEMA national averages were used for sales estimates. Westchester County sales per sq. foot are likely higher than the national average.

Table 5-11 Summary of Floodplain Related Damages in the Village of Mamaroneck

Event	Flood Depth* (Feet)	Total Value of Structure (Million \$)	% of Structure Inundated**	Structure Damage (Million \$)	Contents Value*** (Million \$)	% Contents Damage**	Contents Damage (Million \$)	Downtime Costs**** (Million \$)	Total Damage (Million \$)
100-Year Flood Zone									
Residential	3	458.9	23	105.5	229.5	34.5	79.2		184.7
Commercial/Industrial	3	117	23	26.9	117	34.5	40.4	1	68.3
Community Services	3	3.2	23	.74	3.2	34.5	1.1		1.84
Total				133.2			120.7		254.84
500-Year Flood *****									
Residential	5	237.6	33	78.4	118.8	49.5	58.8		137.2
Commercial/Industrial	5	25	33	8.3	25	49.5	12.4	0.28	20.9
Community Services	5	3.6	33	1.2	3.6	49.5	1.8		3.0
Total				87.9			87.3		161.2

* Base Flood Elevations less the Low Floor Depths. Based on figures from Village of Mamaroneck FIS, 2007.

** FEMA 386.2 Page 4-13.

*** Contents Value estimated using FEMA 386.2 Page 3-11.

**** See Table 5-12. for estimates. Downtime values were not estimated for residential buildings or Community Services.

Table 5-12. Summary of Flood Related Downtime Damages in the Village of Mamaroneck.

Event	Flood Depth (Feet)	Number of Structures Inundated	Average Estimated Area* (Sq. Feet)	Total Structure Area (Sq. Feet)	Annual Sales** (\$/Sq. Ft.)	Total Daily Sales Loss (\$)	Function Downtime *** (Days)	Total Downtime Costs (\$)
100-Year Flood Commercial/Industrial	3	54	535,400	535,400	30.0	44,005	23	1,012,115
500-Year Flood Commercial/Industrial	5	33	111,623	111,623	30.0	9,174	30	275,220

* Derived from HAZUS model.

** Value estimated using FEMA 386.2 Page 3-12.

*** FEMA 386.2 Pages 4-14

5.D.3 Wind Storm Damage Assessment

The Village of Mamaroneck is highly vulnerable to wind damage from hurricanes, nor'easters, thunderstorms and other significant wind events. In severe storms, the village is subject to damaged roofs, siding, windows, utility poles, and trees as well as total building losses. The most significant storm events that cause the greatest damage to the region are remnants of hurricanes. Tornados, because of their low frequency are unlikely to strike the Village of Mamaroneck although their potential for destruction is high. The following section provides a detailed damage and economic assessment of hurricane wind damages and economic impacts in the Village of Mamaroneck.

5.D.3.1 HAZUS Hurricane Model

Hurricane impacts from wind were assessed using FEMA's HAZUS ®*MH MR2* model. HAZUS is a regional multi-hazard loss estimation computer model that was developed by FEMA and the National Institute of Building Sciences. The HAZUS Hurricane Model provides estimates of the economic losses from hurricane force winds. The damage and loss estimates can be used to plan and propose efforts to mitigate or reduce risks from wind damage, reduce disaster payments and to prepare for emergency response and recovery in the event of a damaging event.

Two runs of the model were used in this assessment: a user-defined historical model and a probabilistic analysis of impacts for different strength hurricanes. The historical model was given worse-case storm parameters as an example of a hurricane that could strike Mamaroneck directly. The model parameters used were those defined in Section 9.3 of the HAZUS Users Manual for Hurricanes. The HAZUS probabilistic model evaluates risks of future impacts from hurricanes for several hurricane wind speeds and return periods (i.e. probability of an occurrence in a year).

Since the HAZUS model uses data derived from several databases with varying assumptions, the results in Tables 5-16 through 5-20 and in the Attachments included in Part 2 may differ from the data provided by the Village of Mamaroneck in Tables 5-6 through 5-8. For example the number of residential houses and commercial buildings differ in part due to different sources of the data, use of regional model estimates for local village parameters, and dates the data were

collected. Considering these variables, the Village total building counts in Table 5-6 are reasonably close to the model estimates in Table 5-16. Since the Village provided counts are current and based on the Mamaroneck Tax Assessors Office, the HAZUS model estimates of damages were adjusted using the Village of Mamaroneck data. Although the Village replacement costs are substantially higher than the model's "Dollar Exposure" replacement costs, the Village estimates are more in line with the current real estate market values.

Table 5-16 Basic parameter estimates

Property Use Class	Village Building Counts	HAZUS Building Counts	Count Adjustment Factor	Village Replacement Value x1,000	HAZUS Replacement Value x1,000	Value Adjustment Factor *
Commercial/Industrial	1,285	83	13.5	660,044	236,386	2.79
Government	16	4	4.0	235,126	5,164	7.94
Education/Community Services	26	7	3.7	359,415	47,781	
Religious	21	2	10.5	80,912	6,915	
Residential	3,636	4,061	0.9	2,292,279	1,175,153	1.95
Total	4,984	4156		3,427,776	1,471,399	

* Values combined for Commercial/Industrial and Government/Education/Religion/Community Services

The HAZUS historical model represents a probable worse-case Category 3 hurricane that could strike the village and would be similar to those storms listed in Table 4-4 and Figure 4-6 except it would track through Mamaroneck (Figure 5-4). Although the storms may begin as Category 3 or 4 hurricanes, they historically deteriorate quickly to Category 1 when they hit land or track closer to the coast, thus avoiding major inland damage for the Westchester County region. Since a Category 4 storm would be a rare event and Category 5 storms are unlikely to reach as far north as New York, a Category 3 Hurricane with maximum 1 minute sustained winds ranging of 102 mph is considered as the most probable worst case scenario.

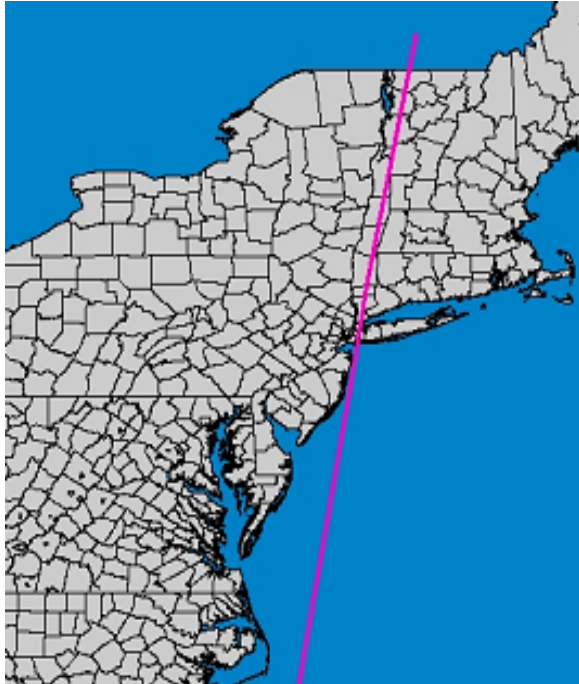


Figure 5-4. HAZUS Historical Model projected track for a hypothetical hurricane through Mamaroneck NY with 120 mph winds.

The model results in Table 5-16 show what could have happened if this model hurricane track struck Mamaroneck with full force sustained winds of 120 mph with peak 3-second gusts of 141 mph. The model's assumptions and detailed output from the HAZUS historical model is given as an Attachment in Part 2. A hurricane of this size could destroy over 549 homes and severely damage 758 more. About 6.5% or 235 of the homes would escape some damage. A similar type of considerable wind damage could be caused by a tornado rated as F2 but the damages would be over a narrow band of the village rather than covering the entire area.

The HAZUS probabilistic model was run to evaluate possible future impacts of hurricanes on Mamaroneck. Using the HAZUS program, probabilities of damage, expected building losses, expected contents losses, and expected loss-of-use are computed for different classes of building use for several probable hurricanes and peak wind gusts. Results of these analyses are given in Tables 5-17 and 5-18.

**Table 5-17. Potential Damage to Mamaroneck Buildings From a Category 3 Hurricane.
(120 MPH Sustained Winds)**

Occupancy Class	Village Count *	No Damage		Minor Damage		Moderate Damage		Severe Damage		Destruction	
		Count	(%)**	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Commercial/Industrial	1285	103	8.0	175	13.6	397	31.0	590	45.9	20	1.53
Education/Community Services	26	2	7.2	3	11.0	7	28.2	14	53.0	0	.66
Government	16	1	7.4	2	9.9	4	27.1	9	55.2	0	.38
Religious	21	2	7.8	4	18.5	7	34.9	8	37.9	0	.84
Residential	3,636	236	6.5	829	22.8	1262	34.7	760	20.9	549	15.1
Total	4,984	344		1013		1,677		1,381		569	

* Village-provided building counts were substituted for estimated model counts. See Text and Table 5-16.

** % Damaged buildings were estimated using the HAZUS Historical Model.

Table 5-18 shows the probabilistic model results for building damages associated with four hurricane “return periods” and peak wind gusts (maximum 3-second wind speed). A return period of 100 years for example, corresponds to a 1% chance per year in Mamaroneck of exceeding the computed total direct loss shown for the 100-Year event. These periods and winds are specific to the Village of Mamaroneck. Areas closer or more distant from the coastline will have different values. A 200-year return event would be in the mid range of a Category 2 storm. A 500-Year return event with peak wind gusts of 127 mph would be in the lower range of a Category 3 storm having maximum 1-minute sustained winds of 111 mph. This storm would have a probability of 0.2% striking the area in a year. A return period of 1000 years is a rare storm event and is not presented in Tables 5-18 and 5-19. Also the 10 and 20-year events with peak wind gusts of 39 and 58 mph are not summarized since the model results show either no or minor damages from these more frequent storms. The peak wind gust speeds are estimated by HAZUS for each of the return periods. These wind speeds are the estimated maximum 3-second gusts in open terrain at 10m above ground at the center of each census tract used in the model. The wind gust speeds and return periods are within the ranges of a Category 1, 2 and 3 storms. Detailed output from the HAZUS probabilistic model for all return periods is given in the Attachments in Part 2.

The data used in the model were from the Village of Mamaroneck US Census tracts that are part of the model’s database. The default conditions were applied to the model, which included information describing the building use inventory, essential facilities, tree coverage, and surface

roughness. For the purposes of this hazard mitigation plan, this simplified approach was judged to be sufficient.

In Tables 5-17 and 5-18, the count of damaged buildings was estimated by multiplying the total count in a property class by the % impact (/100). To correct for differences between the default census tract data in the model for building use categories and the current assessment data provided by the Village Administration, the model output results were adjusted using the ratio of the property value provided by the Village to model's building use class value. For example, the total residential building replacement value derived from the HAZUS model was \$1,175,153,000 and the Village's property estimate based on assessed value for residential and multi-residential (Table 5-8 and 5-16) was \$2,292,279,000. This resulted in an adjustment factor of 1.95, which was applied to the HAZUS model result for residential loss to obtain the result of \$11,524,890 in Table 5-19. The adjustment factor for combined commercial/industrial use was 2.79 and for other community services (education, government, and religious services) the factor was 7.94. Thus capital damage losses in Table 5-19 can be compared to current property values in Mamaroneck.

Using formulas programmed in HAZUS, damage probabilities, expected building losses, expected contents losses, and expected loss-of-use were estimated for different class uses of buildings. The hurricane loss estimates provided in this report are based on regional census and economic parameters. The area of Mamaroneck Village is 3.14 square miles. There are over six thousand households in the village, which has a total population of 18,464 people in 4 census tracts (2000 Census Bureau data). There are an estimated 5,000 buildings in the Village with a total building and property value, excluding contents, of 3.4 billion dollars (Table 5-7). Approximately 75% of the buildings (and 64% of the building value) are associated with residential housing.

Table 5- 18. Probabilistic Building Damage Risks from Hurricanes that Could Strike the Village of Mamaroneck.

Return Period (Yrs.)*	Peak Wind Gusts (mph)*	Property Class**	Total Building Count***	Degree of Wind Damage									
				None		Minor		Moderate		Severe		Destruction	
				(%) Impact	Damage Count	(%) Impact	Damage Count	(%) Impact	Damage Count	(%) Impact	Damage Count	(%) Impact	Damage Count
50	82	Commercial/Industrial	1285	97.1	1,248	2.6	34	0.3	3	0.0	0	0.0	0
		Education/Community	26	96.7	25	3.1	1	0.2	0	0.0	0	0.0	0
		Government	16	96.7	15	3.1	1	0.2	0	0.0	0	0.0	0
		Religious	21	97.6	21	2.3	0	0.1	0	0.0	0	0.0	0
		Residential	3636	96.3	3,500	3.3	120	0.4	16	0.0	1	0.0	0
		Total	4,984		4,809		155		19		1		0
100	98	Commercial/Industrial	1285	82.0	1,053	13.4	172	4.2	53	0.5	6	0.0	0
		Education/Community	26	79.5	21	14.9	4	5.1	1	0.5	0	0.0	0
		Government	16	79.5	13	14.7	2	5.3	1	0.5	0	0.0	0
		Religious	21	84.2	18	13.4	3	2.4	0	0.1	0	0.0	0
		Residential	3636	79.7	2,899	16.4	596	3.7	133	0.2	6	0.1	3
		Total	4,984		4,003		777		189		12		3
200	111	Commercial/Industrial	1285	50.8	652	25.2	324	18.4	236	5.6	72	0.1	1
		Education/Community	26	49.3	13	24.8	6	19.4	5	6.5	2	0.0	0
		Government	16	49.3	8	23.8	4	20.0	3	6.9	1	0.0	0
		Religious	21	52.1	11	28.9	6	15.7	3	3.3	1	0.0	0
		Residential	3636	49.2	1,787	33.7	1,224	14.4	523	1.8	64	1.1	39
		Total	4,984		2,471		1,564		771		139		39
500	127	Commercial/Industrial	1285	19.0	244	22.4	288	31.5	405	26.6	342	0.4	6
		Education/Community	26	16.9	4	19.7	5	31.3	8	32.1	8	0.1	0
		Government	16	17.0	3	18.1	3	31.1	5	33.7	5	0.1	0
		Religious	21	18.6	4	28.8	6	31.5	7	21.0	4	0.1	0
		Residential	3636	18.7	681	34.7	1,260	30.3	1,101	10.0	364	6.3	231
		Total	4,984		936		1,562		1,526		724		236

Table 5-18 Notes:

- * Return period, peak wind and % impacts are from HAZUS probabilistic model for hurricane damage for the Village of Mamaroneck
- ** Residential includes single and multifamily.
- *** Building counts provided by Village of Mamaroneck Manager's Office were substituted for model estimates. (See text.)

5.D.3.2 Hurricane Damage Analysis

Table 5-18 summarizes the expected building damage by hurricane event and general property class in the Village. Based on HAZUS percentage estimates, about 1,564 buildings will suffer from minor damage to destruction from a 200-year event. This is about 31% of the total number of buildings in the village. There are an estimated 236 buildings that will be completely destroyed in a 500-year event. In contrast, a 50-year event showed 4,809 or 96% of the buildings would have no significant wind damage compared to only 936 or 18.8% unharmed from a 500-year event.

The hardest hit would be residential buildings. The greatest amount of damage is to wooden structures and the HAZUS model estimated that 79% of the buildings in the Village are constructed of wood. The strong winds of a 500-year return storm would impact about 80% of these wooden structures and 5.5% of the wooden structures would be destroyed. The model estimated that 1459 households would be displaced from their homes as a result of a 500-year hurricane and about 335 people in the village population will likely need temporary public shelters. (See Attachments in Part 2.)

Building losses are divided into two categories: direct property damage losses and business interruption losses. The direct property damage or capital losses include the estimated costs to repair or replace the damage to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

Table 5-19 HAZUS Hurricane Probabilistic Model – Property Damage Capital Losses (X \$1,000)*

Return Year	Wind Gusts mph	Losses	Residential **	Commercial /Industrial	Community Services	Total Interruption Losses
50	82	Building	11,525	492	358	12,375
		Contents	2,417	74	12	2,498
		Inventory	0	3	1	4
			13,492	569	371	5,978
100	98	Building	42,470	3,749	3,099	49,588
		Contents	9,404	1,241	1,108	11,753
		Inventory	0	53	14	67
		Subtotal	52,144	5,043	4,221	61,408
200	111	Building	145,477	21,192	17,164	183,833
		Contents	45,351	11,044	8,819	65,214
		Inventory	0	468	78	546
		Subtotal	190,828	32,704	26,061	249,593
500	127	Building	478,632	87,235	73,807	639,674
		Contents	193,306	56,137	45,709	295,152
		Inventory	0	2,210	267	2,477
		Subtotal	671,938	145,582	119,783	937,303

*HAZUS Model results adjusted for Mamaroneck Village replacement values (See text and Table 5-16).

** Total Residential, Commercial includes Industrial, and Community Services include Educational, Governmental, and Religious Facilities.

Table 5-20 HAZUS Hurricane Probabilistic Model - Business Interruption Losses (X \$1,000)*

Return Year	Wind Gusts mph	Losses	Residential	Commercial /Industrial	Community Services	Total Interruption Losses
50	82	Income	0	307	0	307
		Relocation	203	201	4	408
		Rental	221	116	0	337
		Wage	0	109	0	109
		Subtotal	424	733	4	1,161
100	98	Income	0	2,509	184	2,693
		Relocation	1,050	3,174	336	4,560
		Rental	916	1,598	20	2,579
		Wage	0	2,492	737	3,229
		Subtotal	2011	9,773	1,277	13,061
200	111	Income	1	5,709	255	5,965
		Relocation	6,022	17,943	1,886	25,851
		Rental	3,468	9,260	116	12,844
		Wage	2	5,954	995	6,951
		Subtotal	9493	38,866	3,252	51,611
500	127	Income	14	71,489	328	71,831
		Relocation	19,054	62,413	7,122	88,589
		Rental	9,931	36,854	496	47,281
		Wage	33	74,259	1,108	75,400
		Subtotal	29,032	245,015	9,054	283,101

* Corrected for Building counts provided by the Village. (See text)

** Total Residential, Commercial includes industrial and Community services include education, government, and religious facilities.

Table 5-21 HAZUS Hurricane Probabilistic Model – Summary of Economic Losses (X \$1,000)

Return Year	Wind Gusts mph	Total Interruption Losses	Total Capital Losses	Total Village Losses
50	82	1,161	14,877	16,038
100	98	13,061	61,408	74,469
200	111	51,611	249,593	301,204
500	127	283,101	937,303	1,220,404

Tables 5-19, 5-20 and 5-21 summarize the losses associated with the building damage for the hurricane events with return periods of 50 years through 500 years. The losses were adjusted to building counts and replacement values provided by the Village Administration. (See Section 5.D.3.1 above.) The total economic loss estimated for a 500-year return hurricane is about \$1,220.4 million dollars, which represents nearly 36% of the \$3.4 billion in total property value for the total Village. The total capital property damage costs were about \$937 million dollars with 23% or \$283 million of the estimated losses due to the interruption of business in the Village. The largest capital loss, \$672 million, was to residential buildings, which accounted for 71% of the total capital losses. The HAZUS model showed \$16,038 million in damages for a 50-year event with peak gusts of 82 mph. Thus a Category 1 storm could produce significant dollar losses with only minor and moderate damage to buildings.

HAZUS estimates the amount of debris generated by a hurricane. Three general types of debris are evaluated by the model: brick/wood, reinforced concrete/steel, and trees. A total of 16,175 tons of debris will be generated from wind damage during a 200-year event. Brick and wood comprises 81% of the total debris, reinforced concrete and steel comprise of 1% and the remaining debris consists of trees. The building debris alone (brick, wood, concrete and steel) generated by the hurricane will require 530 truckloads (@25 tons/truck) to remove the debris.

There are several critical facilities of concern (see Section 5.B.2). There are several schools, 4 fire stations, a Village Hall containing police facilities, Village administration offices which could be used as the Village Emergency Operations Center (EOC), etc. There are no hospitals in the Village. A 500-year event would likely have a 50% probability of causing at least moderate damage to these facilities. Loss-of-use time for these facilities is expected to be less than one day.

Although HAZUS can provide comprehensive loss estimates, uncertainties are inherent in any model methodology. The next hurricane that may strike Mamaroneck could be quite different from any model hurricane included in this hurricane analysis. The results of this model analysis for Mamaroneck should not be considered a *prediction or forecast* of future hurricanes but viewed as an indication of what possible hurricanes in the future may do. This probabilistic

hurricane analyses can be used to develop estimates of long-term “annualized losses” as well as the expected distribution of losses based on “return period losses”. These damage estimates reflect the expected hurricane tracks and intensities that may likely occur in Mamaroneck. There are significant uncertainties in the results due to the limited history of hurricane observations, limited knowledge of actual local building characteristics, use of simplified modeling assumptions, and other local socio-economic factors. A probabilistic analysis has statistical uncertainties that need to be considered when interpreting the model results.

5.D.4 Valuation Assessment of Earthquakes

An earthquake is a rare event in Mamaroneck but can cause impacts and losses to the Village’s structures and facilities. The overall hazard ranking determined by the Hazard Mitigation Planning Committee for this hazard is moderately low. The following vulnerability assessment emphasizes that earthquakes are a hazard of concern. Existing and future mitigation efforts should continue to be developed and employed that will enable the study area to be prepared for these events when they occur. Possible mitigation actions would include public awareness/education and reviewing State and local building codes with respect to earthquakes.

In 2000, FEMA reported a study using the model “HAZUS99 Estimated Annualized Earthquake Losses for the United States”. The study showed that New York State ranked 4th in annualized earthquake losses, and 20th in annualized earthquake loss ratio (annualized loss as a fraction of replacement value of building stock). Annualized Earthquake Loss was determined to be \$83,987,000, while Annualized Earthquake Loss Ratio was \$90 per million.

In addition, FEMA ran a vulnerability assessment study using HAZUS-MH software which indicated counties most vulnerable to earthquake hazards. The study factored in regional variations in earthquake hazards, as well as the extent of the built-up areas between counties. Estimated losses for several return periods were used, based on values from the USGS seismic probabilistic curves. The estimated cost of earthquakes to each county is based on annualizing the aggregates of the loss and exceedance probabilities. Total Exposure represents the dollar value of all general building stock and calculated potential total losses (Capital Stock and Income Losses) for four return periods.

Westchester County's results are as follows:

Total Exposure	2500-year	1000-year	500-year	250-year
69,147,392	4,579,368,000	1,218,843,000	343,001,000	69,121,000

The four approaches used in the study were Annualized Total Loss-Rank, Annualized Total Loss per Capita-Rank, Exposure Ratio, and Exposure Ratio-Rank. Table 5-22 below provides the ranking results for Westchester County. The New York City Area Consortium for Earthquake Loss Mitigation estimates the cost of a large earthquake in the New York Metropolitan Area to be between \$39 and \$197 billion dollars.

TABLE 5-22. HAZUS-MH Earthquake Annualized Loss Estimation and Ranking Results

Total Exposure (x \$1,000) (\$)	69,147,392
Annualized Capital Stock Losses (\$)	4,393
Annualized Income Losses (\$)	579
Annualized Total Losses (\$)	4,972
Annualized Loss Ratio (\$/\$1 million of exposure)	72
Annualized Loss per Capita (\$)	5.38
Exposure Rank	6
Exposure Ratio-Rank	9
Annualized Loss Rank	5
Annualized Loss per Capita-Rank	6

Source: New York State Standard Multi-Hazard Mitigation Plan, Section 3. SEMO.

www.semo.state.ny.us/programs/planning/hazmitplansection3.cfm

Additional HAZUS studies were run which factored in the different classifications in soils. The following maps depict the annualized earthquake losses by county, factoring in soil classifications from the NEHRP (National Earthquake Hazard Reduction Program).

Figure 5-5 shows the annualized earthquake loss for New York State to be \$24,234,822, and the annualized earthquake loss for Westchester County to be \$1,498,958. Figure 5-6 shows the Per

Capita Annual Earthquake Loss for Westchester County to be estimated at \$1.01 - \$2.00. Figure 5-7 shows the Annualized earthquake loss per square mile to be estimated at \$500.01 - \$10,000

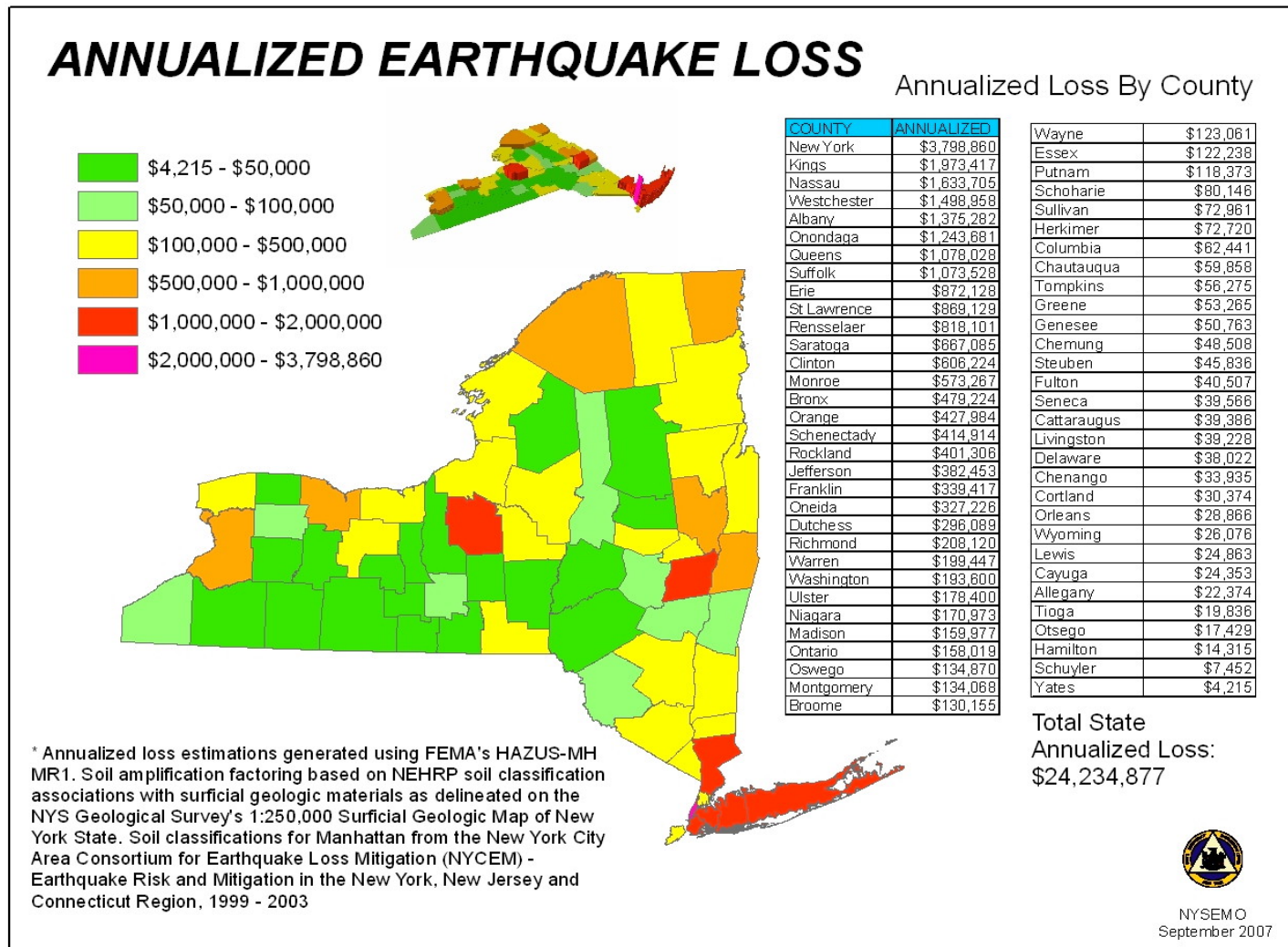


Figure 5-5. Annualized Earthquake Loss

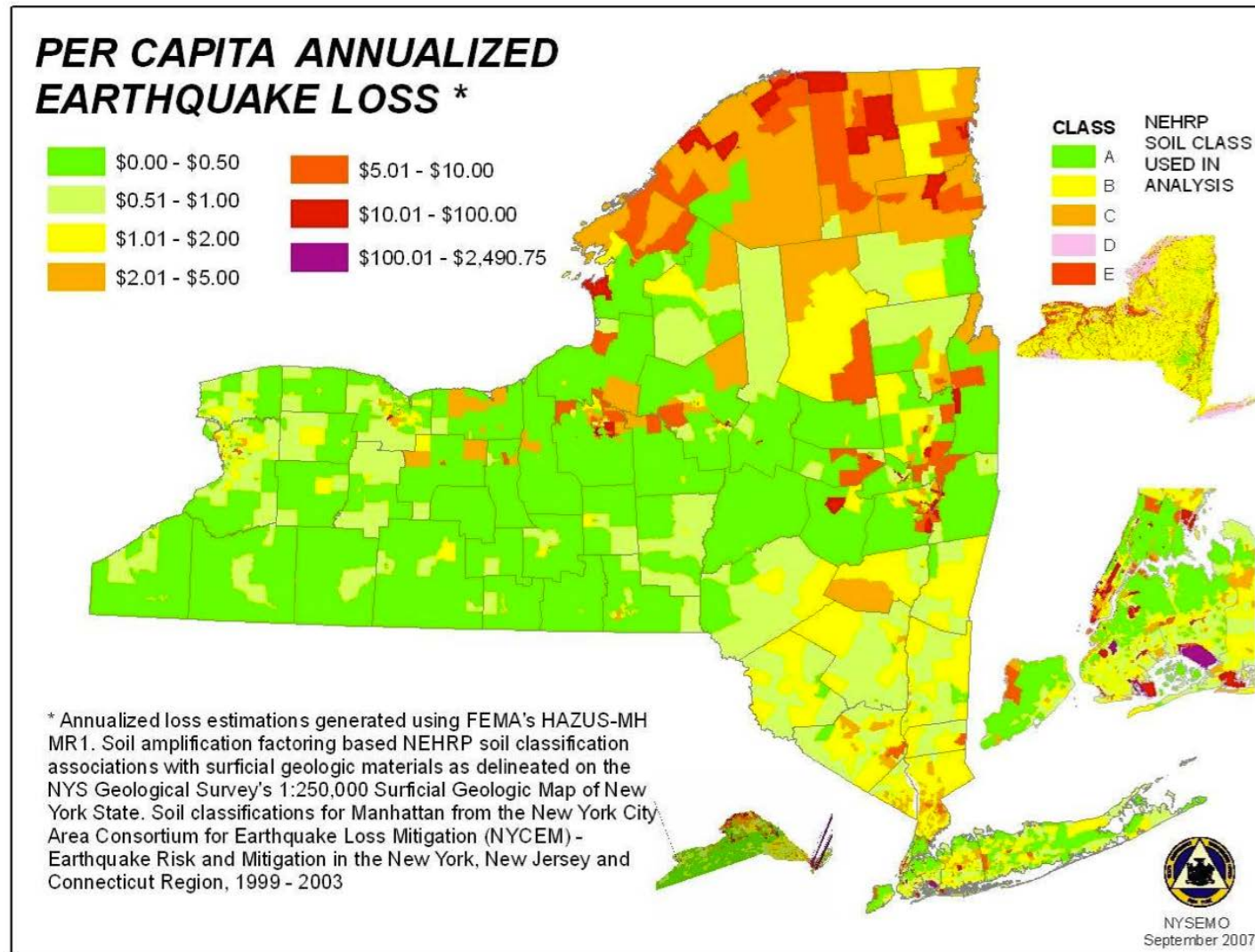


Figure 5-6. Per Capita Annualized Earthquake Loss.

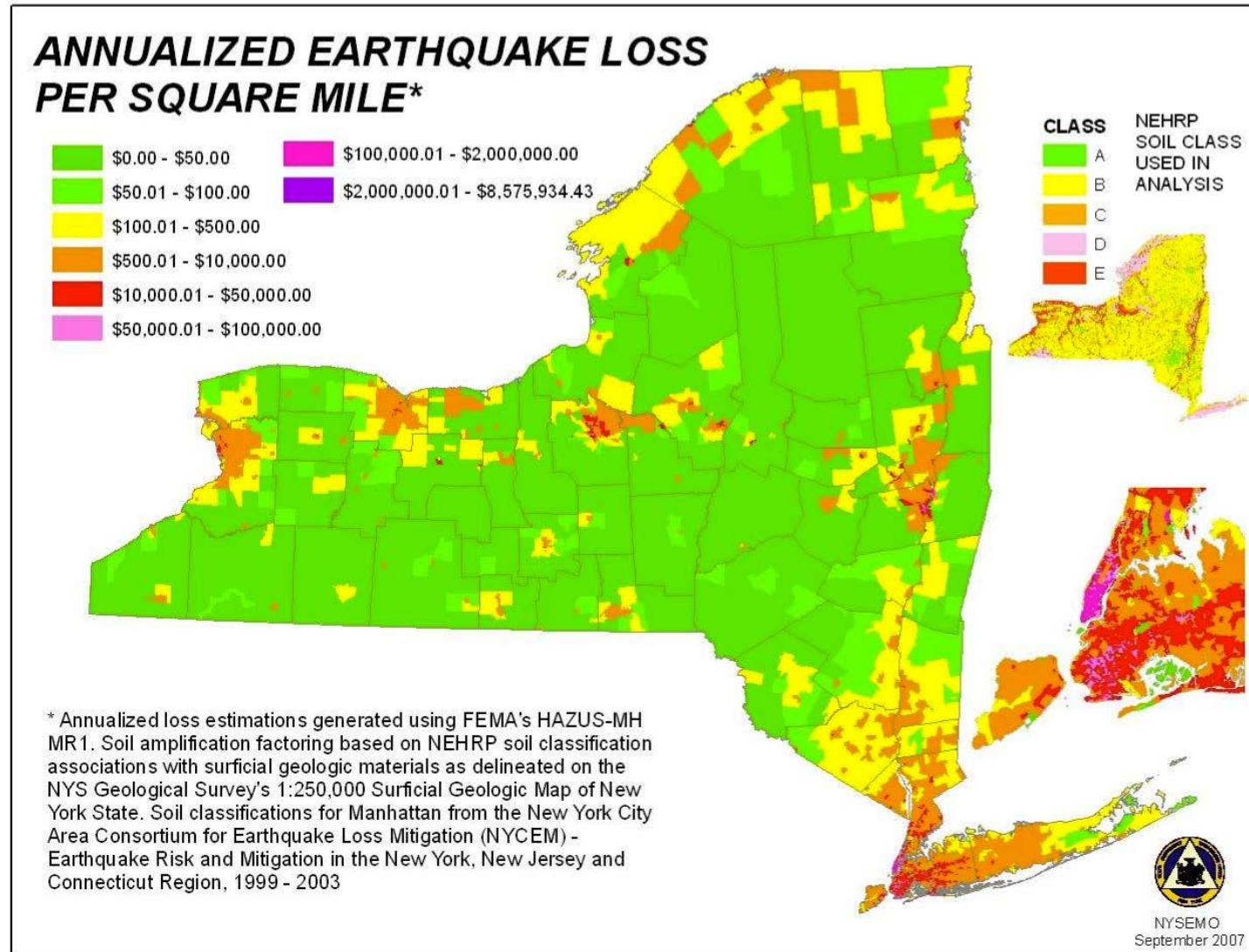


Figure 5-7. Annualized Earthquake Loss

5.E Valuation Assessment of Other Hazards

The damage to structures for the other hazards was not quantitatively evaluated. Damage was judged to be small for these hazards compared to flooding and wind damage. Also, these hazards were judged to be rare, improbable or not significant to the Village of Mamaroneck. Further data needs to be collected on these hazards to review and evaluate probable extent of impacts if they are judged to be significant. This additional information would be used to develop future mitigation strategies if needed.

The following hazards were discussed above in Section 5.C and are not expected to have a major impact on properties, people, critical facilities or other key facilities in The Village of Mamaroneck. These include:

- Air Contamination
- Civil Unrest
- Extreme Temperatures
- Explosion
- Fire
- Epidemics
- Hazardous Material Release
- Oil Spills

5.F Natural and Beneficial Functions

Wind, water, ice and snow are part of natural storm events affecting the Village. They are significant events and affect the near-shore shifting of channels, shoreline erosion and redistribution and shifting of beaches. There are a number of areas for natural habitats, wetlands and marsh plants and grasses along the Long Island Sound, Sheldrake River, the Mamaroneck River, Otter Creek, Guion Creek, and Beaver Swamp. These are areas that are affected by natural storm events, and other hazards such as coastal and riverine erosion and flooding, and

would impact the village. The village's terrain is low-lying and slopes downward toward the east and the Long Island Sound.

5.G Land Use Development, Redevelopment and Population Trends

The current population in the Village of Mamaroneck is around 18,930 according to the 2010 US Census. It is seen as a mature suburban community with an established land use pattern. The population has increased by .9% over the last 10 years, yet changes are planned for the Village. Proposed changes to the Zoning Codes are presently under consideration and review by the Village of Mamaroneck. One focus is for the Village to provide additional affordable housing to the community. New residential developments and accessory buildings are currently in the planning stages. The Village of Mamaroneck is also in the process of improving the downtown area, easing congestion in the industrial area

5.H Summary of the Impacts on the Community

Of all of the probable hazards that are likely to cause damage to the Village of Mamaroneck, the ones that cause flooding and high winds are most significant. These hazards include hurricanes, nor'easters, coastal storms, severe thunderstorms and winter storms. These are the events that have the potential to impact the entire community to the highest possible degree.

Sections of the Village of Mamaroneck have limited access to natural escape routes, especially in the coastal neighborhoods of Orienta and Shore Acres. Other neighborhoods, such as Columbus Park, Washingtonville, Harbor Heights, the Industrial area, and the Northern section of the central business district, suffer from riverine flooding, which can be just as devastating. This causes a high risk with regard to citizens' safety.

The next major flooding hazard in terms of probable consequences and costliness is the flooding from an inadequate storm drainage infrastructure. The road, street and basement flooding resulting from these problems are costly.

Flooding damages can be substantial but they do not have the same damaging impact as high wind events due to hurricanes. All of the other hazards listed in Section 5.E and discussed in

Section 5.B have been addressed in this plan and are of concern. They have the potential for serious impact. However, none of these hazards, under the most probable circumstances would cause the same level of damage or would result in the loss of life to the same degree as floods and wind damage.

All of these other hazards are likely to impact the community to some degree and should be addressed. However, the issues deriving from wind and water hazards should be addressed as the first priority. With primarily the issues connected with wind and water hazards, there are many safety and economic benefits that would result from planning mitigation activities that focus on these issues. These are discussed in Section 7 of this plan.

Section 6 - Setting Goals and Objectives

6.A Setting Mitigation Goals

Following the identification, profiling and vulnerability assessment of hazards that are likely to cause significant harm to the Village of Mamaroneck (See Sections 4 and 5), the next step is to identify planning goals to guide in proposing mitigative actions. The Hazard Mitigation Planning Committee, with input from the consultant and review by the community, proposed the following goals and objectives for developing mitigative measures that are discussed in Section 7. The goals listed below are a consensus of the committee and the Village administration and were available for review and comment by the public. Six hazard mitigation goals were proposed for implementing the Village mitigation measures. These include:

1. Reduce impacts of flooding
2. Protect residents from catastrophic disasters
3. Involve the community in identifying and implementing mitigation measures
4. Become a member of the Community Rating System (CRS) Program
5. Heighten preparedness and response efforts for Hazards
6. Prepare for climate change impacts on the Mamaroneck community

These goals are derived from primary hazards of concern identified and analyzed previously in Sections 4 and 5. The primary hazard is flooding and damage from severe storms such as thunder storms, heavy rain storms, Nor'easters, tropical storms and hurricanes. The goals however are sufficiently broad to encompass other hazards evaluated previously. These hazards have the potential for serious impact, but would not likely cause the same level of frequent or severe damage or harm to people as major storms and flooding. Goals that were not directly linked to hazard mitigation issues such as purely economic and development goals or capital construction project goals were excluded.

These goals represent the major issues and aims of the community and consider significant hazards and their impacts. Three proposed goals (2, 3, and 5) are broad and inclusive of technological and human caused hazards.

The six goals consider the existing resources and capabilities of Village government and strive to reduce vulnerabilities or mitigate hazards and their risks. All the goals will be evaluated for future updates in the Plan. (See Section 9.)

6.A.1 Reduction of Vulnerabilities

Each goal is intended to reduce hazard vulnerabilities discussed in Section 5 Assess the Impacts. The hazards of concern that were excluded were discussed in Section 4.E. The primary hazards of concern, described in Section 4, included seven natural hazards that were selected for further evaluation. These include:

- Floods
- Tropical Storms
- Thunderstorms
- Coastal storms
- Hurricanes
- Wind storms, and
- Winter storms

Vulnerabilities to these hazards include people, village structures and property. Vulnerabilities to people include Village residents, visitors, commuters, travelers and workers who are potentially exposed to these hazards in the Village. Vulnerabilities of structures include critical facilities, private homes, businesses and infrastructures. Vulnerabilities of property include trees, vehicles and land. (See Section 5 for details.)

The first goal, (Reduce impacts from flooding) is intended to protect lives and prevent injuries of vulnerable people living or working in flood prone areas identified in Sections 4 and 5. This goal focuses on impacts to vulnerable property and structures and human safety.

The second goal (Protect residents from catastrophic disasters) is intended to cover any hazard that has the potential to cause significant damage to property, structures, or injury and death. Protecting the safety of the public is of prime concern. This goal includes protection from natural as well as man caused hazards. This goal is also intended to protect vulnerable

businesses, homes and critical facilities from loss of value from all hazards. Vulnerable government services include emergency operations command, police, fire and emergency response units, Village administration and Village communications center.

The third goal, (Involve the community in identifying and implementing mitigative measures) emphasizes the importance of community involvement in protecting lives, safety and property. Effective communication and action is critical in implementing mitigation measures.

The fourth goal (Become a member of the Community Rating System (CRS) program) involves documenting and implementing Village efforts to reduce flooding hazards that will qualify the Village to lower flood insurance rates.

The fifth goal, (Heighten preparedness and response efforts for Hazards) is intended to improve the Village ability to respond to any natural or human caused hazard.

The sixth goal, (Prepare for climate change impacts on the Mamaroneck community) includes preparing for future impacts from global warming. Some of potential changes may already be beginning as increases in flooding and storm events and damage to shoreline facilities such as homes, parks, open space, marinas, and water quality.

6.A.2 Strategy for Objectives

The community formulated specific objectives for each primary goal. These objectives provide a strategy for identifying and proposing mitigation measures in Section 7 that meet these established goals. The objectives and proposed mitigation activities comply with several relevant criteria that include Social, Technical, Aministrative, Political, Legal, Economic and Environmental standards (referred to as STAPLEE criteria).

The objectives proposed are intended to fulfill at a minimum the following STAPLEE criteria:

- Social - Improve the quality of life and reduce neighborhood impacts.
 - Include public support and involvement
 - Consider effects on selected segments of the population
 - Compatible with present and future community values

- Consider cultural impacts on the community
- Technical - Develop technically feasible mitigation efforts
 - Effective in reduction of long-term losses, impacts and risks
 - Effective in minimizing secondary losses
 - Effective in solving the problem and not only the symptoms
- Administrative - Provide resources and staffing to implement proposed actions
 - Jurisdiction and capability necessary to implement an action
 - Ability to accomplish activities in a timely manner
 - Ability to maintain and manage the mitigation measure
- Political - Acceptable to and supported by community politicians
 - Have full support of the Village Board and Administration
 - Involve political leaders in the planning process
 - Support and involvement of stakeholders
 - Public support and involvement
- Legal - Legal authority to undertake an action
 - Meet all applicable regulatory requirements
 - Define the roles of Village, Town, County, State and Federal governments
 - Provide a legal basis for mitigation actions
 - Assure laws, regulations, ordinances, and resolutions are in place
 - Identify liabilities for an action or lack of an action
 - Consider needs for legal counsel
- Economic - Develop affordable and cost effective mitigation efforts
 - Obtain budget and funding for an action
 - Economic costs and benefits of a mitigation action
 - Burden to the tax base or local economy
- Environmental - Improve environmental quality.
 - Identify and evaluate environmental impacts
 - Compliance with all environmental laws and regulations
 - Benefit the environment from a mitigation action

The objectives presented below are not mutually exclusive and may apply to one or more goals. For example, objectives under the goal for protecting human life and safety from disasters can also help avoid the loss of property from flood hazards. For simplicity, objectives are listed once

under a primary goal. Each of the objectives discussed below form the basis for the mitigative measures presented and discussed in detail in Section 7.

If the nature or magnitude of risks change, goals and objectives will be evaluated to assure that they address current and future conditions. An evaluation process will be implemented to assess whether the current resources are appropriate for implementing the Plan. An assessment will be made of the outcomes of mitigation actions and the roles of participating agencies and other partners identified in this Plan.

6.B Mitigation Objectives by Goal

6.B.1 Reduce Impacts of Flooding

The goal to reduce impacts from flood hazards is a focus of major concern for the community since flooding is so frequent. The Village of Mamaroneck is known to flood in several areas frequently. This goal is aimed to mitigate impacts related to water damage through upgrading drainage and sewage systems, and improvement of roads. The existing sewer and storm drain system is more than 100 years old. Several objectives intended to avoid and reduce impacts from floods include:

- Update applicable codes and development requirements.
- Implement flood control projects. (such as dredging, building retention ponds, freeing up constrictions, etc.)
- Improve efficiency of communications with those in flood areas.
- Improve the storm water collection and drainage system.
- Improve flood-prone streets.
- Correct storm and sanitary sewer backup problems from floods.

Mitigating impacts from flood hazards is needed in areas of high risk such as in the 100-year/500-year flood zones. Mamaroneck is located on Long Island Sound and is prone to coastal storms and tidal effects. Flooding is the most significant hazard followed by severe storms in the damage they do in Mamaroneck.

In addition, significant structural defects in the storm and sanitary sewer systems could impact the entire system. Thus, correcting these problems in the storm and sanitary sewer systems would help meet this goal.

Compliance with the storm water regulations could reduce the street flooding in the Village. The major objective of this regulation is to control and largely reduce the flow of storm water into sensitive areas.

6.B.2 Protect Residents From Catastrophic Disasters

Avoiding loss of life and injury from disasters is a major goal for the Village. Protecting residents' property from catastrophic storm disasters is included. This goal is also aimed at mitigating losses through various property protection activities before, during and after a hazardous event occurs. Technological and man-caused hazards discussed in Sections 4 and 5 also apply and may be evaluated in future updates to this plan.

Objectives to protect residents against catastrophic disasters include:

- Enhance residents' awareness of emergency procedures.
- Improve receiving communications from the Village in an emergency.
- Invest in proper emergency and evacuation equipment for the Community.
- Protect Critical Facilities, buildings and infrastructures from damage and loss.
- Heighten public awareness through multi-level public relations campaign.
- Develop specialized outreach programs for people with disabilities.
- Protect vulnerable harbor and shoreline from damage and loss.

Enhancing residents' awareness requires effective communication between the Village officials and the community. Such an action would include receiving communication during a hazard event through a reverse 911 call. The objective for heightened public awareness requires involvement at several levels. It involves using mass media, email, newspapers, churches, community groups and other organizations.

Storm related events such as thunder storms, tropical storms, hurricanes, Nor'easters and winter storms are most likely to happen and cause disasters. (See Section 5.) Strong winds and floods from these storms cause the greatest risks of deaths and injuries and a reduction in quality of life. Although Category 3 hurricanes are rare in the county, less intense storms have occurred recently such as Tropical Storm Irene that was downgraded from a hurricane by the time it struck Mamaroneck.

Storms cause the greatest damage, property loss and economic impact and are likely to have the highest degree of impact. They are costly in the damage they do and in response and cleanup efforts needed. (See Section 5.) They also cause extensive secondary damage such as loss of electrical service and communication systems.

One of the major objectives is to ensure that all efforts are directed at avoiding loss of life or injuries during a major storm or other hazardous event by having a well-prepared emergency response and escape plan. Critical facilities need to be protected from hazards to assure that basic Village and emergency services are not disrupted and that people in need of emergency services get them during a major hazardous event. Preparedness includes having appropriate staff, completed appropriate training and having the necessary equipment and supplies to meet response needs.

6.B.3 Involve the Community in Identifying and Implementing Mitigation Measures

Several mitigation actions require detailed planning, impact and vulnerability analysis or specific engineering studies before they can be implemented. The community needs to identify the mitigation activities that require such planning needs and implement such studies. Several objectives related to this goal are:

- Complete engineering study of the Mamaroneck and Sheldrake Rivers.
- Perform an engineering analysis and study of other rivers and water courses impacting the community.
- Evaluate vulnerability of critical facilities in the Village.
- Review Village infrastructures related to storm water conveyances.
- Identify and eliminate inflow and infiltration problems.
- Coordinate with neighboring communities.

The U. S. Army Corps of Engineers (USACE) is currently preparing an engineering study of the Mamaroneck and Sheldrake Rivers. This study needs to be completed and its recommendations implemented. Other streams such as Beaver Swamp and Guion Creek that are not covered by the USACE which are impacting Mamaroneck also need to be studied and mitigation actions implemented.

The Mamaroneck Harbor and shoreline are highly vulnerable to storms, surges and erosion. Vulnerability studies should be implemented and recommendations made. Several critical facilities in the Village are at risk, such as the Department of Public Works and the Fire Department. Vulnerability studies should be implemented and recommendations made.

Village infrastructures, including storm water conveyances need to be reviewed for expansion and enhancement for control of storm water.

6.B.4 Become a Member of the Community Rating System (CRS) Program

Meeting the criteria of FEMA's Community Rating System Program and becoming certified in it will help meet this goal. Certification in the CRS program can result in reduction of flood insurance premiums from 5% to 50%. The program requires a designated program coordinator, a program plan, public notification, program approval by FEMA and the Insurance Services Organization (ISO).

Several specific objectives reviewed that relate to this goal include:

- Identify personnel to develop CRS program
- Reduce flood insurance premiums.
- Accurately identify the number of Severely Repetitive Loss (SRL) properties
- Reduce the number of Severely Repetitive Loss (SRL) properties

Several criteria have been completed and need to be formally documented and submitted. The Village of Mamaroneck is part of the National Flood Insurance Program (Community Number 360916). The Village's Flood Insurance Rate Map (FIRM) was last revised on September 28, 2007. Its Flood Insurance Study (FIS) is dated September 28, 2007. There may be areas in the village with a history of flooding that are not adequately noted in the current FIRM. Residents are invited to communicate these areas to members of the Village Administration, who will make note of the information, mark-up the maps and communicate the information to FEMA and the NYS DEC Floodplain Administrator for inclusion in future FIRM map updates.

6.B.5 Heighten Preparedness and Response Efforts for Hazards

Being prepared for hazards that may strike the community is essential for minimizing impacts. Several objectives intended to heighten preparedness and response include:

- Improve preplanning for mitigation of hazards.
- Improve communications between the Village staff and the community.
- Improve preparedness and response.
- Invest in appropriate emergency response and evacuation equipment.
- Identify and move materials and equipment to safe locations.
- Improve inter-municipal planning and coordination.

Having a fully compliant and updated National Incident Management System (NIMS) and implementation plans in place is a critical first step. Without a clear definition of roles, available services and resources in the Village, implementation of effective emergency response is limited. Having effective warning systems is a key to communication with the community.

6. B.6 Prepare for Climate Change Impacts on the Mamaroneck Community

Climate change such as global warming is generally accepted as a trend for the future. Expected changes in weather patterns may include more frequent and intense coastal storms, gradual rise in sea levels and more extreme temperatures. Although there is a high degree of uncertainty in forecasting these events, there are several planning efforts that can prepare the community for the future and minimize impacts.

Objectives to determine how climate change can impact the community include:

- Review and update floodplain management codes.
- Improve and upgrade local waterfront properties.
- Educate the community about climate impacts.
- Coordination and communication with government agencies for future planning.
- Amend applicable building and zoning codes to reflect needs of the community

These objectives will help protect environmental resources that are important for preserving shorelines, plants, wildlife, fish, sensitive ecosystems and open space as climate changes.

Section 7 - Review of Mitigation Activities

7.A Planning Process and Strategy

Section 7 includes mitigation activities that would reduce the impact of various hazardous events that may occur in the Village of Mamaroneck. This planning process provides a consistent approach for local, County, State and Federal governments to work effectively and efficiently together to prepare for, respond to and recover from a hazardous event regardless of cause, size or complexity as specified under the National Incident Management system (NIMS).

As discussed in Sections 4 and 5, the primary hazards of concern are floods. The fact that flooding is rated as the most serious hazard (see Table 4-5) is due to a variety of storm hazards such as coastal storms, thunder storms, nor'easters, tropical storms, hurricanes, storm surges and other storms that threaten the village almost every year and any one of these can have a devastating impact. For example the HAZNY scorings showed in Table 4-5 show hurricanes as a moderately low hazard. This rating is due to the fact that category 3 and 4 hurricanes, the most hazardous, are the least encountered, while tropical storms are more frequent and cause limited wind damage but large scale flooding. Mitigation measures for hurricane hazards in this section are therefore covered primarily as a flood hazard. These hazards often have secondary effects such as utility failures, dam failures, transportation accidents, water supply contamination and structural collapse. The principal hazards considered for proposed mitigation measures include:

Moderately High Hazards

- Floods
- Coastal Storms (including tropical storms, nor'easters)
- Severe Storms (including thunder storms, wind)

Moderately Low Hazards

- Winter Storms (blizzards, ice storms)
- Storm Surges and Wave Action
- Hurricanes
- Utility Failure
- Dam Failure
- Water Supply Contamination

Other natural hazards like heat waves and earthquakes, technological hazards such as fires and man-caused events such as terrorism were evaluated in Section 4 of this plan. However these do not have the same frequency or level of impact as floods, coastal storms and severe storms.

In this Section we discuss the process and strategies used to develop and prioritize the mitigation activities to protect the community against the primary hazards. In Section 7.B we identify and organize the possible activities according to the goals and objectives established in Section 6. We have assigned the proposed mitigation activities to an action category and given each a general order of priority. The mitigation activity items and associated objectives are given for each goal along with their applicable hazards. All proposed activities, priorities and costs were reviewed by the Hazard Mitigation Planning Committee.

7.A.1 Mitigation Goals and Objectives

The proposed mitigation measures must help meet the goals, objectives and the criteria outlined in Section 6. Mitigation activities that contribute to meeting these goals are discussed below in Section 7.B. The six primary goals identified by the Hazard Mitigation Planning Committee are:

1. Reduce impacts of flooding.
2. Protect residents from catastrophic disasters.
3. Involve the community in identifying and implementing mitigation measures.
4. Become a member of the Community Rating System (CRS) program.
5. Heighten preparedness and response efforts for Hazards.
6. Prepare for climate change impacts on the Mamaroneck community.

The Committee identified several objectives to help meet these goals. A number of possible mitigation activities that achieve these objectives are proposed below. As discussed in Section 6, these objectives are not mutually exclusive and may apply to other goals in addition to the primary goals listed. Likewise, a mitigation action may help meet several objectives. The recommended actions will be incorporated in the action plan, which is developed in Section 8.

7.A.2 Mitigation Action Categories

Each mitigation action type is classified according to FEMA guidance under one of six categories or strategies:

- Preventive Measures (PM)
- Property Protection (PP)
- Public Information and Awareness (PI)
- Natural Resource Protection (NR)
- Emergency Services (ES)
- Structural Projects (SP)

Preventive Measures are a strategy of institutional steps that reduce the impacts from hazards, avoid or limit personal harm and decrease the loss of property value. These include administrative or regulatory actions that affect the way land, buildings and infrastructures are developed. These measures help keep problems from getting worse and may include planning, zoning, building codes, fire codes, laws, regulations, and preservation activities. Such improved zoning, building codes and updated plans will discourage future development in inappropriate areas such as flood plains or Village areas prone to flooding. Each item is identified with a 'PM' to indicate it is a Preventative Measure Activity Item.

Property Protection measures are strategies associated with the goals and objectives that protect property from damage or loss of property value. Property owners may protect buildings and properties by retrofitting structures, acquiring properties in safe areas, relocating facilities or elevating structures. Each proposed Property Protective Measure is identified by 'PP'.

Public Information activities involve informing, educating, soliciting input and advising the community, elected officials, property owners and stakeholders concerning actions in the proposed plan. These are activities that help save lives and protect property through an informed public. They include public meetings, Web Page productions, local public television, outreach programs and newspaper notices. 'PI' indicates Public Information Activities. These activities may be performed at various times and are generally associated with other mitigation items.

Natural Resources Protection activities are linked with the goal of preserving natural resources. The Village has limited open space and several natural areas are located adjacent to the Mamaroneck Harbor. Natural resource protection works to preserve or restore natural areas and the natural function of floodplain. These activities may include stream protection, vegetation

management, sediment and erosion control, water quality control, pond management or wetland management. Each proposed Natural Resource Protection Measure is identified as 'NR'.

Emergency Services actions help avoid loss of life and harm just before, during and after a hazardous event. These actions may include emergency planning, warning systems, evacuation shelters, emergency response services including the fire department, hazardous materials release teams and ambulance and first aid services. These measures minimize the impact of a hazard on people. Proposed Activity Items related to emergency services activities are designated as 'ES'.

Structural Projects involve strategies for modifying or controlling the hazard itself. This strategy includes projects such as elevating roads or flood control structures such as storm and sanitary sewers, levees, or retaining walls that direct floodwaters away from an area. The objective of this strategy is to modify or control the hazard itself. Activity Items related to structural project activities are designated as 'SP'.

7.A.3 Estimating Activity Item Costs

Detailed specifications for each activity item are not within the scope of this Hazard Mitigation Plan but will be submitted with future proposals for work and grant applications. The proposed activities represent a brief summary or conceptual plan for work items. Therefore, detailed cost estimates are not available at this time. Based on past experience, size and scope of the activity, known unit costs for similar activities or estimates based on engineering guides. These estimates may have a margin of error of +/- 25% and represent a value in current 2011 dollars.

7.A.4 Setting Priorities

An order of priority from high to low (1 to 3) has been developed for each of the mitigation actions proposed. Only three priority categories were chosen to keep decision-making easier and to promote consensus among the Committee. The criteria for analyzing the alternative priorities are based on Social, Technical, Administrative, Political, Legal, Economic and Environmental (STAPLEE) considerations provided in FEMA guidance. (See Section 6.A. for an explanation of each criteria.) These criteria and priorities will be used to further refine the Draft Action Plan in Section 8. Implementation of these actions must be socially acceptable to the community and

technically feasible. They must have the administrative resources and jurisdiction to implement them and be acceptable to political decision-makers, stakeholders, and public representatives. The activities need to be backed by legal authority and be consistent with current laws. They need to be economically affordable, cost-effective and protective of the environment.

The priorities were determined in agreement with the Village officials, the community and the Planning Committee. The highest priorities were based on those actions already started or that need to be taken before others can be implemented. Activities that were most cost-effective were rated highest. Funding resources were also important considerations. Actions that can be done using available resources or having identified sources of funds also have a higher priority. Items requiring procurement of additional local funds and resources or procurement of additional State or Federal funds would likely be planned in the future.

A high priority activity involves maximum benefits relative to the costs even though in most cases, a quantitative estimate of benefits in dollars cannot be made. Therefore qualitative judgments of benefits relative to cost were made based on the benefits listed for the objects at risk and damage estimates that are given in Section 5. The highest priority tasks are those that can be done with low costs relative to the high benefits received such as saving lives or completing a Comprehensive Evacuation Plan. Certification of the CRS Program is also a low-cost activity with an immediate effect of lowering of flood insurance rates. A benefit from lowering the rate would make the insurance more available to those who can't afford it. Projects having high costs and high benefits or high risk reduction such as storm drainage control would also have a high priority. High-cost items having a lower benefit would have a lower priority. A low-cost item such as expanding the Village website, though important, was given a lower priority because there were fewer direct property and safety benefits to the Village.

A priority is assigned to each Activity Item shown in Tables 7-1 to 7-6. Group 1 activities are the highest priority with group 3 having the lowest priority. Priority 1 activities are considered the most urgent projects to start with. As the plan is implemented these priorities are expected to change based on resource availability, funding, new information, and future community needs. Since some activity items have already started they will continue as a top priority. In addition,

many of the activities are dependent on other activities and have a higher priority. Most of the proposed items require outside funding (grants) or other assistance.

The Hazard Mitigation Planning Committee generated, reviewed and discussed the list of possible activities and proposed projects. A preliminary screening list was generated using the HAZNY analysis. (See Appendix 1.) Activities were screened out if they failed to help meet the Plan's goals and objectives formulated in Section 6. An activity item may fulfill one or more objective or goal.

These activities were proposed, reviewed and evaluated by the Committee, Village officials and the consultant. The results of these discussions are outlined in the following Sections 7.B.1 through 7.B.6. Each item includes:

- The objective of concern,
- A description of the proposed mitigation measure,
- The hazards being addressed,
- The benefits produced by the action,
- Estimated costs,
- Feasibility of implementation,
- Priority rating of 1 to 3.

7.A.5 Capability and Resources

The Village of Mamaroneck will have the responsibility, jurisdiction, capability and authority to administrate and implement most all of the mitigation activities proposed below. In some instances a neighboring community or other agency may have jurisdiction that requires a joint Memorandum of Understanding to implement the activity. The Village official in charge of a project will be responsible for interfacing with the public and appropriate neighboring jurisdictions, the County, USCOE, NY SOEM, FEMA or other agencies identified in Section 3. Responsible officials for the village that may administer these projects are shown in Figure 1-3 in Section 1.

In most cases, the village does not have financial resources or human resources to prepare the plans, studies, and engineering designs or implement public outreach and construction required for many of the activities proposed. Therefore, external agency funding for consultants, engineers and contractors will be needed to successfully implement this Hazards Mitigation Plan.

7.B Proposed Mitigation Actions

Numerous possible mitigation activities were identified and screened by the Committee and Village officials and reviewed by the community. The proposed activities are listed by their primary goal in Tables 7-1 through 7-6. Each mitigation action is summarized with its action type, key objective, associated hazards (see Sections 7.A.2 – 7.A.3), probable funding requirements and a listing of possible mitigation benefits. An action priority of 1 to 3 was assigned considering the criteria discussed above in Section 6.A.2 and Section 7.A.4. These goals, objectives and benefits listed below are consistent with and incorporate several STAPLEE criteria listed in Section 6.A and 7.A.4. Unless noted under a specific activity, no STAPLEE criteria limits the activities evaluated below.

The proposed mitigation actions are consistent with the recommendations developed in the September 2011 Draft Comprehensive Plan for the Village of Mamaroneck. A Citizens Flood Committee appointed by the Mayor has recommended short- and long-term mitigation measures.

7.B.1 Goal 1 - Reduce Impacts of Flooding

This goal is self-evident and is the primary goal in this Hazard Mitigation Plan. Since flooding is the major hazard of concern and is caused by several other specific hazards, meeting this goal will include reducing impacts from storm-specific events. Protection of people and properties from floods is first and foremost. Meeting this goal and its objectives depends on having all planning tools in place, all needed resources ready and all emergency personnel trained. The Village has identified a number of related actions that will result in a reduction of flooding. Table 7-1 lists the proposed mitigation activities, objectives, priorities, hazards mitigated and the potential benefits to promote this goal. These activity items are discussed in the following sections.

7.B.1.1 Channelization and Improvement of the Confluence in the Sheldrake and Mamaroneck Rivers

The Village plans to continue in its efforts of stream/channel improvements to improve flow capacity at the confluence of the Mamaroneck and Sheldrake Rivers in Columbus Park. This project is part of the USACE Risk Management Reevaluation study of these rivers. One proposed modification would divert the Sheldrake River upstream from the confluence of the Mamaroneck River through a concrete-lined tunnel into the West Basin of the Mamaroneck Harbor. One proposal is to construct a tunnel under Fenimore Road. The USACE will not likely favor this project but will likely recommend the Ward Avenue tunnel. The principal objective is to “implement flood control projects”. Although the cost of the project is high, the long term benefits are high compared to costs of potential future losses experienced by residents if the project is not completed. Therefore, costs relative to benefits for this project are about equal. This structural project has a priority of 1. Due to the rivers’ major role as source of flooding, mitigating this source will have a high benefit and a high cost for the Village.

The USACE would be the lead agency for this project. The Village administration will take the Village lead. Cost-sharing funding for the activity would come from the USACE, NYDEC and the Department of Planning, Westchester Co. NY. The project would likely require an Environmental Impact Statement. Preliminary costs estimates from the USACE were based on 1989 annual costs for the entire project, and converted to 2011 U.S. Dollars for this plan.

7.B.1.2 Inflow and Infiltration Removal

The primary hazard of concern is flooding in the Village. When storms impact the Village, storm sewers and sanitary sewers overflow and coningle. Removing inflow and infiltration (I&I) problems from storm and sanitary sewer overflow is a Preventative Measure. A principal objective is to “improve the storm water collection and drainage system.” Its primary benefit is prevention of sewage infiltration into storm water. This mitigation action will result in a high benefit for community health relative to the cost of the mitigation action. The mitigation action is feasible and cost-effective. This activity is given a high priority of one.

Table 7-1. Proposed Activities to Reduce Impacts of Flooding.

Action Type*	Action Item	Primary Objective **	Priority ***	Hazards Mitigated [#]	Applies to Structures	Benefits/Comments	Cost (\$1,000)
SP	1. Channelization and Improvement of Rivers' confluence	Implement flood control	1	Flooding	Existing	Improve storm water flow and reduce flooding, save lives	\$20,735
PM	2. Inflow and Infiltration removal	Improve storm water collection and drainage	1	Flooding	Existing	Stop and prevent sewage infiltration into storm water	\$2,500
PM	3. River dredging and silt removal	Implement flood control	2	Flooding	NA	Improve storm water flow	\$1,000
PM	4. River debris and obstruction removal (ongoing)	Improve storm water collection and drainage	1	Flooding	NA	Improve storm water flow	\$900
SP	5. Repair, raise, remove and replace bridges	Improve storm water collection and drainage	2	Flooding	Existing	Improve storm water flow, reduce street flooding	\$15,000
SP	6. Redirect wing wall and refurbish bridge at Anita Ln. & Valley Pl.	Improve storm water collection and drainage	3	Flooding	Existing	Improve storm water flow, reduce street flooding. <u>Westchester Co. responsibility</u>	\$750
PP	7. Enhance inspections	Improve flood-prone streets	1	Flooding	Existing	Identify problem areas, reduce street and building flooding	\$50
SP	8. Continue relining storm and sanitary sewer lines	Improve flood-prone streets	1	Flooding	Existing	Improve storm and sanitary sewer water flow	\$900
PM	9. Install backflow/check valves	Correct sewer backup problem	1	Flooding	Existing	Stop and prevent sewage infiltration into buildings	\$950
PM	10. Change code for BFE	Update applicable codes	2	Flooding	New & Existing	Reduce flooding of buildings	\$25
PM	11. Improve zoning and codes	Update applicable codes	2	Flooding	New & Existing	Reduce building in flood prone areas	\$ 25

*Action Type: PM – Preventative Measures
PP – Property Protection
NR – Natural Resources

ES – Emergency Services
SP – Structural Projects
PI - Public Information

***Priority: 1 - High
2 - Medium
3 – Low

**Activity may also meet other goals and objectives – see text.

For all primary hazards included see page 7-1, Sect. 7.A.

7.B.1.3 River Dredging and Silt Removal

The Army Corps of Engineers (USACE) recommended dredging of the Sheldrake and Mamaroneck Rivers as part of a total mitigation effort. Dredging would continue in these and other streams in the Village to remove silt which reduces the volume of water flow. Mitigation of these rivers will contribute to flood reduction. The estimated cost is \$1,000,000.

Dredging the rivers is feasible; however its effectiveness in controlling flooding is limited. Therefore, this activity has a moderate priority rating of two.

7.B.1.4 Ongoing Removal of Debris and Obstructions in the Rivers, Dams and Catch Basins

As a Preventative Measure, the Village DPW would continue its ongoing short-term mitigation actions to clean and maintain catch basins. This activity is meant to “improve storm water collection and drainage. They would continue to remove debris from the Village streets, streams, dams and rivers. Mitigation of these blockages contributes to flood reduction by removing objects that obstruct flow and clog storm and sanitary sewers and grates. This activity has a high priority of one and a moderate cost of \$900,000 relative to the benefits achieved. This activity is highly feasible and has been performed in past years.

The Village DPW will take the lead in this project. Funding for the activity would be requested from FEMA through Hazard Mitigation Program Grant applications, for filing with the NYSOEM. Key participants include the NYSDEC and the Planning Department, Westchester Co. NY.

7.B.1.5 Repair, Raise, Remove and Replace Bridges

The Village is in the design phase to replace the Jefferson Avenue Bridge, located in the center of the Village. A key objective is to “improve storm water collection and drainage.” The current bridge has suffered extensive structural damage during past flooding events. Furthermore, the center piling of the bridge is located mid-stream in the Mamaroneck River, in an area where the river makes a number of bends. These conditions cause debris flowing downstream to get stuck in this area and reduce the normal flow capacity of the river. This backup leads to the flooding of surrounding streets and buildings.

This structural project has a high cost of \$3,000,000 but will benefit the Village by reducing street flooding in the long term. The project is feasible and it has a moderate priority of two.

7.B.1.6 Redirect Wing Wall

Wing walls provide additional support and retention of stream banks and bridges. Damaged walls impede water flow and increase erosion. An objective is to “improve storm water collection and drainage.” A major benefit is improvement of storm water flow that will reduce flooding. This activity is feasible with an estimated cost of \$500,000. This activity is the responsibility of Westchester County, and not a Village activity.

7.B.1.7 Enhance Inspections

Inspection of buildings, structures, and other properties in the Village should have an additional focus on flood mitigation. A primary objective is to “Improve flood prone streets”. A procedure should be prepared to enhance inspections. This property protection activity should include all applicable codes and zoning regulations that enhance flood protection. This item has a high priority and a proactive high benefit of identifying flood-prone areas prior to a flood event at a low cost of \$50,000. A major benefit is the reduction of street and building flooding.

This is a highly feasible activity that can utilize Village employees. This activity will enable Village inspectors to efficiently identify building and zoning problems that may need mitigation.

7.B.1.8 Continue Relining and Refurbishing Storm and Sanitary Sewer Lines

This Structural Project is intended to improve flood-prone streets. The Village would continue relining and refurbishing storm and sanitary sewer lines to repair leaks and damaged sections which reduce effective drainage. This mitigation action on the sewer lines will contribute to flood reduction. There would be a significant benefit of improved flow through the sewers. Approximate costs would be around one million dollars. The priority rating is high and the activity is highly feasible.

7.B.1.9 Install Backflow/Check Valves in Service Lines of Affected Buildings

The Village will address the flooding issue of backup of raw sewage from the storm water system into residents’ dwellings. The Village proposes for the homeowners to pay for and to install back flow

valves into the service lines of these dwellings thus preventing the sewage from entering buildings during flooding events. The estimated cost to complete the project is \$850,000 which is small compared to future losses and exposure experienced by residents.

This activity is highly feasible and has a high priority of one.

7.B.1.10 Develop a Plan and Change Code to Base Flood Elevation (BFE) + 2 feet +.

To accommodate predicted sea level rise, residential construction must have the lowest floor including the basement elevated to more than +2 feet above the BFE. A key objective is to “update applicable codes.” Flooding is the primary hazard. Utilities must also be designed and/or located to prevent water damage during flooding. Adoption of the local flood damage laws is a prerequisite for participation in the National Flood Insurance Program. The law was updated by the Village Board of Trustees in July 2007. The revised law reflects guidelines set by NYSDEC. These revisions will involve changes to the Village Zoning Code, Floodplain Management requirements, subdivision regulations, housing standards or other relevant Village Code Chapters or planning documents.

The estimated cost is \$25,000 to develop the plan and change the Village codes. This feasible activity has a priority of two. Any new or revised requirements will require Board of Trustees review and approval to become incorporated as Village law.

7.B.1.11 Improve Zoning, Storm Water, Erosion and Sediment Control Codes

Several Village codes and regulations apply to protection of buildings, structures and other properties from flood damage caused by storm water and erosion. This activity includes the review and revision of all applicable codes and zoning regulations that enhance flood protection. The primary objective of this action is to “update applicable codes.” The primary hazard addressed by this activity is flooding. The major benefit is to reduce building in flood prone areas. The estimated cost is \$25,000. The activity is feasible and has a priority rating of two.

Development is permitted in federally mapped flood plain areas, as long as it complies with state and federal building-elevation requirements, and is compliant with Village regulations in Mamaroneck Village Code Chapter 186.

7.B.2 Goal 2: Protect Residents From Catastrophic Disasters

Avoiding loss of life and injury from disasters is a major goal for the Village. Protecting residents' property from catastrophic storm disasters is included. This goal is also aimed at mitigating losses through various property protection activities before, during and after a hazardous event occurs. Technological and man-caused hazards discussed in Sections 4 and 5 also apply and may be evaluated in future updates to this plan. Six remediation activities were identified for this Goal that meet the objectives listed in Section 6.B.2.

7.B.2.1 Raise Homes Located in the Flood Plain +2 feet and Amend Zoning Codes to Facilitate Home Raising

See Section 7.B.1.10 above for changing BFE Code. Buildings that are impacted by flooding need to be identified and funding obtained to elevate these structures to more than +2 feet above the BFE. Raising homes in the flood plain will "protect buildings from flood damage" and reduce the number of SRL properties. It requires revisions to the Village Zoning Code, Floodplain Management requirements, subdivision regulations, housing standards or other relevant Village Code Chapters or planning documents.

The feasibility of this activity is complex and has a priority rating of three. Raising a home to meet BFE requirements could be costly at \$250,000 per building. Finding funds to raise individual structures may be difficult. This project would meet the objective to protect Critical Facilities, buildings and infrastructure from damage and loss. This mitigation action has a low priority, high costs and a high benefit of protecting property from a flood event. It is uncertain whether the benefits from raising an existing house would outweigh the costs. This activity has a low priority and high benefits and has a high unit cost. Its primary objective is Reduce the number of SRL properties.

The Village administration will take the lead using existing staff from the Building Department, Zooning Board and Flood Mitigation Advisory Committee. Any new or revised requirements will require Board of Trustees review and approval and incorporated as Village law.

7.B.2.2 Reinforce Existing Structures to Ensure They are Flood Safe.

It is proposed that existing structures in flood zones be reinforced to ensure they are flood safe. This Structural Project activity is intended to protect existing structures at risk from flood damage. The estimated costs of \$400,000 are high and priority is 2.

7.B.2.3 Update Emergency Operation Plan and Evacuation Plan per NIMS

The Village plans to review all of its emergency plans and update and revise them where necessary to be consistent with FEMA's National Incident Management System (NIMS). This planning process provides a consistent approach for local, County, State and Federal governments to work effectively and efficiently together to prepare for, respond to and recover from a hazardous event regardless of cause, size or complexity. Updated plans will "enhance residents' awareness of emergency procedures." Members of a Committee will review and recommend revisions. The Village Police Department will take the lead in this effort. There will not be a need for funding, since all members of the Committee are Village employees and meetings will be conducted during their work days. Completion of this project should take less than a year, but the results will have long term benefits for the community. Since the project does not result in any additional expense, the cost benefit ratio is excellent. The estimate for in kind services is \$30,000. The activity is highly feasible and has a priority of one.

7.B.2.4 Check Vulnerability, Stability of Waterfront Sea Wall, Docks, Pilings, Gas Tanks

Waterfront structures such as seawalls, piers, docks and service buildings are at risk of damage from storms, tidal surges, and to a lesser extent, ice jams. A key objective is to "Protect vulnerable harbor and shoreline from damage and loss." Inspections of shoreline structures in the Mamaroneck Harbor and Long Island Sound are needed to check the vulnerability and stability of piers and their pilings, docks, sea walls, service buildings, fueling stations and other shoreline structures. Benefits from this activity would include identifying structures that require repair or replacement or removal. Identifying and fixing the problems would save property from future damage.

This activity is highly feasible using Village staff resources and a waterfront building inspector consultant. This activity is given a priority rating of two. The cost is estimated to be \$50,000.

Table 7-2. Proposed Activities to Protect Residents from Catastrophic Disasters.

Action Type*	Action Item	Primary Objective **	Priority ***	Hazards Mitigated [#]	Applies to Structures	Benefits/Comments	Cost (\$1,000)
SP	1. Raise homes above BFE +2 ft. and amend zoning codes	Protect buildings from damage	3	Flooding	Existing	Protect homes from flood damage, costs per house are high.	\$250/ Building
SP	2. Reinforce existing structures to ensure they are flood safe.	Protect existing structures from damage	2	Flooding	Existing	Ensures existing structures are flood safe.	\$400
ES	3. Update Emergency Plan and Evacuation Plan per NIMS	Enhance residents' awareness of emergency procedures	1	All hazards	NA	Protect lives	\$30
SP	4. Check vulnerability of waterfront structures	Protect vulnerable Harbor and shoreline	2	Severe storms and surges	Existing	Prevent damage to piers, docks and buildings	\$50
ES	5. Procure public address system	Improve receiving communications	1	All hazards	NA	Improved communication during an emergency	\$40
PI	6. Revise communications for 911 protocols	Improve receiving communications	1	All hazards	NA	Improve communication to protect residents during an emergency	\$25

*Action Type: PM – Preventative Measures
PP – Property Protection
NR – Natural Resources

ES – Emergency Services
SP – Structural Projects
PI - Public Information

***Priority: 1 - High
2 - Medium
3 – Low

**Activity may also meet other goals and objectives – see text.

For all primary hazards included see page 7-1, Sect. 7.A.

7.B.2.5 Procure a Public Address System to Announce Potential Emergencies in the Community

This Emergency Services activity requires a current system to announce a potential emergency. A new public address system is needed to warn each likely impacted neighborhood of impending flood conditions or other hazards. In the event of a flood, serious storm hazard or downed power lines, a vehicle carrying a public address system would warn the neighborhoods affected about the hazard and advise actions the people should immediately take.

The primary objective of this activity is to “Improve receiving communications” and the primary benefits would be improved communication during an emergency and protection of the public from the hazard. This is a highly feasible and flexible activity. The cost of \$40,000 is relatively low in relation to the benefits of having an informed community during an emergency will help protect your family and neighbors. This activity is given a high priority.

7.B.2.6 Revise Communications Protocols Including the Reverse 911 Warning System

Reverse 911 calls are a geographically based calling system that offers the ability to quickly communicate with the public by telephone. It will ring residents to alert them of a hazard even in the middle of the night. Reverse 911 calls will not reach screened calls, blocked or unlisted numbers or cell phones unless the resident registers. It warns residents of hazards such as flooding in their neighborhood so that they can safely leave the area.

This activity has a high priority one and is highly feasible. Revision of the protocols has a low cost of 25,000 and proven high benefits.

- Reverse 911 can target specific geographic locations, warning only those people who are directly at risk.
- The system uses existing telephones to alert citizens; there is no need for people to buy a specialized warning device.
- The system can deliver text messages. This feature has the potential to warn and protect citizens who are deaf or hard of hearing.
- System administrators can add telephone numbers to the database. This can be used to add unlisted telephone numbers and cell phone numbers to the system.

On June 18, 2009 there was minor flooding on Plaza Avenue near Madison in Mamaroneck. Reverse 911 calls were sent out to residents cautioning them of the potential for flooding but some residents did not receive calls. The village will be placing a link on its website or provide forms to give residents a means for registering their phone numbers for the reverse 911 system.

7.B.3 Goal 3: Involve the Community in Identifying and Implementing Mitigation Measures

This goal includes several mitigation actions related to involvement and coordination of different agencies and jurisdictions. The community needs to be involved in the planning of these mitigation actions and be able to obtain information in their native language.

7.B.3.1 Develop a Coordination Plan for Inter-Municipality Decontamination (Decon) Preparedness

Emergency responders who have worked in a contaminated area need to go through a process of decontamination prior to leaving the area. Different municipalities and jurisdictions may have different procedures that may delay assistance of a neighboring community. This remedial activity is intended to develop a coordination plan that will be consistent between municipalities.

The key objective is to “coordinate with neighboring communities”. A principal benefit is “improved communication between communities during an emergency response.” The cost of this activity is \$25,000. This feasible activity was given a low priority because it is limited to a small specialized group.

Table 7-3. Proposed Activities to Involve the Community in Identifying and Implementing Mitigation Measures.

Action Type*	Action Item	Primary Objective **	Priority ***	Hazards Mitigated [#]	Applies to Structures	Benefits/Comments	Cost (\$1,000)
PM	1. Develop a coordination plan between neighboring municipalities	Coordinate with neighboring communities	3	All hazards	NA	Improve communication between communities during an emergency response	\$25
PI	2. Multi-lingual educational materials	Heighten public awareness through multi-level campaign	1	All hazards	NA	Improved hazard communication with non-English speaking residents	\$35
PI	3. Multi-lingual flooding preparedness manual	Enhance residents' awareness of procedures	1	All hazards	NA	Improved hazard communication with non-English speaking residents	\$35
ES	4. Work with local agencies, County and Transit Authority to assist in NYC evacuation	Coordinate with neighboring communities	3	Category 2 and higher hurricane	NA	Transport large number of people out of impacted areas to save lives	\$30

*Action Type: PM – Preventative Measures
PP – Property Protection
NR – Natural Resources

ES – Emergency Services
SP – Structural Projects
PI - Public Information

***Priority: 1 - High
2 - Medium
3 – Low

**Activity may also meet other goals and objectives – see text.

For all primary hazards included see page 7-1, Sect. 7.A.

7.B.3.2 Create Multi-Lingual Educational Materials for LMC TV, and Videos for Schools

The primary objective of this Public Information activity is to “heighten public awareness through a multi-level public relations campaign”. A key tool to achieve this objective is to create bi-lingual educational materials for the community’s public TV service, LMC TV. These programs will also be produced on DVD videos and distributed to Village schools. These materials will be prepared in English and Spanish and cover the primary hazards of flooding, severe storms and utility outages. The estimated cost to produce these materials is \$35,000. They will explain the nature and scope of the hazard and the procedures to follow in the event that any neighborhood is impacted.

This activity is highly feasible and has a priority of one. A major benefit will be improved hazard communication with non-English residents which will protect them from the hazards of concern.

For adults in the community who do not access LMC TV or do not speak Spanish or English, a brochure will be prepared in several languages covering the principal languages spoken in the community. This brochure will contain the same basic information found on the DVD.

The costs are relatively low in relation to the benefits of having an informed community on how to protect your family and neighbors in the event of a serious hazard impact. Since the ability to reach the community at a low cost and high benefit, this activity is given a high priority.

7.B.3.3 Create a Multi-Lingual Flooding Preparedness Procedures Manual

The primary objective of this mitigation action is to “Enhance residents’ awareness of emergency procedures.” A key tool to achieve this objective is to prepare a bi-lingual manual in Spanish and English to aid the community in the event of serious flooding. The manual will explain the nature and scope of the flood hazard and detail procedures and evacuation routes to follow in the event that any neighborhood is impacted. It will include warning systems and locations of emergency shelters. A major benefit will be improved hazard communication with Spanish and English speaking residents which will help protect them from the hazard of concern.

The cost of \$35,000 is low, the benefits are high and the action is highly feasible. The primary benefit is having an informed community knowing how to protect their families and neighbors in the event of a serious hazard impact. This activity is given a high priority.

7.B.3.4 Work With Local Agencies, Westchester County and Metropolitan Transit Authority (MTA) to Prepare for Mass Evacuation From NYC

Mass evacuation from New York City is a rare event. Some sections of the City were evacuated during Hurricane Irene in August 2011. In the event of a major disaster, NYC residents and commuters may have to evacuate to or through Westchester Co. and the Village of Mamaroneck. Mamaroneck officials will need to plan and coordinate with local agencies, officials from Westchester Co., neighboring communities, and the MTA to develop procedures pertaining to the Village's role in the evacuation.

This activity has an objective to "Coordinate with neighboring communities". The most common hazard that is likely to trigger an evacuation is a sizable hurricane. A principal benefit is the saving of lives by transporting a large number of people out of an impacted area. The cost for generating the plan for Mamaroneck's role in the plan is about \$30,000. Preparing a plan is highly feasible and has a priority rating of three.

7.B.4 Goal 4: Become a Member of the Community Rating System Program

FEMA's National Flood Insurance Program/ Community Rating System (NFIP/CRS) that allows property owners in participating communities to purchase flood insurance in exchange for state and community floodplain management regulations that reduce future flood damages. Participation in this program is based on an agreement between communities and FEMA. If a community adopts and enforces a floodplain management ordinance for new construction in floodplains, the federal government will make flood insurance available within the community to mitigate flood losses. Formal approval of this Multi-Hazards Mitigation Plan is a prerequisite for the CRS approval. Once the application is completed and approved, each resident or business with flood insurance would be eligible for a reduction in insurance premiums.

Table 7-4. Proposed Activities to Become a Member of the Community Rating System Program.

Action Type*	Action Item	Primary Objective **	Priority ***	Hazards Mitigated [#]	Applies to Structures	Benefits/Comments	Cost (\$1,000)
PP	1. File required CRS documentation	Reduce flood insurance premiums	1	Flooding	Existing	Reduced cost of flood insurance	\$25
PP	2. Develop and manage the CRS program	Reduce the number of SRL properties	1	Flooding	New and Existing	Protection of buildings from flooding	\$25 /yr.
PP	3. Ensure an accurate inventory of (SRL) properties	Accurately identify the number of SRL properties	2	Flooding	Existing	Reduced cost of flood insurance. Costs covered in CRS Program.	---

*Action Type: PM – Preventative Measures
PP – Property Protection
NR – Natural Resources

ES – Emergency Services
SP – Structural Projects
PI - Public Information

***Priority: 1 - High
2 - Medium
3 – Low

**Activity may also meet other goals and objectives – see text.

For all primary hazards included see page 7-1, Sect. 7.A.

The NFIP's Community Rating System is a voluntary incentive program offering flood insurance premium reductions to communities who exceed minimum requirements. Communities receive points for meeting additional requirements, and are ranked in up to 10 rating classes according to their total score. The higher the score, the greater the premium discount the community receives. Creditable activities are grouped into four categories: public information, mapping and regulations, flood damage reduction and flood preparedness.

7.B.4.1 File Required CRS Documentation

This activity addresses flooding hazards. The primary objective for this activity is to "reduce flood insurance premiums." The Village does not currently qualify for membership in the Community Rating System (CRS) Program. The Village will work with State and Federal officials to complete this documentation. The Village is already conducting some activities that provide credit points for the rating. Other activities that would generate additional points (such as public information activities) would be fairly simple and low-cost to implement.

The Village should assess its National Flood Insurance Program (NFIP) compliance, with a view to qualifying for a CRS rating of at least 7. The benefits from becoming a CRS Program member are lower flood insurance premiums. Estimated costs for this activity are \$25,000. This activity is highly feasible. This rating, which requires 1,500 credit points, gives an insurance premium reduction of 15%. As of September 2010, the Village was in the process of completing its application to qualify for CRS rating program. This activity has a high priority and high benefits relative to its low cost.

7.B.4.2 Develop a CRS Program Plan and Manage the Program

See Section 7.B.4 above regarding this Community Rating System (CRS) Program. A part-time CRS coordinator on the Village staff is needed to manage a program specifying CRS requirements and procedures. A consultant may be needed to help develop the program and complete the paperwork. Its primary objective is to "reduce the number of Severely Repetitive Loss (SRL) properties" caused by flooding.

It is estimated that the annual cost for this program would be \$25,000. The activity is highly feasible and has a Priority of one. A major benefit is long term protection of buildings and properties from flooding.

7.B.4.3 Ensure an Accurate Inventory of Severely Repetitive Loss (SRL) Properties

See Section 7.B.4 above regarding this CRS Program. The CRS Coordinator will work with NYSOEM to ensure an accurate inventory of (SRL) properties. There are currently 23 such properties in the Village. This program will require the CRS coordinator on the Village staff to record and manage the inventory. This activity has a moderate priority of two. The cost per year is included in managing the CRS program. Its primary objective is to “accurately identify the number SRL properties.”

7.B.5 Goal 5: Heighten Preparedness and Response Efforts for Hazards

7.B.5.1 Audit Village Facilities, Equipment, and Personnel for Strengths and Weaknesses

This activity is intended to “Improve preparedness and response”. This is a cost effective use of Village staff to identify needs, training for staff, emergency equipment and facilities in order to be prepared to respond to any of the hazards identified in this Hazard Mitigation Plan. This task is given a high priority. Implementation of the audit is feasible and the audit can be performed by representative of different Village departments who are involved in an emergency response. Estimated costs for this activity are about \$25,000.

7.B.5.2 Relocate Equipment Impacted by Floods

The primary objective of this activity is to “Identify and move equipment to a safe location”. This involves relocating land-based Public Works and Fire Department facilities and equipment impacted by floods. It is assumed the new locations are existing Village facilities. A key benefit is that facilities and equipment are accessible and protected from damage during a flood.

Transferring emergency equipment and supplies to safe facilities is given a high priority and will cost about \$25,000. Its implementation is feasible since Village staff and facilities are used.

7.B.5.3 Plan for Pre-Evacuation and Staging of Emergency Equipment

A key objective for this activity is to “Improve preplanning for mitigation of hazards”. The hazards covered include flooding and severe storms. Implementation of this activity will save lives by providing an effective pre-evacuation plan. A benefit of this activity is to improve preparedness for an emergency.

Table 7-5. Proposed Activities to Heighten Preparedness and Response Efforts for Hazards.

Action Type*	Action Item	Primary Objective **	Priority ***	Hazards Mitigated [#]	Applies to Structures	Benefits/Comments	Cost (\$1,000)
PM	1. Audit village facilities resources for strengths and weaknesses	Improve preparedness and response	1	All hazards	NA	Cost effective use of Village staff	\$25
PM	2. Relocate equipment impacted by floods	Identify and move equipment to a safe location	1	All hazards	NA	Protects equipment from damage and improves it's access	\$25
ES	3. Plan for pre-evacuation and equipment staging	Improve preplanning for mitigation of hazards	1	All hazards	NA	Improved preparedness for an emergency	\$25
ES	4. Evaluate safety and relocation of waterborne equipment	Identify and move equipment to safe location	2	All hazards	NA	Protect boats and associated emergency equipment during storms	\$25
PM	5. Trim trees and limbs	Improve preplanning for mitigation hazards	1	All storm hazards	Existing	Protection of power lines, communication lines and buildings from tree damage. Con Ed Responsibility	Con Ed to pay
ES	6. Generator for emergency facility	Invest in emergency equipment	1	All hazards	Existing	Provide power to emergency facility	\$125
ES	7. Purchase emergency response equipment	Invest in emergency response equipment	1	All hazards	Existing	Improved preparedness for an emergency	\$150
ES	8. Relocate emergency facilities from flood prone areas	Identify and move equipment to safe location	1	Flooding	Existing	Improved preparedness for an emergency	\$100

*Action Type: PM – Preventative Measures
PP – Property Protection
NR – Natural Resources

**Activity may also meet other goals and objectives – see text.

ES – Emergency Services
SP – Structural Projects
PI - Public Information

***Priority: 1 - High
2 - Medium
3 – Low

For all primary hazards included see page 7-1, Sect. 7.A.

The Village needs to develop a plan for staging emergency equipment and supplies as part of preparation for evacuating an impacted area. This is a cost effective use of Village staff to identify needs and facilities to respond to flooding and storm hazards identified in this Hazard Mitigation Plan. This preparation will help in any flooding or storm emergency. This task is given a high priority. This activity is highly feasible and will cost about \$25,000.

7.B.5.4 Evaluate Safety and Possible Relocation of Waterborne Equipment (Police, Fire, and Harbormaster Boats)

A primary objective for this Emergency Services activity is to “Identify and move equipment to a safe location”. A benefit of this activity is to “protect boats and other water craft and associated emergency equipment during storms.” Implementing this activity will protect watercraft used by Harbor Master, Police, Fire Department, Bay Constable and US Coast Guard.

Village staff would develop a plan for protecting water-borne equipment from major storms and storm surges. The estimated cost for this evaluation is \$25,000. This preparation will help protect equipment from any flooding emergency for a low cost and a high benefit. This task is given a moderate two priority. The implementation of this activity is highly feasible.

7.B.5.5 Trim Trees and Limbs that Endanger Utility Lines

The Village will continue to work with the local energy, cable and telephone utilities in an effort to remove and trim trees and tree limbs. By taking this action, the Village is taking a proactive approach to reducing the chance that falling trees will cause future blackouts and phone outages. This will result in less financial losses to businesses, fewer school closures, and in general, less disruption of life in the Village. It will also be a cost savings for the Village, in that it will not have to spend additional funds for response and recovery from a power outage event. The benefits achieved would be long term. The cost of this project will be borne by Con Edison.

7.B.5.6 Obtain a Permanent Power Generator for Emergency Services and Facility

The Village needs to obtain a larger generator for the Emergency Medical Service (EMS) Facility. A primary objective is to “invest in emergency equipment. Keeping the EMS prepared for a disaster is a priority to the health and safety of the entire Village. This activity is intended to address any hazard that may result in power outages. The cost of the generator and its installation would be \$125,000. Receipt

of this funding from FEMA is contingent on FEMA's approval of this Hazard Mitigation Plan. This activity is highly feasible pending funding. This activity has a high priority.

7.B.5.7 Purchase Emergency Response Equipment

This Emergency Services activity covers the purchase of emergency response equipment for all applicable hazards and meets the objective for investing in emergency equipment. This will improve preparedness for an emergency. It has a high priority and estimated costs of \$150,000. It is highly feasible and is cost effective.

7.B.5.8 Relocate Emergency Equipment from Flood Prone Areas

There are emergency facilities in the Village that are impacted by floods. This Emergency Services activity is intended to mitigate this problem. By relocating emergency equipment from flood prone areas the Village will be better prepared for an emergency. It will be necessary to identify and move equipment to a safe location. This activity has a high priority and an estimated cost of \$100,000. It is highly feasible and cost effective.

7.B.6 Goal 6: Prepare for Climate Change Impacts on the Mamaroneck Community

It is recommended that the Village develop a proactive program to reduce the negative impacts of climate change. Changes in weather patterns may include more frequent and intense coastal storms, gradual rise in sea levels and more extreme temperatures.

7.B.6.1 Review NOAA Documents, LI Sound Study and Nature Conservancy Coastal Resilience Program and Projections of Changing Weather Patterns and Coastal Impacts

Future changes in climate will need effective planning today. Habitat improvement can protect harbors and shorelines from erosion. Restricting building construction in existing open spaces or preserves prevents future damage to buildings that might have been built in these areas. Review of current studies from Federal agencies and private groups provides information on future impacts due to climate changes. The primary objective of this activity is to educate the community about climate impacts. The benefit comes from improved planning and would largely be feasible over the long term. This has a priority rating of three. The estimated cost of \$25,000 would be for in house services.

Table 7-6. Proposed Activities to Prepare for Climate Change Impacts on the Mamaroneck Community.

Action Type*	Action Item	Primary Objective **	Priority ***	Hazards Mitigated [#]	Applies to Structures	Benefits/Comments	Cost (\$1,000)
NR	1. Review documents of NOAA and organizations on coastal impacts	Educate the community about climate impacts	3	Flooding and erosion	Future and existing	Improved planning	\$25
PM	2. Participate in programs to lower carbon footprint	Educate the community about climate impacts	3	Severe storms	NA	Reduced greenhouse gasses	\$25
PM	3. Prepare for more severe storms	Amend applicable building and zoning codes	2	Severe storms	Future and existing	Reduced building in future flood zones.	\$25
PP	4. Establish long term plan to protect coastal residential areas	Plan for long term protection for coastal residents	2	Flooding, erosion, and severe storms	Future and Existing	Coastal residential areas to be better protected from climate change impacts.	\$50

*Action Type: PM – Preventative Measures
PP – Property Protection
NR – Natural Resources

ES – Emergency Services
SP – Structural Projects
PI - Public Information

***Priority: 1 - High
2 - Medium
3 – Low

**Activity may also meet other goals and objectives – see text.

For all primary hazards included see page 7-1, Sect. 7.A.

7.B.6.2 Participate in Programs to Lower the Village's Carbon Footprint and to Minimize Impacts from Sea-Level Change

Purchasing more energy efficient automobiles and trucks for the village fleet will contribute to lowering the carbon footprint. Encouraging pedestrian and bicycle traffic will also help reduce the Village's footprint. Joining neighboring municipalities will compound the beneficial effects. Retrofitting current street lighting and municipal buildings will help reduce energy use.

The primary objective is to "Educate the community about climate impacts". The benefit of reduced greenhouse gasses considers potential changes over time. Therefore, the objectives would largely be achieved over the long term. Educating the Community about climate impacts is highly feasible. The estimated cost is \$25,000. This activity is given a low priority.

7.B.6.3 Prepare for More Severe Storms

One of the primary objectives is to "amend applicable building and zoning codes." The Village will need to review and update floodplain management codes. The benefits of meeting these objectives would be reduced building in future flood zones and buildings and structures will be made more resistant to severe winds and floods.

Estimated cost for this activity is \$25,000. This activity will require some expenses for a consultant to prepare the plans and run models for future coastal conditions. This feasible activity is given a medium priority of two since its benefits are long term and needs are not immediate.

7.B.6.4 Establish Long Term Plan to Protect Coastal Residential Areas

The Village needs to establish a long term plan to protect coastal residential and riverine areas that are threatened by flooding. Flooding and erosion from coastal storms are a frequent problem and may likely become more severe as an impact of future climate change. Development is permitted in federally mapped flood plain areas, as long as it complies with state and federal building-elevation requirements, and is compliant with Village regulations in Mamaroneck Village Code Chapter 186.

The estimated cost for this Priority 2 Property Protection measure is \$50,000. This activity is highly feasible and would require the assistance of a planning consultant.

Section 8 – Draft Action Plan

8.A Introduction

This Draft Action Plan summarizes mitigation strategies applicable to the Village of Mamaroneck's potential hazards identified in Section 4, and the vulnerable properties and populations discussed in Section 5. The Action Plan provides a process for implementing the mitigation activities that were identified in Section 7 (See Tables 7-1 to 7-6) based on the goals and objectives discussed in Section 6. The action items recommended in this plan focus on hazards due to flooding and severe storm events discussed in Sections 4 and 5. This Action Plan proposes mitigation activities that provide interoperability and compatibility among Federal, State and local capabilities and improves coordination and cooperation between public and private entities in a variety of hazardous incident management activities as required by FEMA under the NIMS. The priorities established in Section 7 assure that the most serious problems are addressed first. The Hazard Mitigation Planning Committee also considered several other hazards that are of concern. The recommended actions were reviewed with the Village administration and the Planning Committee and presented to the public.

The proposed mitigation actions in Section 7.B meet FEMA's STAPLEE criteria for developing mitigation actions and priorities. (See Sections 6.A and 7.A.) They are socially acceptable to the community, technically feasible, Protective of or beneficial to the environment and are backed by Legal authority and consistent with current laws, consider Economic benefits and costs and include Environmental considerations. Current community needs were also considered which are acceptable to political decision makers, village representatives, stakeholders, and the public.

The purpose of this Action Plan is to identify which tasks will be implemented first and to outline a strategy for the long-term implementation of each of the items. This Section discusses the following components in this Action Plan:

- Type/ Priority Order
- Action Item
- Relative Cost Benefit/Objectives
- Lead/Administrative Responsibility
- Resources
- Schedule/Duration

- Source of funding

Cost estimates and benefits presented in Section 7 will be considered as each of the priority groups is ordered. The implementation order for each activity item is determined by the potential for reducing risk, costs relative to benefits, availability of village resources and the availability of funding for the project.

Most of the proposed activities are dependent on funding from State or Federal grants. (See Table 8-1.) Some activities may require the involvement of Westchester County, several New York State agencies, various Federal agencies, private stakeholders and civic organizations as discussed in Section 3. Some of these proposed actions require more than a year to complete. Some projects may have already started or are in early planning stages which have been integrated into this plan where applicable.

The proposed items and priorities can change over time as new information or funding becomes available. There may be a change in priorities due to availability of village resources, community sentiment or availability of funding. Some activities may gain or lose political or community support.

This Action Plan, therefore, is a working document, which is expected to change in response to varying conditions and needs. The activities are summarized in Tables 8-2 through 8-4 in the order of their implementation. In the near-term the focus will be on implementation of priority 1 items in Table 8-2. Priority 2 and 3 items will be evaluated each year and implemented as funding and resources become available. Updating the Plan and evaluating priorities will be done as items are completed or priorities change as described in Section 10.

8.B Administrative Responsibility for Action Items

Following review and approval by FEMA, the Village Board of Trustees approves the Multi-Hazard Mitigation Plan before it can be implemented. This approval is documented in Section 9 of this Plan. This Plan will be implemented and administered by the Village of Mamaroneck through the Village Manager who reports to the Board of Trustees. The Village has a staff of officials who will be responsible for administering and implementing the specific proposed

activities. (See Figure 1-3). Depending on the type of project, availability of resources and funding, a specific Village department head or designee such as the Department of Public Works, Building Department or a hired consultant may manage a specific project. In some cases, the Manager may appoint a staff member who will have the authority to administer one or more of the proposed mitigation activities. A management plan consisting of a detailed scope of work, a cost plan, work breakdown, task responsibilities and work schedule will be prepared for each project as an amendment to this Plan.

The designated mitigation action manager will coordinate with village staff participants, stakeholder agencies, community organizations and funding agencies to complete an action item in accordance with the scope of work, regulatory requirements, planned schedule and budget. The Village Manager will have ultimate responsibility for approval and expenditure of project funds. The Multi-Hazard Planning Committee will monitor the progress, accomplishments and budgets of the projects as described in Section 10 of this Plan.

There are six categories of mitigation activities that are included as “Action Type” in Tables 8-2 through 8-4. The type of action will in part define the type of technical and administrative team required to implement and manage a project. These categories were discussed in detail in Section 7.A.2 and include:

- Preventive Measures (PM)
- Public Information Activities (PI)
- Structural Projects (SP)
- Property Protection Measures (PP)
- Emergency Service Activities (ES)
- Natural Resource Protection Measures (NR)

8.C Action Plan Priority Groups

The primary strategy for implementing the plan is to execute it according to the proposed priorities. The activity items in this Plan were organized into three priority groups in Section 7.A.4. The priorities, 1(high), 2 (medium) and 3 (low) were determined in agreement with the Village officers and the Planning Committee. A priority is associated with each action item as shown in Tables 8-2 through 8-4. Group 1 activities are the highest priority. The other groups have a lower priority with Group 3 being the lowest priority. As the Plan is implemented these priorities may change and be reevaluated based on availability of funding, new information,

future community needs and support, stakeholder support, workloads in specific departments, and availability of staff resources.

The implementation of “Priority-Order” in Tables 8-2 through 8-4 is a tentative order for the start and implementation of an activity within a priority group. A Priority-Order of 1-4 for example, represents the fourth item to begin and implement for a priority 1 activity. This order depends on staff availability, funding, other scheduled activities and/or relative importance of completing a task in a given year. It is advisable to spread the work among the different departments so that one group such as the Building Department is not overloaded in a given year.

The schedules listed in Tables 8-2 through 8-4 are general and flexible given the uncertainties in available funding resources. (See Section 8.D below.) The order of implementation of the activity may change depending on the department budgets, shifts in Village priorities, work schedules in specific departments, and availability of staff resources. Thus the year and duration of an activity do not include specific start or end dates. In the text for each activity the general time of year for starting and completion is given. Detailed schedules will be provided when detailed scopes of work or specifications are prepared for each activity.

The STAPLEE criteria for Social, Technical, Administrative, Political, Legal, Economic and Environmental considerations were applied to all of the activity items in Section 7. Therefore, priorities were based on the need for cost-effectiveness, early implementation, dependence on completed activities, economic affordability, availability of administrative resources, and funding. The highest priority activities listed in Table 8-2 were based on the need to be performed before other activities can be implemented or actions already started. Funding and available resources were important considerations for setting implementation order. Actions that can be done using available resources or having identified sources of funds have a higher preference. Action items requiring time for procurement of internal or external funds and staff resources would likely be planned for a future time and have a lower priority of urgency but should not be considered as less important in achieving a goal or objective.

High priority activity items emphasize high benefits relative to the costs of the project. Benefits and costs for each of the proposed actions are given in Section 7.B. Due to the preliminary nature of the activity costs and qualitative assessment of benefits, qualitative judgments of costs vs.

benefits were made. For example, the higher priority tasks are those that can be done with low costs relative to high benefits received (e.g. Prepare a Comprehensive Evacuation Plan). Projects having high costs and high benefits (e.g. Storm Drainage Control) would have a lower priority because of the high costs, and length of time to complete the project. Items such as the assisting in a New York City evacuation plan, which have few significant long-term mitigation benefits to the community, would be given a lower priority.

Future updates to this plan will utilize more detailed cost benefit evaluation. These assessments will consider FEMA Guidance 386-5, *Using Benefit Cost Review in Mitigation Planning*. (www.fema.gov/plan/mitplanning/resources.shtm)

8.D Capability and Resources

The Village of Mamaroneck will have the responsibility, jurisdiction, capability and authority to administrate and implement most of the mitigation activities proposed below. In some instances a neighboring community or other agency may have jurisdiction that requires a joint Memorandum of Understanding to implement the activity. The Village official in charge of a project will be responsible for interfacing with the public and appropriate neighboring jurisdictions, the County, USACE, NYSOEM, FEMA or other agencies identified in Section 3. Responsible officials for the village that may administer these projects are shown in Figure 1-3 in Section 1.

In most cases, the village does not have the financial or human resources to prepare the plans, studies, and engineering designs or implement public outreach and construction required for many of the activities proposed. Therefore, external agency funding for consultants, engineers and contractors may be needed to successfully implement this Hazards Mitigation Plan.

8.E Funding Strategy and Sources

Estimating costs for the mitigation actions was discussed in Section 7.A.3. Best professional judgment and experience was used to provide an approximate cost for each action proposed. Some costs can be budgeted in for in the annual village budget. A number of the projects however, will need to be funded through Federal, State or County grants. The cost estimates are

assumed to have a +/- error of 25%. The minimum costs for any project was assigned a cost of \$25,000. Many activities can be done using in-house resources or supported by a consultant.

Available and potential funding sources were reviewed from the State Hazard Mitigation Plan and Web Pages of the various funding agencies. Summaries of major funding sources that are available to the Village of Mamaroneck are listed in Table 8-1. Identifying specific sources of funding for each activity in Table 8-2 through Table 8-4 is tentative and complex. There are numerous agency programs (Table 8-1) and these change each year depending on legislative appropriations, new regulations and laws, competition for funds and agency priorities. The funding sources identified are not a guarantee for that source or for a particular time frame.

Table 8-1 identifies Federal and State agencies that fund activities proposed in mitigation plans. The most significant source of funds is from FEMA. These are obtained through grant applications administered through NYSOEM. Westchester County has a grant bonding program for Hazard Mitigation Assistance grants. Several other agencies are identified that provide funding for related environmental, capital construction, dredging, and engineering projects.

The Village will provide funding support for those projects that are recommended. For example the Village Board may appropriate a capital improvement budget for upgrading or retrofitting village-owned critical facilities. Specific operating budgets such as the Public Works Department or the Building Department can include supply costs, salaries and consultant fees to complete some mitigation activities. Existing staff time can be used as “in-kind” match to Federal or State funding. Community volunteers can contribute effort to certain activities such as serving on committees or review of plans and documents.

Table 8-1. Potential Funding Sources for Mitigation Activities.

Federal, Funding Sources		
Program	Description	Agency Reference/Contact*
Flood Mitigation Assistance (FMA)	Provides grants to States and communities for pre-disaster mitigation planning and projects to help reduce or eliminate the long-term risk of flood damage to structures insurable under the National Flood Insurance Program. Aimed to reduce repetitive losses.	FEMA Through NYS OEM http://www.fema.gov/about/divisions/mitigation/mitigation.shtm http://www.NYS.OEM.state.ny.us/programs/mitigation/
National Flood Insurance Program	Formula grants to States to assist FEMA communities to comply with NFIP floodplain management requirements (Community Assistance Program).	FEMA http://www.fema.gov/business/nfip/
Hazard Mitigation Grant Program (HMGP)	Provides grants to States and communities for planning and projects providing long-term hazard mitigation measures following a major disaster declaration. Projects are to reduce risks to lives and properties from natural hazards. Enables mitigation measures to be implemented during recovery from a disaster. Projects may include acquiring, retrofitting or relocating structures; constructing localized flood controls; or constructing safe rooms.	FEMA Through NYS OEM http://www.fema.gov/about/divisions/mitigation/mitigation.shtm http://www.fema.gov/government/grant/hmgrp/ http://www.NYS.OEM.state.ny.us/programs/mitigation/
Pre-Disaster Mitigation (PDM) Competitive Grant Program	Grants to States and communities for planning and projects that provide long-term hazard disaster mitigation measures prior to an event.	FEMA Through NYS OEM http://www.fema.gov/about/divisions/mitigation/mitigation.shtm http://www.fema.gov/government/grant/pdm/ http://www.NYS.OEM.state.ny.us/programs/mitigation/
National Dam Safety Program	Technical assistance, training, and grants to help improve State dam safety programs. .	FEMA http://www.fema.gov/plan/prevent/damfailure/ndsp.shtm
National Earthquake Hazards Reduction	Training, planning and technical Program assistance under grants to States or local jurisdictions	FEMA; DOI-US Geological Survey (USGS) Earthquake Program Coordinator: (703) 648-6785 http://www.nehrp.gov/
Disaster Housing Program	Emergency assistance for housing and mortgage and rental assistance. (MRA). Covers disaster-related needs and necessary expenses not covered by insurance. These may include replacement of personal property, and transportation, medical, dental and funeral expenses. Loans are also available for property loss and economic injury.	FEMA http://www.fema.gov/hazard/dproc.shtm
Public Assistance Program (Infrastructure)	Grants to States and Communities to repair damaged infrastructure and public facilities and help restore services following disasters. Mitigation funding is available for work related to damaged components of the eligible building or structure.	FEMA via NYS OEM http://www.fema.gov/government/grant/pa/index.shtm
Repetitive Flood Claims (RFC)	Reduction or elimination of flood damage under the NFIP that have one or more claims. Acquisition, demolition or relocation of severe repetitive loss properties.	FEMA Through NYS OEM http://www.fema.gov/government/grant/rfc/

* Web site addresses as of November 2011. For changed address or additional sources conduct a search on the listed agency's home page, or <http://www.grants.gov/> or search <http://www.google.com>

Table 8-1. (Continued) Potential Funding Sources for Mitigation Activities.

Program	Description	Agency Reference/Contact*
Clean Water Act Section 319 Grants	Grants to States to implement non-point source programs, including support for non- structural watershed resource restoration activities.	EPA Office of Water Chief, Non-Point Source Control Branch (202) 260-7088. 7100
Emergency Watershed Protection (EWP)	Provides technical and financial assistance for relief from imminent hazards in small watersheds, and to reduce vulnerability of life and property in small watershed areas damaged by severe natural hazards.	USDA –NRCS National Office -(202) 690-0848 Watersheds and Wetlands Division: (202) 720-3042
Disaster Mitigation Planning and Technical Assistance	Technical and planning assistance grants for capacity building and mitigation project activities focusing on creating disaster resistant jobs and workplaces.	Department of Commerce (DOC), Economic Development Administration (EDA): (800) 345-1222 www.eda.gov/InvestmentsGrants/Investments.xml
Disaster Recovery Initiative	Grants to fund gaps in available recovery assistance after disasters (including mitigation)	Housing and Urban Development (HUD) Community Planning and Development Grant Programs Divisions in their respective HUD field offices or HUD Community Planning and Development: 202-708-2605
Section 108 Loan Guarantee	Enables states and local governments participating in the Community Development Block Grant (CDBG) Program to obtain federally guaranteed loans for disaster distressed areas.	HUD Office of Community Planning and Development Grant Programs 202-708-3587
Section 205 of the 1948 Flood Control Act	Resources for small flood damage reduction projects	DOD-US Army Corps of Engineers (ACE) Emergency Management contact in USACE field office
Post Disaster Economic Recovery Grants and Assistance	Grant Funding to assist with the long-term economic recovery of firms, industries and communities adversely affected by disasters.	Department of Commerce (DOC) - Economic Development Administration (EDA), EDA Headquarters, Disaster Recovery Coordinator 202-482-6225
School Renovation, Idea and Technology Grant	Grant funding for eligible school renovation and emergency response measures.	US Department of Education
Public Housing Modernization Reserve for Disasters and Emergencies	Funding to Public housing agencies for modernization needs resulting from natural disasters (including elevation, flood proofing and retrofits)	Housing and Urban Development (HUD) Director, Office of Capital Improvements 202-708-1640
Surface Transportation Program	Funding for safety and transportation enhancements. Enhancements include a broad range of safety education, environmental and historically related activities.	US Department of Transportation (DOT) Federal Highway Administration FHWA
Wetlands Reserve Program	Financial and technical assistance to protect and restore wetlands through easements and restoration agreement	USDA – NRCS National Policy Coordinator NCRS Watersheds and Wetlands Division 202-720-3042
Physical Disaster Loans and Economic Injury Disaster Loans	Disaster loans to non-farm, private sector owners of disaster damaged property for uninsured losses.	Small Business Administration (SBA) National Headquarters Associate Administrator for Disaster Assistance: (202) 205-6734
National Estuary Program Long Island Sound Preservation (LIS Stewardship Commission)	Established by Congress in 1987 to improve the quality of estuaries of national importance. For LIS, implementation priorities are habitat restoration, watershed management, disposal of dredged materials, and public education and involvement on Long Island Sound issues.	Environmental Protection Agency (EPA) National Estuary Program

Table 8-1. (Continued) Potential Funding Sources for Mitigation Activities.

New York State Funding Sources		
Program	Description	Agency Reference/Contact*
NY State Emergency Management Office (NYS OEM)	Funding for mitigation planning and project activity through FEMA. See items under Federal funding sources.	New York State Office of Emergency Management (OEM) www.dhSES.ny.gov/grants/
Appropriations through the Governor's Office	Funding for mitigation planning and project activity through special appropriations through the Governor's Office	New York State Office of the Governor
Environmental Protection Fund	Funding to support many of the State's environmental needs. Including development and mitigation related planning initiatives and acquisition projects for conserving open.	New York State Department of State (DOS), Department of Environmental Conservation (DEC), Office of Parks Recreation and Historic Preservation (OPRHP)
Hudson River Estuary Grants Program	Grants available to municipalities located within the geographic boundaries of the Hudson River Estuary and associated shore lands. Grants for education projects; open space planning, inventory and acquisition, or river access; community conservation and river stewardship; watershed planning.	Hudson River Valley Greenway Albany, 12224 (518) 473-3835 Email: hrvG@hudsongreenway.state.ny.us http://www.hudsongreenway.state.ny.us/funding/funding.htm
Empire State Flood Recovery Grant Program	Loans for various projects. Discounted Small Business Loans; Small Business Loans/Lines of Credit.	Empire State Development Corporation 633 Third Avenue New York, 10017 (800) 782-8369
Westchester Co. Flood Task Force Grant Bonding		Westchester Co. Flood Action Task Force planning.westchestergov.com/flood-action-task-force
New York State Office of Homeland Security Grants	Supports projects for emergency response, terrorism and other Homeland Security activities.	Office of Homeland Security, Albany 518-402-2227 www.security.state.ny.us/grants.html https://grants.security.state.ny.us/AccessNotice.jsp
New York State Historic Preservation Grant Program	Funds are available from the Environmental Protection Fund of 1993 (EPF) for acquisition, development, and improvement of parks, historic properties and Heritage Area resources. Preservation projects may include restoration, preservation, rehabilitation, protection, reconstruction or archeological interpretation of a historic property.	New York State Historic Preservation Office nysparks.state.ny.us/shpo/grants/
Local Waterfront Revitalization Program	Community improvements through planning, preservation and redevelopment of important waterfront resources and brownfields. Assistance includes Environmental Protection Fund and Quality Communities Grant Program.	New York State Department of State (DOS) Division of Coastal Resources http://nyswaterfronts.com/grantapps.asp

* Web site addresses as of November 2011. For changed address or additional sources conduct a search on the listed agency's home page, or <http://www.grants.gov/> or search <http://www.google.com/>.

8.F Implementation of Priority 1 Mitigation Actions

Group 1-priority action items are listed in Table 8-2 and have a high priority. These items have a high benefit relative to costs and a high need to be implemented. Several actions are easily and implemented, have readily obtainable resources and available funding. Some of these activities may need to be completed prior to starting other activities. The “Priority Order” in Table 8-2 is a tentative implementation order for the start of an action. Other information can be found for each activity and goal in Section 7.B in discussions associated with Tables 7-1 through 7-6. The total estimated cost for these 18 priority 1 proposed action items is \$26,450,000.

8.F.1 Channelization and Improvement of the Confluence in the Sheldrake and Mamaroneck Rivers

The principal objective of this mitigation action is to "implement a flood risk management project". This project has a high priority of 1 based on the need for reducing the risk of floods in Mamaroneck. There would be long-term benefits for the community by reducing flood risk caused by these two rivers. A number of studies have been conducted as far back as 1976, however an implementation plan is still developing. Several alternatives to address the flood risks are being analyzed and compared - Stream/channel modifications, tunnel, detention basins, bridge modifications, and/or a combination of these – and one will ultimately be selected for implementation (construction). Implementation of the selected plan would improve the efficiency and capacity of the two rivers, especially at the confluence in Columbus Park, where floodwaters back up and create the majority of flood damages. The minimum USACE requirement for a benefits-to-cost ratio is 1:1. Although the cost to complete the project is high, the long-term benefits are high when considering the costs of potential future losses if the project is not constructed. If the project is approved and funding is received, the first constructible element of the project could be completed within 2 years. Depending on the details of a final selected plan, the entire project could take several years to complete. Estimated costs for these alternatives are being developed, and when weighed with the economic benefits and environmental impacts, will be the basis for selecting the plan.

Key participants in the improvements would include the USACE, NYSDEC and Planning Department, Westchester Co. NY. USACE will require Congressional appropriation to construct the project. Although this project is feasible, the ongoing studies, local preferences, and Environmental Impact Statement findings may alter the project's design details. The Village Manager will coordinate with the various government agencies involved.

Table 8-2a. Priority 1 Action Items Implementation - Village of Mamaroneck Hazard Mitigation Plan.

Action Type*	Priority - Order	Action Item	Costs** (\$1,000)	Administrative Responsibility	Schedule/ Duration	Funding Sources
SP	1-1	Channelization and Improvement of Rivers' confluence	\$20,735	USACE / Village DPW	2 Years, starting 2015	USACE, NYSDEC, Westchester, Co.
PM	1-2	Inflow and Infiltration removal	\$2,500	Village DPW	Ongoing	FEMA/NYSOEM/ NYSDEC/Westchester Co.
PM	1-3	River debris and obstruction removal	\$1,000	Village DPW	Ongoing Several times/year	FEMA/NYSOEM/ NYSDEC/Westchester Co.
PP	1-4	Enhance inspections	\$50	Village Bldg Dept	Ongoing	Village Budget
SP	1-5	Continue relining storm and sanitary sewer lines	\$900	Village DPW	Ongoing	FEMA/NYSOEM/ NYSDEC/Westchester Co.
PM	1-6	Install backflow/check valves	\$950	Village DPW	Ongoing	FEMA/NYSOEM/ NYSDEC/Westchester Co., Village DPW, Property Owners
ES	1-7	Update Emergency Plan and Evacuation Plan	\$30	Village Fire Dept	1 Year	Village Budget
ES	1-8	Generators for emergency facilities	\$125	Village Administration	1 Year	FEMA/NYSOEM
PI	1-9	Revise communications for 911 protocols	\$25	Village Administration	Reviewed Annually	Village Budget
PP	1-10	File required CRS documentation	\$25	Village Administration	1 Year	Village Budget
PP	1-11	Develop and manage the CRS program ***	\$25.	Village Manager	Ongoing	Village Budget
PI	1-12	Procure Public Address System	\$40	Village Emergency Services	1 Week	FEMA/NYSOEM
		Subtotal Cost	\$26,405			

Table 8-2b. Priority 1 Action Items (Continued) - Village of Mamaroneck Hazard Mitigation Plan.

Action Type*	Priority - Order	Action Item	Costs** (\$1,000)	Administrative Responsibility	Schedule/ Duration	Funding Sources
ES	1-13	Multi-lingual educational materials	\$35	Village Administration	6 Months	FEMA/NYSOEM
PI	1-14	Multi-lingual flooding preparedness manual	\$35	Village Administration	6 Months	FEMA/NYSOEM
PM	1-15	Trim trees and limbs	---	Village DPW	Ongoing	Con Edison
PM	1-16	Relocate equipment impacted by floods	\$25	Village DPW	One Time	Village Budget
ES	1-17	Plan for pre-evacuation and equipment staging	\$25	Village Administration	6 Months	Village Budget
PM	1-18	Audit village facilities and resources for strengths and weaknesses	\$25	Village Manager	3 Months	Village Budget
ES	1-19	Purchase emergency response equipment	\$150	Village Manager	6 Months	FEMA/NYSOEM
		Subtotal Cost	\$ 295			
		Priority 1 Total Cost	\$26,700			

Table 8-2 Footnotes: * See Section 8B for definition of Action Type. ** Detailed cost estimates will be prepared for work that will be scoped out or when Plan is periodically updated. *** Costs/year

8.F.2 Inflow and Infiltration Removal

Removing inflow and infiltration problems from storm and sanitary sewer overflow is a Preventative Measure with a high priority order of 1-2. (See Table 8-2a.) Its primary benefit and objective is to prevent sewage infiltration into storm water and to "improve the storm water collection and drainage system."

The Village DPW will take the lead in this project. The work can be managed by the DPW with the assistance of a contractor. Funding for the activity would be requested from FEMA through Hazard Mitigation Program Grant applications, for filing with the NYSOEM and NYSDEC. Key participants would include the NYSDEC and the Planning Department, Westchester Co. NY. This project is expected to take a year to complete. The estimated cost is given in Table 8-2a.

8.F.3 Removal of Debris and Obstructions in Rivers, Dams and Catch Basins

The Village DPW would continue to clean and maintain catch basins as a Preventative Measure and is given a Priority Order of 1-3. This activity is meant to "improve storm water collection and drainage. They would remove debris from the Village streets, streams, dams and rivers. The relative benefits achieved are high compared to the moderate costs.

This activity will be scheduled several times a year and will become part of the Village's ongoing maintenance.

The Village DPW will take the lead in this project. Private contractors may be needed to assist in the initial cleanup. Funding for the activity would be requested from FEMA through Hazard Mitigation Program Grant applications, for filing with the NYSOEM. Key participants would include the NYSDEC and the Planning Department, Westchester Co. NY.

8.F.4 Enhance Inspection

Inspection of buildings, structures, and other properties in the Village should have a focus on flood mitigation. This Property Protection activity includes adding applicable building codes and zoning regulations that enhance flood protection. This item has a priority order of 1-4 and a high

benefit of identifying problems prior to a flood event at a low cost. This activity would become part of the Village ongoing inspection process.

The Village Building Department will take the lead using existing staff from the Building Department, Zoning Board and Flood Mitigation Advisory Committee. Funding of this low cost activity could be authorized by the Village Board of Trustees.

8.F.5 Continue Relining and Refurbishing Sewer Lines

The Village DPW will take the lead in this Structural Project with the assistance of a contractor. The activity has a Priority Order of 1-5. The Village would reline and refurbish storm and sanitary sewer lines to repair leaks and damaged sections which reduce effective drainage. There would be a significant benefit compared to the cost of the project since flow through the sewers would be improved relative to costs thereby mitigating flooding. This would have the added benefit of reducing pollution in the rivers as well as Mamaroneck Harbor, thus enhancing the recreational value of these natural resources.

Upon receipt of funding, this project would require about a year to complete. Funding for the activity would be requested from FEMA through Hazard Mitigation Program Grant applications, for filing with NYSOEM. Key participants would include NYSDEC and the Dept. of Planning, Westchester Co. NY.

8.F.6 Install Backflow/Check Valves in Service Lines of Affected Buildings

The Village proposes to install back flow valves into the service lines of residents thus preventing the sewage from entering buildings during flooding events. The benefit for this project relative to costs is high. This Preventative Measure has a priority order of 1-6.

The Village DPW will take the lead in this project. Funding for the activity would be requested from FEMA through Hazard Mitigation Program Grant applications for filing with NYSOEM. Key participants would include NYSDEC and the Westchester Co. NY Department of Planning. The cost for this project will also be borne by the homeowners. If funding is received, the project could be completed in a period of from 6 months to 1 year.

8.F.7 Update Emergency Operation Plan and Evacuation Plan

This Emergency Services action has a priority order of 1-7. The Hazards Mitigation Committee will review the Emergency and Evacuation Plans for updates and revisions. The updates will follow FEMA's NIMS requirements. Good planning leads to better outcomes during emergencies. The Village Fire Department will take the lead in this effort. There will not be a need for outside funding for a consultant because the project will use Village staff and budget. The estimated cost is \$30,000. Completion of this project should take less than a year. This Plan will provide long term benefits to the community in the event of a disaster.

8.F.8 Obtain Permanent Power Generators for Emergency Services and Facilities

This activity is an Emergency Services action with a Priority Order of 1-8. The purchase of a power generator for the EMS facility will prepare the community for any hazard that causes power outages. The Village Administration will take the lead in this acquisition. This project would result in long term benefits to the community by being prepared for an emergency when electrical power is out. The value received from its use in saving lives is worth more than the cost of the generator.

The start of this activity will begin immediately upon receipt of funding from FEMA via NYSOEM. Installation is expected sometime during 2012.

8.F.9 Revise Communication Protocols Including the Reverse 911 Warning System

A Reverse 911 system is a Public Information system that can alert residents in the case of an emergency situation. It can provide an initial warning as well as specific instructions to protect at-risk citizens. This activity has a high priority order of 1-9 and is highly feasible. Revising communication protocols has a low cost.

For those individuals who have cell phone service only or who are not receiving calls, the village will be placing a link on its website or provide manual forms to give residents a means for registering their phone numbers for the Reverse 911 system.

To minimize these problems, communication protocols and procedures need to be specified and a registry system for non-accessible phones implemented. Public information about the system needs to be disseminated to the community. Criteria need to be established to minimize false alarms and what constitutes a serious hazard.

The Village Administration will take the lead in this effort and has the resources to complete the activity. There will not be a need for outside funding. Completion of this activity will take less than a year, but, there will be long term benefits to the community. Since the project does not result in any additional expense, the cost benefit ratio is excellent.

8.F.10 File Required CRS Documentation

The Village does not currently qualify for CRS rating. However, it is already conducting some activities that provide credit points for the rating. Other activities that would generate additional points (such as public information activities) would be easy to implement at a low-cost. The Village should assess its NFIP compliance, to qualify for a CRS rating of at least 7.

This Property Protection activity has a Priority Order of 1-10. Relative benefits for the cost are high. The Village administration will be the lead for this activity. Costs will be in kind services from the Village budget. When the Board authorizes this activity it may require one year to complete.

8.F.11 Procure a Public Address System to Announce Potential Emergencies

This activity requires a public address system (PA system) to announce a potential emergency and warn neighborhoods of flood conditions, a serious storm hazard or downed power lines.

A key objective of this Emergency Services activity is to “Improve receiving communications” and the primary benefits would be improved communication during an emergency and protection of the public from the hazard. The costs are relatively low in relation to the benefits of having an informed community. Based on the ability to inform the community at a low cost and high benefit of protecting the public, this activity is given a high Priority Order of 1-12

The Village Emergency Services will be responsible for procuring and installation of the system. This group has the resources to implement this warning system. Funding for the activity would be requested from FEMA through Hazard Mitigation Program Grant applications, for filing with NYSOEM. The procurement of the PA system can begin upon receipt of funding and can be installed and tested in a week.

8.F.12 Create Multi-Lingual Educational Materials for LMC TV, and Videos to Distribute through Schools

Multi-lingual educational materials are needed to communicate emergency procedures before and during a hazardous event. The primary objective of this Public Information activity is to “heighten public awareness through a multi-level public relations campaign”. A key tool to achieve this objective is to create multi-lingual educational materials in English and Spanish for the community’s public TV service, LMC TV.

A major benefit will be improved hazard communication with non-English speaking residents which will protect them from the hazards of concern. The benefits relative to costs are high. The Village administration will take the key responsibility for this activity with the assistance of the Village Hispanic Resource Center. A video technician may be required to prepare DVDs. Funding for the activity would be requested from FEMA through Hazard Mitigation Program Grant applications for filing with NYSOEM. If funding is received, the project could be completed in a period of 6 months.

8.F.13 Make a Multi-Lingual Flooding Preparedness Procedures Manual for the Community

This Public Information activity is intended to “Enhance residents’ awareness of emergency procedures” and is assigned a Priority Order of 1-14. Preparing a multi-lingual manual will aid the community in the event of a serious flood. It will include warning systems and locations of emergency shelters.

The costs are low and the benefits are high. A major benefit will be improved hazard communication with Spanish and English speaking residents to help protect them from the

hazard of concern. The Village administration will take the key responsibility for this activity with the assistance of the Village Hispanic Resource Center. Funding for the activity would be requested from FEMA through Hazard Mitigation Program Grant applications for filing with NYSOEM. If funding is received, the project could be completed in a period of 6 months.

8.F.14 Develop a CRS Program Plan and Manage the Program

See Section 7.B.4 regarding this Community Rating System (CRS) Program. This activity is a Property Protection action with priority order of 1-11. A part-time CRS coordinator on the Village staff is needed to develop and manage a program specifying CRS requirements and procedures. The primary objective is to "reduce insurance premiums for flooding."

This activity has a high priority and high benefits relative to its low cost. The lead responsibility for this activity would be the Village Manager who would appoint a part-time coordinator. The Village has the capabilities and resources required for this activity. The source of funding would be the Village budget with the approval of the Village Board of Trustees. This project can begin as soon as the Village Board authorizes it. This is an ongoing activity using existing staff.

8.F.15 Trim Trees and Limbs that Endanger Utility Lines

This activity is a Preventive Measure with a Priority Order of 1-15. The Village will continue to work with the local utilities to remove and trim trees that are a hazard to utility lines. There will be very little if any additional cost to the Village to accomplish this project, since DPW workers can perform the work on their normal shifts and utility employees are paid by the utilities.

The benefits achieved would be long term and would reduce power outages and damage to properties. This project is ongoing and will continue as locations are found during inspections, where trees need to be trimmed. Since the project does not result in any additional procurement of funds, the cost benefit ratio is excellent.

The Village DPW will be the lead on this activity and has the capability required for the task. The major labor for the tree work will be the Utilities responsibility.

8.F.16 Relocate Equipment Impacted by Floods

The primary objective of this Preventative Measure is to “Identify and move equipment to a safe location”. It has a Priority Order of 1-16. DPW and FD staff would be used to identify facilities and equipment affected. This is a cost effective use of Village staff to identify emergency equipment and facilities that are at risk to flooding.

Transferring emergency equipment and supplies to safe facilities will help prepare for any flooding emergency for a low cost and a high benefit. It is assumed these new locations are existing Village facilities. The lead for this activity would be the DPW. The activity could commence immediately since no additional funding source would be required.

8.F.17 Plan for Pre-Evacuation and Staging of Emergency Equipment

This Emergency Services objective is to “Improve preplanning for mitigation of hazards” and has a Priority Order of 1-17. Implementation of this activity will save lives by providing an effective pre-evacuation plan. A benefit of this activity is to improve preparedness for an emergency.

Village staff would be used develop a plan for staging emergency equipment as part of preparation for evacuating an impacted area. This is a cost effective use of Village staff to identify emergency equipment and facilities that are needed to respond to flooding hazards. This preparation will help in any flooding emergency for a low cost and a high benefit using in-house funds. Since no additional funding is being requested, the pre-evacuation measures can be performed at any time by the Village departments who are involved in an emergency response.

8.F.18 Audit Village Facilities, Equipment, and Personnel for Strengths and Weaknesses

A key objective of this Preventative Measure is to “Improve preparedness and response.” An audit of the Village’s strength and weaknesses will help prepare for any emergency for a low cost and a high benefit. This task is given a Priority Order 1-18.

The lead for this action is the Village Manager. This task will be performed by Village staff. Since additional funding is not requested, the audit can start at any time. It is expected to take 3 months to complete.

8.F.19 Purchase Emergency Response Equipment

The Village Fire Department has developed a list of emergency response equipment needed to be prepared for any hazard impacting the Village. The Village Manager has the lead for this action item. It has a high priority. The estimated costs of \$150,000 will be requested from FEMA/NYSOEM. It is highly feasible and is cost effective.

8.G Implementation of Priority 2 Mitigation Actions

Group 2 priority action items are listed in Table 8-3 and are a moderate (3) priority. Some of these action items have relatively high costs but also have high benefits. Priority group 2 contains tasks that protect property, human health and personal safety. The implementation priority (Priority Order) in Table 8-3 is a tentative order for the start of an activity. Other relevant information can be found for each activity in Section 7.B. Mitigation actions were summarized for each of the six listed goals associated with Tables 7-1 through 7-6. The total estimated cost for the priority 2 proposed action items is \$ 5,675,000.

8.G.1 River Dredging and Silt Removal

The Army Corps of Engineers (USACE) recommended dredging of the Sheldrake and Mamaroneck Rivers as part of a total mitigation effort. This activity is a Preventative Measure to “implement flood control projects”. Mitigation of these rivers will contribute to flood reduction. There would be a moderate benefit relative to cost with a Priority Order 2-1.

Time will be required to coordinate and obtain a consensus on the work to be done between the stakeholders, regulatory agencies, Village administration and the public. Actual dredging of the Rivers is expected to last six months to one year and would be under the jurisdiction of the USACE. They would continue dredging the Sheldrake and Mamaroneck Rivers in the Village to remove silt. The Village Manager and DPW will provide oversight. Funding for the activity would be requested from FEMA through Hazard Mitigation Program Grant applications, for filing with

the NYSOEM. Supplemental support may come from the USACE. Key participants would include the USACE, NYSDEC and the Planning Department, Westchester Co. NY.

Table 8-3. Priority 2 Action Items - Village of Mamaroneck Hazard Mitigation Plan.

Action Type*	Priority - Order	Action Item	Costs** (\$1,000)	Administrative Responsibility	Schedule / Duration	Funding Sources
PM	2-1	River dredging and silt removal	\$1,000	USACE/Village Manager	Ongoing	FEMA/NYSOEM/ USACE/NYSDEC/ Westchester Co.
SP	2-2	Repair, raise, remove and replace bridges	\$15,000	Village Manager	10 Years	FEMA/NYSOEM/ NYSDOT
PM	2-3	Change code for BFE	\$25	Village Bldg Dept., NYSDEC	1 – 3 Years	Village Budget/ NYSDEC
PM	2-4	Improve zoning and codes	\$25	Village Administration	6 Months – 1 Year	Village Budget
SP	2-5	Check vulnerability of waterfront structures	\$50	Harbor Master	3 – 6 Months	FEMA/NYSOEM
PP	2-6	Maintain an accurate inventory of (SRL) properties ***	---	Village Administration	Ongoing	Village Budget/ CRS Program Cost
ES	2-7	Evaluate safety and relocation of waterborne equipment	\$25	Harbor Master	3 – 6 Months	Village Budget
PM	2-8	Prepare for more severe storms	\$25	Village Administration	Ongoing	FEMA/ Village Budget
SP	2-9	Reinforce existing structures to ensure they are flood safe	\$400	Village Manager	2 Years	FEMA/ Village Budget
PP	2-10	Establish long-term plan to protect coastal and Riverine residential areas	\$50	Village Manager	1 Year	FEMA/NYSOEM
		Subtotal Cost	\$16,600			

Table 8-2 Footnotes: * See Section 8B for definition of Action Type. ** Detailed cost estimates will be prepared for work that will be scoped out or when Plan is periodically updated. ***Costs/year

8.G.2 Repair, Raise, Remove and Replace Bridges

The Village should replace the Jefferson Avenue Bridge, located in the center of the Village. Debris flowing downstream during a heavy rain event often gets stuck in this area and reduces the normal flow capacity of the river.. This activity is Structural Project has a high cost but will benefit the Village by reducing street flooding in the long term. The project has a Priority Order 2-2.

The Village Manager's Office will take the lead in this project. Funding for the activity would be requested from FEMA through Hazard Mitigation Program Grant applications, for filing with the NYSOEM. Additional support may come from NYSDOT. Key participants would include the USACE, NYSDEC and Westchester Co. NY. If funding is received, the project could be completed in a period of from 18 months to 2 years.

8.G.3 Develop a Plan and Change Code to Base Flood Elevation (BFE)

One solution for mitigating flood damage to homes is to elevate them above the flood level. Residential construction must have the lowest floor including the basement elevated to more than +2 feet above the BFE. Relative costs to change existing building codes are low but the actual cost of elevating buildings above BFE is high. Due to predicted rising sea levels, the Village of Mamaroneck may want additional provisions above BFE in excess of state minimum requirements.

The Village Building Department will take the lead using existing staff with assistance from the Zoning Board and Flood Mitigation Advisory Committee. Since additional funding is not requested, the planning activity can start at any time. It is expected to take 6 months to a year to complete since the planning and approval process takes time and requires public involvement.

8.G.4 Improve Zoning, Storm Water, Erosion and Sediment Control Codes

This Preventative Measure activity should include reviewing and revising all applicable codes and zoning regulations that enhance flood protection. This mitigation action has a Priority Order of 2-4 and a high benefit of protecting property prior to a flood event at a low cost.

The Village administration will take the lead using existing staff from the Building Department, Zoning Board and Flood Mitigation Advisory Committee. Any new or revised requirements will

require Board of Trustees review and approval and incorporation as Village law. Since additional funding is not requested, the planning activity can start at any time. It is expected to take 6 months to a year to complete since the planning and approval process takes time and requires public involvement.

8.G.5 Check Vulnerability and Stability of Waterfront Sea Wall, Docks, Pilings and Gas Tanks

Waterfront structures such as seawalls, piers, docks and service buildings are at risk of damage from storms, ice jams, and tidal surges. These shoreline structures in the Mamaroneck Harbor and Long Island Sound need to be checked for vulnerability and stability. This Structural Project has a priority order of 2-5.

The Harbor Master would be the lead agent on this activity. This activity is highly feasible using Village staff resources and a waterfront building consultant. The benefit is to “prevent damage to piers, docks and buildings.” These benefits are high relative to the estimated cost. The activity can start at any time after receipt of funding. It is expected to take three to six months to complete the inspection and the report. Funding for the activity would be requested from FEMA through Hazard Mitigation Program Grant applications, for filing with the NYSOEM.

8.G.6 Maintain an Accurate Inventory of Severely Repetitive Loss (SRL) Properties

See Sections 7.B.4 and 8.F.14 above regarding this CRS Program. This program will require a part time CRS coordinator on the Village staff to record and manage the inventory. This activity has a Priority Order of 2-6 and high benefits relative to its low cost.

The Village administration will take the lead using existing in-house staff. Since additional funding is not requested, the planning activity can start at any time. It is expected to take 6 months to a year to complete the inventory of SRL properties

8.G.7 Evaluate Safety and Possible Relocation of Waterborne Equipment (Police, Fire, and Harbor Master Boats)

This Emergency Services activity will “Identify and move equipment to a safe location”. A benefit of this activity is to protect boats and other associated emergency equipment during storms.

The Harbor Master with the assistance of Village staff would develop a plan for protecting water-borne equipment from major storms and storm surges. This preparation will help protect equipment from any flooding emergency for a low cost and a high benefit. This task is given a Priority Order of 2-7. The implementation of this activity can be performed by the departments who utilize this equipment.

Since additional funding is not requested for this activity, it can start at any time. It is expected to take three to six months to complete the inventory of equipment and recommendations.

8.G.8 Prepare for More Severe Storms

The Village will need to review and update floodplain management codes for future building projects. This is a Preventative Measure with a Priority Order of 2-8. The cost- benefit assessment is high for future residents.

Additional funding would be requested from FEMA for a consultant. Additional in-kind costs would be incorporated into the Village budget. The planning activity can start when funding is approved. It is expected to take 6 months to a year to complete the model runs and make code recommendations.

8.G.9 Reinforce Existing Structures to Ensure They are Flood Safe

This activity is a Structural Project with a moderate priority. The Village Manager will be the lead agency. Residences and businesses in flood zones will need to be identified and inspected for structural problems which need mitigation. The duration of this activity may require two years. The Village plans to request funding FEMA.

8.G.10 Establish Long Term Plan to Protect Coastal and Riverine Residential Areas

Flooding and erosion from coastal storms may likely become more severe as an impact of future climate change. The Village Manager will have the administrative responsibility for establishing a long term plan to protect coastal residential areas. The estimated cost for this Priority 2 Property Protection measure is \$50,000. This activity is highly feasible and would require the assistance of a planning consultant.

8.H Implementation of Priority 3 Mitigation Actions

Group 3 Priority items are listed in Table 8-4. The total estimated cost for these six (6) items is \$850,000.

8.H.1 Redirect Wing Wall and refurbish bridge at Anita Lane and Valley Place

Wing walls provide additional support and retention of stream banks and bridges. Damaged walls can impede water flow and increase erosion. A key objective is to improve storm water collection and drainage. A benefit is improvement of storm water flow that will reduce flooding. The bridge at Anita Lane and Valley Place also has a center abutment that needs to be removed. If funding is received, the project can be completed in 18 months at a preliminary estimated cost of \$750,000. Westchester Co. has the primary responsibility for this activity.

This Structural Project has a low Priority Order of 3-1. It would benefit flood control at a moderate cost. Westchester Co. will take the lead in this project with cooperation from the Village DPW. A contractor will be needed to perform the excavation work. Funding for the activity would be through Westchester County DEF and Westchester County Budget.

Table 8-4. Priority 3 Action Items Implementation - Village of Mamaroneck Hazard Mitigation Plan.

Item Type	Priority-Order	Action Item	Costs (\$1,000)	Administrative Responsibility	Schedule / Duration	Funding Sources
SP	3-1	Redirect wing wall and refurbish bridge at Anita Lane and Valley Place	\$750	Westchester Co.	18 Months	Westchester Co. DEF/ Westchester Co. Budget.
PP	3-2	Raise vulnerable properties above BFE or utilize other protective measures, and amend zoning codes***	\$250 /Bldg	Village Building Dept. & Property Owners	18 Months – 2 Years	FEMA/NYSOEM/ NYSDOT/USACE/ Westchester Co./ Individual Property Owners
PM	3-3	Develop a coordination plan between neighboring municipalities	\$25	Village Administration	3 – 6 Months	Village Budget
ES	3-4	Work with county and transit authority to assist in NYC evacuation	\$30	Village Fire Department Emergency Services	3 – 6 Months	Village Budget
NR	3-5	Review documents of NOAA and organizations on coastal impacts	\$25	Village Committee for the Environment	6 Months – 1 Year	Village Budget
PM	3-6	Participate in programs to lower carbon footprint	\$25	Village Manager	Ongoing	Village Budget
		Subtotal Costs	\$1,105			

Table 8-2 Footnotes: * See Section 8B for definition of Action Type. ** Detailed cost estimates will be prepared for work that will be scoped out or when Plan is periodically updated. *** Costs/ Building

8.H.2 Raise Homes Above BFE or Utilize Other Protective Measures

See Section 7.B.1.10 above for changing BFE Code. Raising homes in the flood plain will require revisions to the Village Zoning Code, Floodplain Management requirements, subdivision regulations, housing standards or other relevant Village Code Chapters or planning documents. Buildings that are impacted by flooding need to be identified and funding obtained to elevate these structures more than +2 feet above the BFE.

This is a Structural Project with a Priority Order of 3-2. Raising homes to meet BFE requirements would be costly but effective. This project would meet the objective to protect Critical Facilities, buildings and infrastructure for damage and loss.

The Village Building Department will take the lead in this project. Property owners will contribute to funding improvements to their properties. Additional funding for the activity would be requested from FEMA through Hazard Mitigation Program Grant applications, for filing with the NYSOEM. Additional support may come from NYSDOT. Key participants would include the USACE, NYDOT and Westchester Co. NY. If funding is received, the project could be completed in a period of from 18 months to 2 years.

Raising homes or buildings may not always be a pragmatic solution, especially for major commercial or industrial buildings. Alternative flood proofing measures should be investigated. For example, flood mitigation doors, dams, or barriers have been deployed across the United States, and if these are structurally and economically feasible, then they certainly can be utilized.

8.H.3 Develop a Coordination Plan Between Neighboring Municipalities

This Preventative Measure key objective is to “coordinate with neighboring communities with a Priority order of 3-3. Different municipalities and jurisdictions may have different procedures that may delay assistance of a neighboring community. This remedial activity is intended to develop a coordination plan that will be consistent between municipalities and include NIMS approach to hazard incidents. NIMS encompasses incidents as diverse as wildfires, floods, hazardous materials releases, nuclear accidents, earthquakes, hurricanes and tornadoes. The emergency response uses the same management methods, language and organization. The cost of this activity is low and the benefits are limited to a small group of people.

8.H.4 Work with County and Transit Authority to Assist in NYC Evacuation

Mamaroneck officials will need to plan and coordinate with Westchester Co. officials, neighboring communities and the MTA and prepare procedures pertaining to the Village's role in the evacuation. This is a Emergency Services activity with a Priority Order of 3-4

The most common hazard that is likely to trigger an evacuation is a sizable hurricane. The cost for generating the plan for Mamaroneck's role is low relative to the potential impact of doing nothing. The lead administrative responsibility would be the MTA with the participation of the emergency services group in the Police Department. Since additional funding is not requested to complete the Coordination Plan, it can start at any time. It is expected to take three to six months to complete.

8.H.5 Review Documents of NOAA and Organizations on Coastal Impacts

This Natural Resource activity has a primary objective to "Educate the community about climate impacts". The benefit of improved planning which considers potential future changes, the objectives would largely be achieved over the long term.

The lead administrative responsibility would be the Village Committee for the Environment. Since additional funding is not requested to complete activity, it can start at any time. It is expected to take six to 12 months to complete. The activity does not result in any additional Village expense. The cost benefit ratio is limited. This activity has a Priority Order of 3-5

8.H.6 Participate in Programs to Lower Carbon Footprint

This Preventative Measures activity has a primary objective to "Educate the community about climate impacts". The benefit of reduced greenhouse gasses considers potential changes over time. Therefore, the objectives would largely be achieved over the long term.

The lead administrative responsibility would be the Village Manager's Office. Since additional funding is not requested to complete activity, it can start at any time. The activity does not result in any additional Village expense, the cost benefit ratio is uncertain. It is expected that any changes in the carbon footprint would be over a long time period. Costs for this activity could be incorporated into the Village budget. This activity is given a Priority Order of 3-6.

8.I Next Steps

The above action plan emphasizes implementation of the proposed mitigation activities based on priorities that consider costs and benefits as well as Social, Technical, Administrative, Political, Legal, Economic and Environmental (STAPLEE) considerations. Once the Village officials review and accept this Action Plan, there are two additional steps needed to complete this Flood Plain Management & Hazard Mitigation Plan. They are:

- Section 9 – Adopt the Plan; and
- Section 10 - Implement, Maintain, Evaluate, and Revise the Plan

Prior to the official adoption of the plan, the Village will submit the plan to NYSOEM for review and comment. NYSOEM will forward the plan to FEMA for their comments. Upon receipt of the agencies' comments, the plan will be revised; incorporate all required changes and resubmitted for final review and approval by NYSOEM and FEMA.

Section 9 - Implement, Maintain, Evaluate and Revise the Plan

Pending final approval of this Multi-Hazard Mitigation Plan FEMA, the Mamaroneck Village Board of Trustees will officially adopt the Plan as documented in Section 10. This Section begins with the implementation of the Plan, discusses how the plan will be maintained, evaluation of progress and the process of plan revisions. The Planning Committee, described in Section 1 and Figure 1-3, under direction of the Chairperson, will review and monitor the progress of the plan. The Village Board of Trustees is responsible for approving the implementation of the Plan and any substantial revisions. Current officials of the Village or the Committee including the Village Manager, Public Works Foreman, Fire and Police Chiefs, Building Inspector or other Village officials and consultants appointed by the Mayor or the Board will be responsible for administering or managing specific projects proposed in Section 8.

This Plan is considered an active document. Once the Plan is approved and implemented, the Planning Committee will maintain the Plan through periodic review of the schedule, preparation of detailed plans or specifications for funded activities, monitoring the plan's progress and evaluating the plan's successes. As this plan is implemented, the Committee will review and evaluate any additional agencies, organizations, contributors or stakeholders that are needed to advise and participate in a particular activity.

9.A Plan Implementation Process

9.A.1 Plan Administration

The Committee Chairperson (currently the Village Manager) will be responsible for the administration of the Plan. The Manager will assure that the Plan is implemented; maintained, and evaluated for its effectiveness, and that it is updated in a timely manner. Plan updates will be added as Attachments to this present Plan. The progress of the work activities will be monitored; the schedule tracked in monthly activity progress reports and reviewed by the Plan Administrator.

The Manager will be responsible for:

- Monitoring and maintaining project budgets,
- Scheduling and coordinating committee meetings,
- Meetings or conference calls with funding agencies,
- Informing and coordinating stakeholders and;
- Keeping community members informed.

The Plan's administrator will work closely with the Committee and the Board of Trustees to assure that they are fully informed of progress on activities. The administrator will assure that quarterly progress reports and updates are provided to the committee and to funding agencies via NYSOEM by the end of the first week of each month. The quarterly progress report should contain the following information to help monitor the program:

- Grant Program
- Activity item(s) covered
- Reporting Period
- Village Program Administrator
- Funding Agency
- Type of Plan
- Plan Status
- Key deliverable reports, plans, design drawings or studies
- Activity technical progress
- Key meetings, phone conferences or site visits
- Key Successes
- Problems encountered
- Schedule Status and Progress
- Budget Status
- Evaluation of the plan's effectiveness

Each Activity Leader or Manager will be responsible for the successful implementation of their project or activity item. Their primary responsibilities include:

- Managing the activity's budget,
- Maintaining the schedule,
- Monitoring and oversight of the work,
- Assuring adherence to the scope of work or specifications,
- Informing the Plan Administrator of progress or problems.

9.A.2 Public Participation

Improving the public participation program is a key goal of this mitigation plan. The Mamaroneck community will continue to be notified of all important project activities, reports, public meetings and recommendations through the expanded Village Web Site. Notifications will also include news bulletins and public notices that are published in the local newspaper. The Activity Leader for each specific project will be responsible for communicating with the public. The Village Web Page will be updated and will include items related to emergency planning. (<http://www.village.mamaroneck.ny.us/Pages/index>) At a minimum one public meeting a year will be held to address the status and progress of this Hazard Mitigation Plan. All annual reports, technical reports, plan updates and amendments will be available at the Village Hall and the public library for public review and input.

The public participation program for this Hazard Mitigation Plan was described in Section 2 of this Plan. Residents actively participated and provided input in public meetings and expressed concerns verbally and in writing about the street and home flooding they face with major rain storms. Strong interest and concern was shown by the community in this Plan.

The public will continue to be involved in the revision and updating process. Meeting notices will be advertised and published. The Mayor, the Village Manager and staff, and elected trustees will continue to meet and discuss hazard issues with the community and impacted residents. Public meetings on key issues will continue and notices and progress will be published in local papers. The Village will continue to post updates on their Website: (<http://www.village.mamaroneck.ny.us/Pages/index>) The Village will also send e-mail updates to individuals that request them. These meetings can be accessed through LMC-TV the local public access television station. They can be viewed on Cablevision channel 76 or Verizon

channel 35. The Board meetings can be viewed online at www.lmc-tv.org Videos on Demand, Municipal meetings.

The Village Manager will be responsible for implementing, scheduling and coordinating public involvement and assuring that the website is operating and updated. Public comments will be responded to and integrated into the plan as they are received or with each five-year update. Updates will be submitted three months prior to the due date to allow for review and comment.

9.A.3 Incorporation with Other Plans and Activities

The Village of Mamaroneck has also cited other related or ongoing projects and draft plans as part of this Hazards Mitigation Plan. These projects and plans include:

- Village Emergency Response/Operations Plan
- Comprehensive Flood Action Plan – 2009 Phase
- Mamaroneck and Sheldrake Rivers Basin Flood Risk Management Reevaluation Study
- Phase II Stormwater Management Plan
- Comprehensive Plan Update – Village of Mamaroneck, adopted February 2012, with errata sheet authorized on April 9, 2012.
- Village of Mamaroneck Local Waterfront Revitalization Program Draft September 2011
- Dam Emergency Action Plan

Several of these activities are discussed in Sections 7 and 8 and involve the same village officials who served on the Planning Committee and were responsible for developing this Multi-Hazard Mitigation Plan.

MS4 Program: Federal and state stormwater regulations (MS4 regulations) are under the responsibility of Public Works. This plan provides for control of on-site stormwater and is a NYSDEC and EPA program. Required permit measures include public participation, outreach and involvement; illicit discharge and elimination; runoff controls; and pollution prevention. The MS4 requirements are being integrated into this Multi-Hazard Mitigation Plan.

Village Emergency Response/Operations Plan: The Village has prepared a Working Copy of an Emergency Response Plan. The revision of this plan needs to be integrated with the State and Westchester County plans. This Plan has leaders and responsibilities assigned, but needs the capabilities to respond to a variety of incidents and hazards discussed in this Multi-Hazards Mitigation Plan. The Village's Emergency Response Plan needs to be updated and will include coordination with Town, County and State Offices as discussed in Section 7.B.2 and 8.F.7. The Fire Department is responsible for the revision and completion of this plan. Completion of this activity has been identified as action item in this plan.

In addition to these projects, several proposed local planning mechanisms incorporate the Plan requirements, address the Plan's goals and objectives, provide Village resources, tap into stakeholder interests and include volunteer assistance. The projects listed below do not require capital funded items and several may require Memoranda of Understanding for government agencies, stakeholders and volunteer organizations. They include:

- Prepare a comprehensive Evacuation Plan
- Obtain certification in the CRS Program
- Evaluate and upgrade Village building and fire codes
- Update the Village Emergency Response Plan

Prepare a Comprehensive Evacuation Plan: This activity is the primary responsibility of the Mamaroneck Police with assistance of the Fire Department. The Police Chief is expected to oversee completion of this plan. The Village board will review and adopt the document and assure that it meets all FEMA/NIMS requirements. Several neighboring communities such as Town of Mamaroneck, Larchmont, Scarsdale and Rye in Westchester County need to be incorporated in planning this document. The Red Cross or other volunteer relief organizations are expected to be involved in the planning.

Obtain Certification in the CRS Program: This application for the CRS program will also require the Village to perform flood plain preventative activities. Formal approval of this Multi-Hazards Mitigation Plan is a prerequisite for the CRS approval. This activity will be implemented using existing Village resources. Many of the elements of the Village's MS4's

Stormwater Quality Improvement Program discussed above are the same as the requirements in the CRS program and could be integrated with that activity.

Evaluate and Upgrade Village Building, Fire and Zoning Codes: The Building Department will be responsible for administering this activity and implementing updated codes, as may be approved by the Codes Council under the auspices of the New York State Department of State. This activity will need matching funds from the Village budget and in-kind services. The updated codes will be documented in a set of recommendations for the Village Board to review and approve.

Update the Village Emergency Response Plan: This activity will require coordination and cooperation between various Federal, State, and County agencies and the Village for responding to all hazards facing the Village. The Fire Department would manage and administer activity as in kind services under the general operating budget. Input and assistance from stakeholders and volunteer organizations will be needed.

9.B Monitoring and Evaluating the Plan

The Planning Committee will monitor and document the progress of the Plan's recommended mitigation activities. Progress reports will be prepared and submitted quarterly by the Plan's Administrator. A sample form of a progress report is provided in the Appendix of this Plan. This progress report will track planned costs, schedules and milestones, Plan successes, work status, and next steps. Status of individual mitigation project actions, risk assessments, and suggested Plan revisions will be evaluated as noted in the Appendix.

The status report will also include any periodic monitoring reports by involved agencies or organizations implementing the proposed actions. An annual report will be prepared that highlights the mitigation activities completed or in progress.

9.C Plan Maintenance Process

A review of the Plan will be conducted annually or with the occurrence of a significant change. Annual committee reviews will be completed by the 31st of January of each year. The Mayor and Village Board of Trustees will be informed of the Plan's progress. A yearly summary report,

which evaluates progress of the Plan, will also be submitted by the end of January of each year to the Planning Committee and funding agencies via NYSOEM. The Plan's Administrator will be responsible for assuring that the plan's effectiveness is evaluated.

The Committee will review the monthly and annual reports to evaluate the plan's implementation progress. The Plan's Administrator will provide the Committee with updates on the completion of the Plan Action Items. The community will be informed of the plan's progress through the Village Web Pages (<http://www.village.mamaroneck.ny.us/Pages/index>) and in annual public meetings.

9.D Evaluate Plan Effectiveness

The Planning Committee will review the Quarterly Reports to evaluate the plan's effectiveness and to determine if action item objectives are being achieved. This evaluation will be included as part of periodic reports submitted by the Plan's Administrator when activities are completed. The Committee and Board of Trustees will be provided with all reports, updates on hazard vulnerability or changes in estimated property losses. One measure of the effectiveness is the successful completion of work activities, the number of recommendations implemented and specific action plans accepted.

Estimating the losses avoided can be used as an indicator of success. This is an estimate of costs that would have occurred if mitigation actions were not taken. Participation in the National Flood Insurance Program can be followed and any information on number of participants and claims will be examined as an indicator of success.

The Plan Administrator will be responsible for assuring that Activity Leaders and participating agencies prepare periodic progress reports including the various parameters to measure the progress of the actions and action completion dates.

9.E Revising the Plan

The Village of Mamaroneck is committed to reviewing and updating the plan every five years. By March of the fifth year of the program, a review and update of changes in development,

recent hazard events, the hazards originally identified, the risk assessment, estimated losses, new studies and technologies and results of recent disasters should be made. The committee also needs to review any changes in local, State or Federal laws, policies, plans, funding and socioeconomic factors in the Village. Original goals, objectives and mitigation activities need to be reviewed and updated. Following this review and update, the findings will be incorporated into a revised Plan. Worksheet and forms are provided in the Appendix to assist this process.

The Multi-Hazard Mitigation Planning Committee will be responsible for reviewing all updates to the plan. The updates will be submitted by the Plan's Administrator and will incorporate any annual changes to the scope of work such as newly identified activities or hazards, any expansion or deletion of currently planned activities or changes in costs or schedules. Any significant changes in scope, costs or schedule are to be approved by the Village Board of Trustees.

Changes in community or property development will be evaluated. Any new projects, plans or applicable mitigation measures will be examined and potential losses estimated and evaluated. Over a five-year period there may be applicable changes in local, state, or federal requirements, policies and funding. This may require updating the goals, objectives and actions of this plan. The update may require changing a current mitigation measure or implementing a measure for different hazard or loss prevention.

Within two months of completing the review in March of the 5th year of the Plan, a draft revised plan will be submitted to NYSOEM in May for review and comment, revised and then forwarded in July to FEMA for review and comment. After receipt of comments from FEMA in September, the Village will revise the draft within two months and submit it to NYSOEM and FEMA in December for approval.

Section 10 - Adoption of the Plan

10.A Formal Village Government Process

On January 10, 2011, a resolution was offered, and officially accepted by the Board of Trustees of the Incorporated Village of Mamaroneck, giving the Hazard Mitigation Committee, designated Village staff, and the planning consultant, full authority to carry out identification of hazards, assessment of hazards impacts, establishment of goals and objectives, identification of mitigation measures, preparation of a mitigation plan and plan implementation. (See Section 1.E for contents of the Board resolution.)

On March 11, 2011 the Village Board authorized contracting ETG Inc. to prepare the Multi-Hazard Mitigation Plan

On March 26, 2012 a draft copy of the Multi-Hazard Mitigation Plan was provided to the Board of Trustees for their review and comment at the monthly Board meeting.

On April 23, 2012, the Mamaroneck Village Board of Trustees adopted the plan following the review and pending acceptance by NYSOEM and FEMA. Approval of the Plan by FEMA was then granted.

10.B Official Public Participation:

Documentation of the public participation program and Hazards Mitigation Planning Committee is presented in Section 2 of this Plan.

Committee Representation:

On July 18, 2006, a resolution was offered, and officially accepted by the Village Board of Trustees, to appoint two members of the community to the Multi-Hazard Planning Committee.

Public Meetings:

A notice for the first public meeting was published in the journal News. The first meeting held was June 27, 2011 at 7:30 PM in the Village Hall meeting room. (See Appendix for a copy of the announcement.

A second public meeting was held March 26, 2012 in conjunction with the Village Board of Trustees meeting to present and review the contents of the Draft Multi-Hazard Mitigation Plan.

10.C Adoption of the Final Plan

At a meeting on April 23, 2012 of the Board of Trustee for the Village of Mamaroneck, a motion was made and seconded by to adopt the following resolution:

**RESOLUTION RE:
ADOPTION OF VILLAGE OF MMARONECK LOCAL MULTI-HAZARD MITIGATION PLAN**

(Name of Jurisdiction) Village of Mamaroneck
(Governing Body) Village Board of Trustees
(Address) 123 Mamaroneck Avenue, Mamaroneck, NY 10543

WHEREAS, the Board of Trustees has determined that the adoption of the Village's Local Multi-Hazard Mitigation Plan is a Type 2 Action under SEQRA; and

WHEREAS, the Village of Mamaroneck, with the assistance from Environmental Technology Group, has gathered information and prepared the Village of Mamaroneck Local Multi-Hazard Mitigation Plan; and

WHEREAS, the Village of Mamaroneck Local Multi-Hazard Mitigation Plan has been prepared in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS, the Village of Mamaroneck is a local unit of government that has afforded the citizens an opportunity to comment and provide input in the Plan and the actions in the Plan; and

WHEREAS, the Village of Mamaroneck have reviewed the Plan and affirms that the Plan will be updated no less than every five years.

On motion of Trustee Albert, seconded by Trustee Ryan:

RESOLVED, by the Village Board of Trustees that Village of Mamaroneck adopts the Village of Mamaroneck Local Multi-Hazard Mitigation Plan as this jurisdiction's Natural Hazard Mitigation Plan.

Ayes: Albert, Ryan, Santoro, Rosenblum

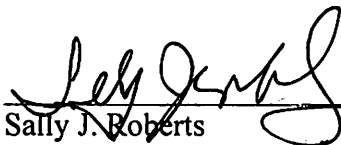
Nays: Hofstetter

I, the undersigned Deputy-Clerk of the Village of Mamaroneck, Westchester County, New York,
DO HEREBY CERTIFY:

That I have compared the annexed extract of the minutes of the Regular Meeting of the Board of Trustees of the Village of Mamaroneck, including the resolution contained therein, held on the 23rd day of April 2012 with the original thereof on file in my office, and that the same is a true and correct transcript therefrom and of the whole of said original so far as the same relates to the subject matters therein referred to.

I FURTHER CERTIFY that all members of said Board had due notice of said meeting.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said Village this 30th day of April 2012.


Sally J. Roberts

Village of Mamaroneck - Multi-Hazard Mitigation Plan

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Section 12 – Acronyms and Glossary

Acronyms

ANSI – American National Standards Institute
CFR - Code of Federal Regulations
CRS - Community Rating System
DMA 2000 - Disaster Mitigation Act of 2000
EOC – Emergency Operations Center
ETG - Environmental Technology Group, Inc.
FEMA - Federal Emergency Management Agency
FIRM - Flood Insurance Rate Map
FIS - Flood Insurance Study
FMAP - Flood Mitigation Assistance Program
GIS - Geographical Information System
Haz-Mat – Hazardous Materials operation or incident
HAZNY - Hazards New York, Computer process for identifying and ranking hazards
HAZUS - Hazards United States, GIS-based software tool developed by FEMA for estimating losses from various hazards
HMGP - Hazard Mitigation Grant Program
LCSN – Lamont-Doherty Cooperative Seismographic Network of Columbia University.
LISWIC - Long Island Sound Watershed Intermunicipal Council
NCDC - National Center for Disaster Control
NFIP - National Flood Insurance Program
NIMS – National Incidence Management System
NOAA - National Oceanographic and Atmospheric Administration
NWS – National Weather Service.
NYC DEP - New York City Department of Environmental Protection
NYCEM – New York City Earthquake Mitigation
NYS - New York State
NYSDEC - New York State Department of Environmental Conservation
NYSDOT - New York State Department of Transportation
NYSOEM - New York State Office of Emergency Management
PDM - Pre-Disaster Mitigation Grant Program
PGA - Peak Ground Acceleration
SEQRA – State Environmental Quality Review Act
SLOSH - A tidal flood inundation zone caused by a hurricane
USACE – U. S. Army Corps of Engineers
USEPA - United States Environmental Protection Agency
USDOT - United States Department of Transportation
USGS – United States Geological Survey
VMFD - Village of Mamaroneck Fire Department

Glossary of Technical and Planning Terms

100-Year (or Base) Flood: A flood event that statistically has a 1 out of 100 (or one percent) chance of being equaled or exceeded on a specific watercourse in any given year. A flood event of this magnitude is often used to determine if flood insurance is either advisable or required on a property. It is also known as the Base Flood.

500-Year Flood: A flood event that statistically has a 1 out of 500 (or 0.2 percent) chance of being equaled or exceeded on a specific watercourse in any given year.

Air contamination: Air contamination is the result of emissions chemicals from industry, transportation into the air.

Base Flood: the flood having a 1-percent chance of being equaled or exceeded in any given year. It is also known as 100-year flood. The Base Flood has been adopted by the National Flood Insurance Program as the basis for mapping, insurance rating and regulating new construction.

Base Flood Elevation (BFE): A base flood elevation (BFE) is the height of the base flood, usually in feet, in relation to the National Geodetic Vertical Datum of 1929, the North American Vertical Datum of 1988, or other datum referenced in the Flood Insurance Study report, or the depth of the base flood, usually in feet, above the ground surface. It is shown on the Flood Insurance Rate Map (FIRM).

Base Map: Map of the community that depicts cultural features (roads, railroad, bridges, dams, culverts, etc.), drainage features, and the corporate limits.

Blizzard: Low temperatures, winds 35 mps or more, and sufficient falling and or blowing snow to reduce visibility to ¼ mile or less for a duration of at least three hours.

Civil Unrest: The unruly or violent crowds during public events, and political protests.

Coastal Storm: Non-tropical storm that produce gale-force winds and precipitation in the form of heavy rain or snow and includes Nor'easters and severe winter low-pressure systems.

Community Rating System (CRS): A program created by FEMA to provide new incentive for activities that reduce flood losses and support the sale of flood insurance. Any community participating in the NFIP may apply for CRS classification by demonstrating that it is implementing floodplain management and public information activities that exceed the minimum requirements of the NFIP. Once qualified, the community benefits by obtaining flood insurance premium rate credits for its residents. The credits vary by the level of activities undertaken by the community.

Dam Failure: A dam failure is the collapse or failure of an impoundment that causes downstream flooding.

Disaster: An occurrence of a natural catastrophe, technological accident, or human-caused event that has resulted in severe property damage, deaths, and/or multiple injuries.

Drought: A prolonged period of limited precipitation affecting the supply and quality of water.

Earthquakes: A sudden motion or trembling of the ground that is caused by abrupt displacement of rock masses under the earth's surface.

Emergency: Any occasion or instance such as a hurricane, tornado, storm, flood, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, fire, explosion, nuclear accident, or any other natural or man-made catastrophe that warrants action to save lives and to protect property, public health, and safety.

Emergency Operating Center: The protected site from which State and local civil government officials coordinate, monitor, and direct emergency response activities during an emergency.

Emergency Operations Center (EOC): The physical location at which the coordination of information and resources to support domestic incident management activities normally takes place. An EOC may be a temporary facility or may be located in a more central or permanently established facility, perhaps at a higher level of organization within a jurisdiction. EOCs may be organized by major functional disciplines (e.g., fire, law enforcement, and medical services), by jurisdiction (e.g., Federal, State, regional, county, city, tribal), or some combination thereof.

Epidemic: The occurrence or outbreak of disease in a large number of individuals or proportion of human or animal populations.

Explosions: An explosion is a sudden and violent release of energy from chemical reaction, ignition of a fuel, gas under pressure or nuclear reaction.

Extreme Temperatures: Extended periods of excessive cold or hot weather with a serious impact on human populations, particularly the elderly and/or persons with respiratory ailments.

Federal Insurance Administration (FIA): This organizational unit administers the National Flood Insurance Program (NFIP), which was created by Congress in 1968 in response to the rising cost of taxpayer-funded disaster relief for flood victims and the increasing amount of damage caused by floods.

Federal Emergency Management Agency (FEMA): The agency reporting directly to the President and responsible for identifying and mitigating natural and man-made hazards.

Fire Hazard: Uncontrolled combustion of materials, buildings or other structures that threaten human life and property

Flood: A general and temporary condition of partial or complete inundation of normally dry land areas from (1) the overflow of inland or tidal waters, (2) the unusual and rapid accumulation of runoff or surface waters from any source or (3) from intense and severe rainfall.

Flood Insurance Rate Map (FIRM): A map on which the 100- and 500-year floodplains, BFEs, and risk premium zones are delineated to enable insurance agents to issue accurate flood insurance policies to homeowners in communities participating in the NFIP.

Flood Insurance Study (FIS): An examination, evaluation, and determination of the flood hazards, and if appropriate, the corresponding water-surface elevations.

Floodplain: The area adjoining a watercourse that may be covered by floodwater during a flood. Storm runoff and flood events may cause alterations in the floodplain.

Flood Zone: An area shown on a Flood Insurance Rate Map (FIRM) that reflects the severity or type of flooding. (See also Zones A, B, C and X below.)

Fuel Oil Spill: Release of any liquid fuels that when involved in an accident and released in sufficient quantities, poses a risk to people's health, safety, and/or property.

Geographic Information System (GIS): System of computer hardware, software, and procedures designed to support the capture, management, manipulation, analysis, modeling, and display of spatially referenced data for solving complex planning and management problems.

Goals: General guidelines that explain what you want to achieve. They are usually broad policy-type statements, long term in nature, and represent broad outcomes.

Hazard: A source of potential danger or an adverse condition.

Hazard Event: A specific occurrence of a particular hazard.

Hazard Mitigation: Any action taken to reduce or eliminate the long-term risk to human life and property from hazards or reduce the potential for damage to a facility or structure from a disaster event.

Hazard Mitigation Grant Program (HMGP): FEMA's Hazard Mitigation Grant Program (HMGP) gives grants to State and local governments for long-term hazard mitigation measures after a major disaster declaration.

Hazardous Material: Any substance or material that when involved in an accident and released in sufficient quantities, poses a risk to people's health, safety, and/or property. These substances and materials include explosives, radioactive materials, flammable liquids or solids, combustible liquids or solids, poisons, oxidizers, toxins, and corrosive materials.

Hazardous Material Release: Release of any substance or material that when involved in an accident and released in sufficient quantities, poses a risk to people's health, safety, and/or property. These substances and materials include explosives, radioactive materials, flammable liquids or solids, combustible liquids or solids, poisons, oxidizers, toxins, and corrosive materials.

Hazard Profile: A description of the characteristics of a hazard including its magnitude, duration, frequency, probability and extent.

Hurricane: A tropical cyclone, formed in the atmosphere over warm ocean areas, in which wind speeds reach 74 miles per hour or more and blow in a large spiral around a relatively calm

center or "eye". Circulation is counter-clockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere.

Incident: An occurrence or event, natural or human-caused that requires an emergency response to protect life or property. Incidents can, for example, include major disasters, emergencies, terrorist attacks, terrorist threats, wild land and urban fires, floods, hazardous materials spills, nuclear accidents, aircraft accidents, earthquakes, hurricanes, tornadoes, tropical storms, war-related disasters, public health and medical emergencies, and other occurrences requiring an emergency response.

Infrastructure: Facilities serving the public and a community such as communication structures, public water supplies, sewage treatment facilities, electric power systems and transmission structures, transportation systems, navigable waterway facilities, dams and other vital services.

Landslides: Downward movement of a slope and materials under the force of gravity.

Major Disaster: Any natural catastrophe (including any hurricane, tornado, storm, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, or drought) or, regardless of cause, any fire, flood, or explosion in any part of the United States that, in the determination of the President, causes damage of sufficient severity and magnitude to warrant major disaster assistance under the Stafford Act to supplement the efforts and available resources of States, local governments, and disaster relief organizations in alleviating the damage, loss, hardship, or suffering caused.

Mitigation: The activities designed to reduce or eliminate risks to persons or property or to lessen the actual probability, potential effects or consequences of an incident. Mitigation measures may be implemented prior to, during, or after an incident.

Multi-Hazard Plan: A plan that includes both natural and manmade emergencies and disasters.

National Flood Insurance Program (NFIP): The Federal program, created by an act of Congress in 1968, that makes flood insurance available to residents in flood prone communities that enact satisfactory floodplain management regulations.

Objectives: Objectives define strategies or implementation steps to attain the identified goals. Unlike goals, objectives are specific and have measurable outcomes.

Preparedness: Those activities, programs, and systems that exist before an emergency and that are used to support and enhance response to an emergency or disaster.

Resources: Personnel and major items of equipment, supplies, and facilities available or potentially available for assignment to incident operations and for which status is maintained. Resources are described by kind and type and may be used in operational support or supervisory capacities at an incident or at an EOC.

Response: Activities to address the immediate and short-term effects of an emergency or disaster.

Risk: The likelihood of a hazard event resulting in an adverse condition that causes injury, death or damage.

Stafford Act: Robert T. Stafford Disaster Relief and Emergency Assistance Act, PL 100-707, signed into law November 23, 1988; amended the Disaster Relief Act of 1974, PL 93-288. A Federal statute designed to supplement the efforts of the affected States and local governments in expediting the rendering of assistance, emergency services, and the reconstruction and rehabilitation of devastated areas.

Snow Storm: A storm that deposits heavy snow which amounts to 12 inches in 12 hours or less.

Stakeholder: Groups or individuals including businesses, private organizations, agencies, and citizens that will be affected in any way by an action or policy.

Storm Surge: A dome of sea water created by the strong winds and low barometric pressure in a hurricane that causes severe coastal flooding as the hurricane strikes land.

Terrorism: The use of—or threatened use of criminal violence against civilians or civilian infrastructure to achieve political ends through fear and intimidation, rather than direct confrontation. Emergency management is typically concerned with the consequences of terrorist acts directed against large numbers of people (as opposed to political assassination or hijacking, which may also be considered "terrorism").

Thunderstorm: Storms accompanied by lightning, thunder, strong winds and heavy rain. Other associated dangers of thunderstorms include tornadoes, strong winds, hail, and flash flooding. Flash flooding is responsible for more fatalities—more than 140 annually—than any other thunderstorm-associated hazard.

Tornado: A local atmospheric storm, generally of short duration, formed by winds rotating at very high speeds, usually in a counter-clockwise direction. The vortex, up to several hundred yards wide, is visible to the observer as a whirlpool-like column of winds rotating about a hollow cavity or funnel. Winds may reach 300 miles per hour or higher.

Tropical Storm: A tropical cyclone, formed in the atmosphere over warm ocean areas, in which wind speeds are less than 74 miles per hour.

Utility Failure: Utility Failure refers to periodic cessation of electrical or communication services due to adverse weather conditions, human error or mechanical failure.

US Geological Survey (USGS): The Federal agency responsible for nationwide civilian mapping projects and standards development.

Vulnerability: Exposure or susceptibility of an asset or community to damage or harm.

Watershed: An area from which water drains into a lake, stream or other body of water. A watershed is also often referred to as a basin, with the basin boundary defined by a high ridge or divide, and with a lake or river located at a lower point.

Wildfire: An uncontrolled fire including trees, brush, or grass involving a substantial land area which has the potential to threatening human life and property.

Wind Storm: Storms accompanied by strong gale force or stronger winds that may or may not be accompanied with precipitation. These winds may be associated with tornadoes, thunderstorms, Nor'easters, tropical storms, and hurricanes.

Winter Storm: A storm system in winter that deposits snow, sleet or freezing rain, with a significant impact on transportation systems and public safety. This includes snow storms and blizzards.

Zoning: The division of land within a community or local jurisdiction into zones of allowable types and intensities of land use.

Zone A (unnumbered): Zone A is a Special Flood Hazard Area identified by FEMA that is subject to inundation from a 100-year flood event. Because detailed hydraulic analyses have not been performed, no base flood elevation or depths are shown. Mandatory flood insurance requirements apply.

Zone AE and A1-30: Special Flood Hazard Areas subject to inundation by the 100-year flood determined by a Flood Insurance Study (FIS). Base flood elevations are shown within these zones and mandatory flood insurance requirements apply. (Zone AE is used on newer maps in place of Zones A1-30.)

Zone AH: Special Flood Hazard Areas subject to inundation by 100-year shallow flooding (usually areas of ponding) with average depths between one and three feet. Base flood elevations derived from detailed hydraulic analyses are shown in this zone. Mandatory flood insurance requirements apply.

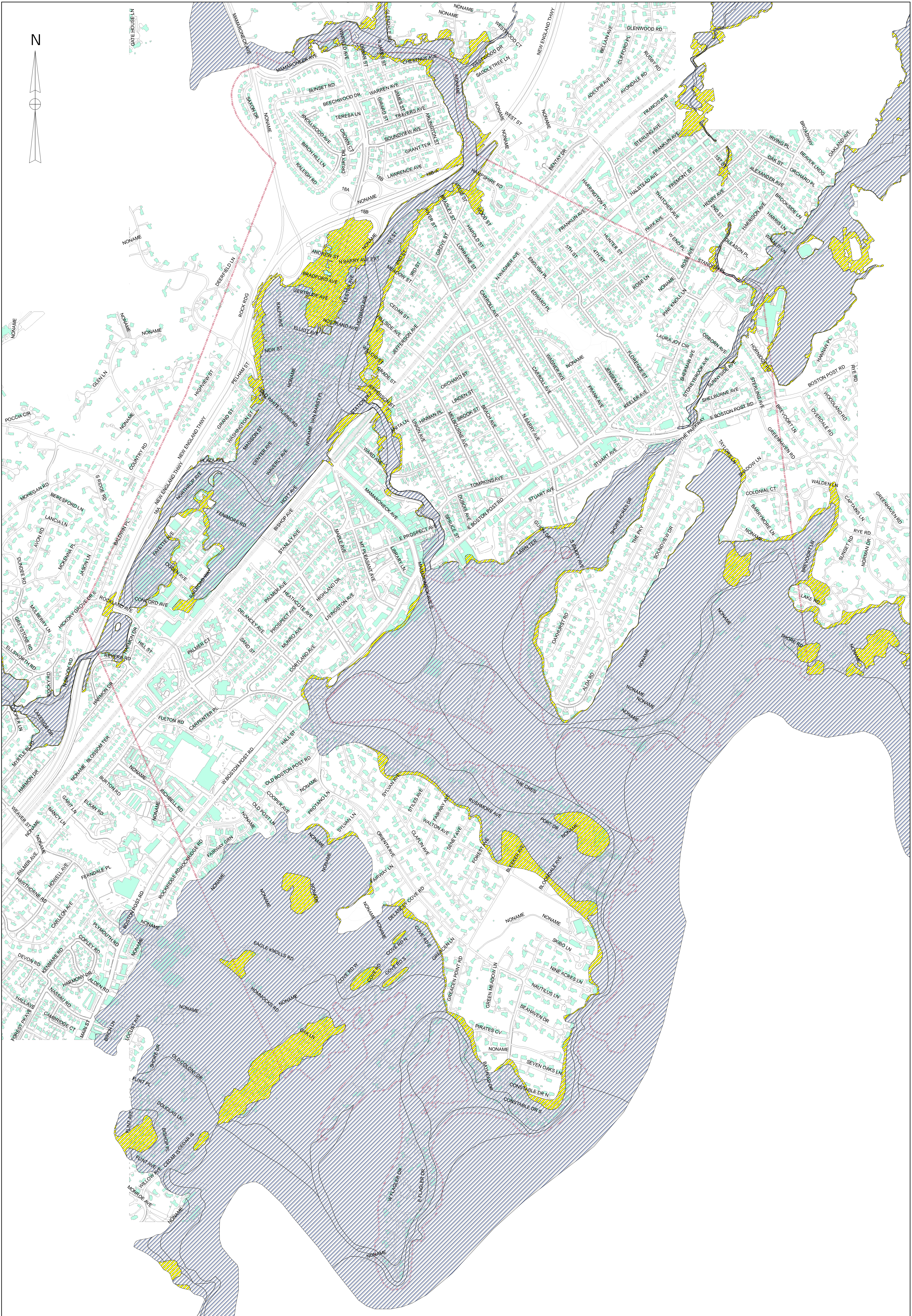
Zone AO: Special Flood Hazard Areas subject to inundation by 100-year shallow flooding, usually resulting from sheet flow on sloping terrain, with average depths between one and three feet. Average flood depths derived from detailed hydraulic analyses are shown within this zone. Mandatory flood insurance requirements apply.

Zone B, C and X: Areas that have been identified in a community flood insurance study as having moderate or minimal hazard from flooding. Buildings or other improvements in these zones could be flooded by severe, concentrated rainfall, in the absence of adequate drainage systems. Flood insurance is available in participating communities, but it is not required in these zones. (Zone X is used on newer maps in place of Zones B and C.)

Zone D: Unstudied areas where flood hazards are undetermined but where flooding is possible. No mandatory flood insurance requirements apply, but coverage is available in participating communities.

Folded Pocket Maps



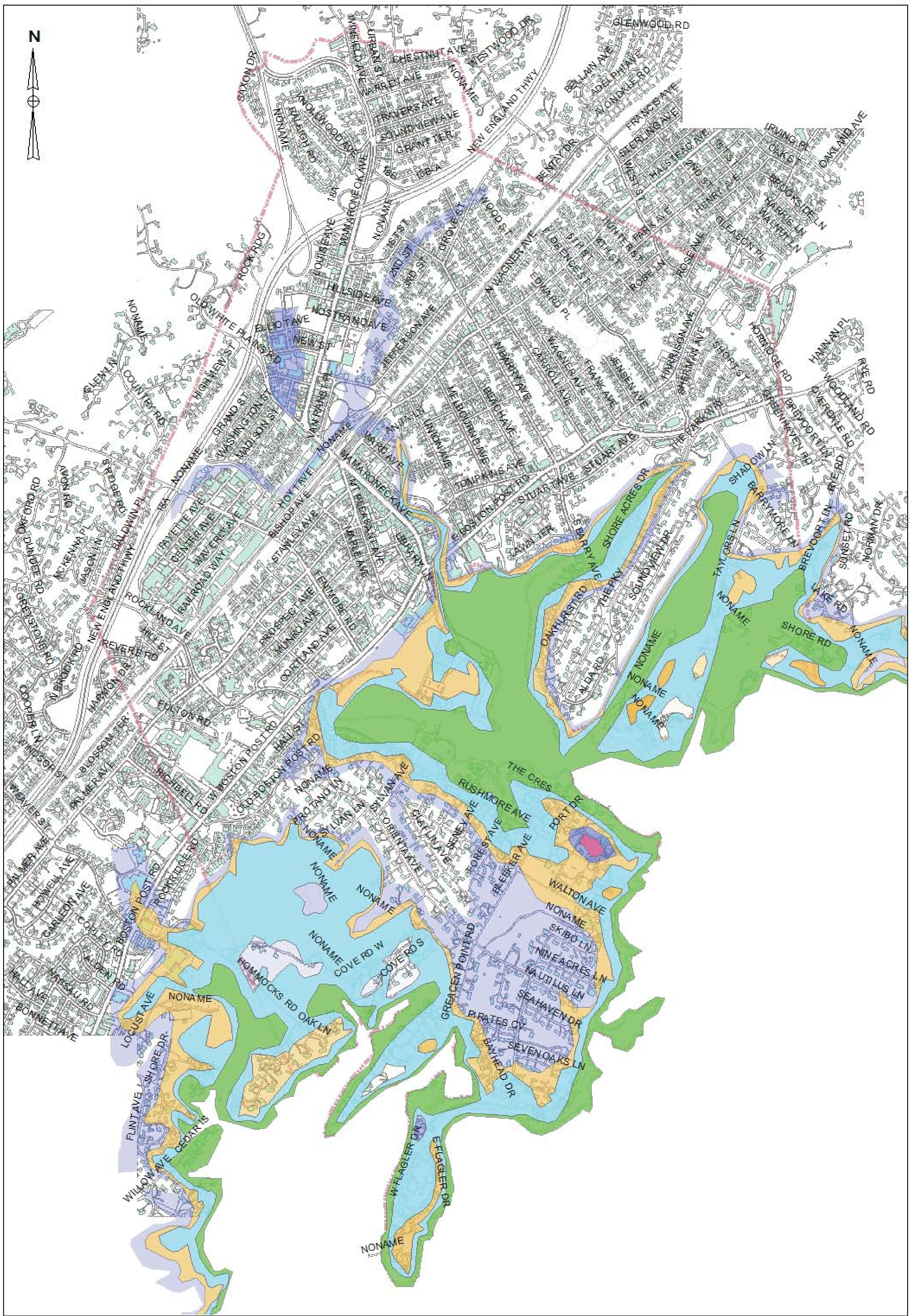


ETG Environmental
Technology
Group, Inc.
300 WHEELER ROAD, SUITE 307, HAUPPAUGE, NEW YORK 11788

Map 2
100 and 500-Year Floodplain
Incorporated Village of Mamaroneck
Multi-Hazard Mitigation Plan

Legend
FEMA Flood Mapping
100 Year Flood Line
500 Year Flood Line
DWN BY: YS
CHK BY: JB
SCALE: AS SHOWN
DATE: 04/27/12

Basemap Information by Westchester County GIS



ETG Environmental Technology Group Inc.
300 WHEELER RD SUITE 307 HAUPPAUGE, NY 11788
TEL: 631-232-1987

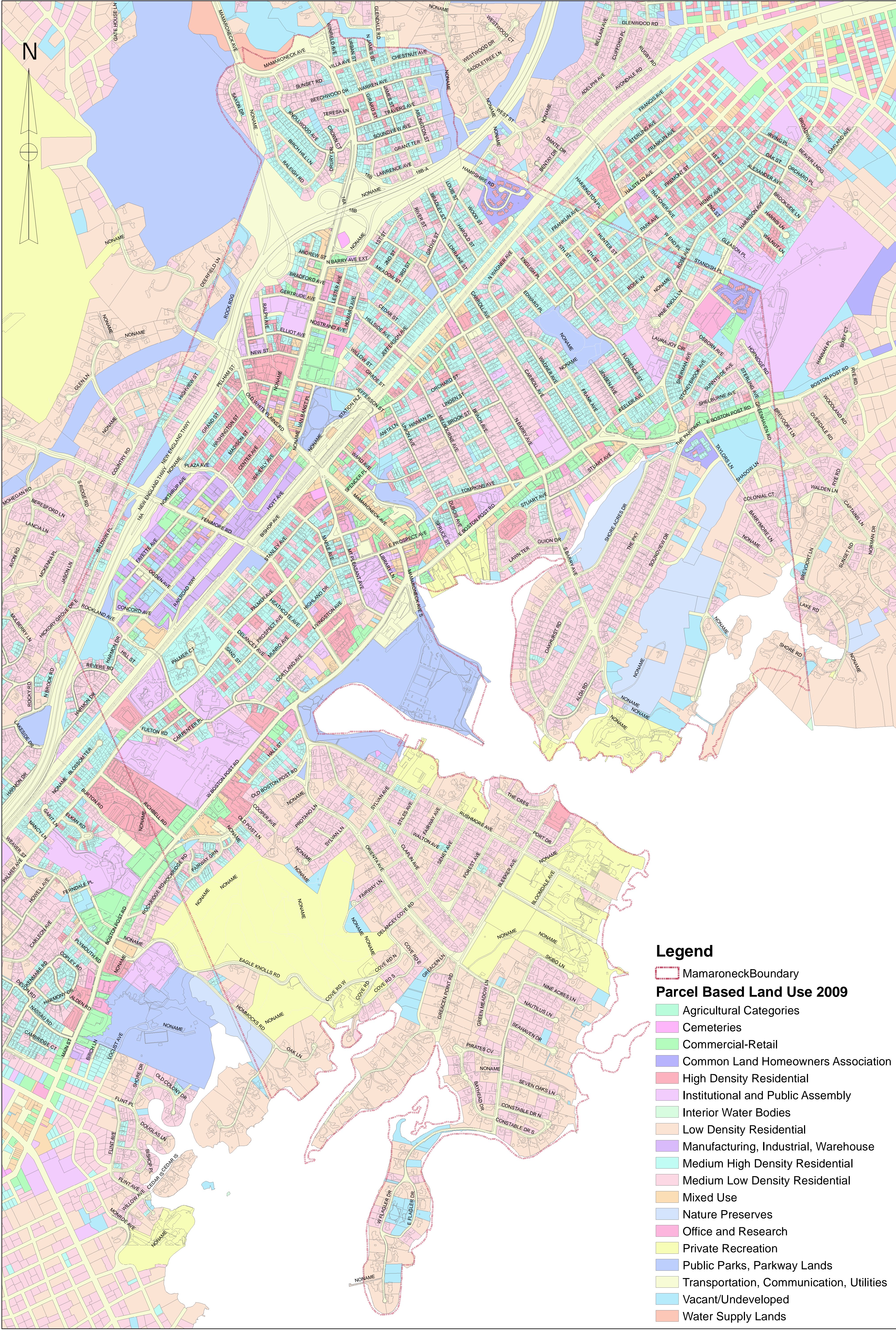
Map 3
Hurricane Inundation Zones
Incorporated Village of Mamaroneck
Multi-Hazard Mitigation Plan

- Legend**
Hurricane Inundation Zones
- 0
 - 1
 - 2
 - 3
 - 4

DWN BY: YS
CHK BY: JB
SCALE: AS SHOWN
DATE: 03/21/12

0 750 1,500 2,250 3,000 Feet

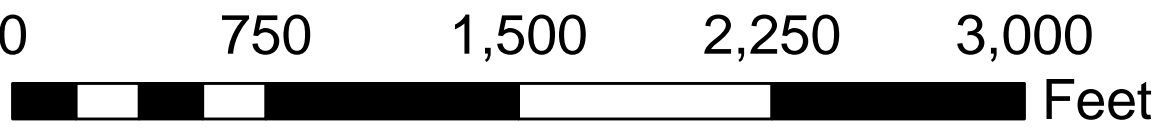
Basemap Information by Westchester County GIS



Map 4
Parcel Based Land Use
Incorporated Village of Mamaroneck
Multi-Hazard Mitigation Plan

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Basemap Information by Westchester County GIS



DWN BY: YS
CHK BY: JB
SCALE: AS SHOWN
DATE: 04/27/12

APPENDICES

Attachments and Supporting Documents

Appendix 1. HAZNY Analysis

Village of Mamaroneck Hazards Ratings

HAZNY Analysis

Background Summary

On June 27 and July 22, 2011, the Village of Mamaroneck conducted a hazard analysis using the automated program *HAZNY* (Hazards New York). *HAZNY* was developed by the American Red Cross and the New York State Emergency Management Office.

The results of this hazard analysis are presented in this summary report.

***HAZNY* Process**

HAZNY is an automated interactive spreadsheet that asks specific questions on potential hazards in a community and records and evaluates the responses to these questions. *HAZNY* also includes historical and expert data on selected hazards. *HAZNY* is designed specifically for groups, rather than individual use. Village of Mamaroneck assembled a group of local officials, (Hazard Mitigation Planning Committee) to consider and discuss the questions and issues raised by the *HAZNY* program. Representative consultants from the Environmental Technology Group (ETG) facilitated the meeting and recorded the results.

The *HAZNY* Score Results

The Committee evaluated 38 hazards that potentially affect the Village of Mamaroneck. The *HAZNY* program rated each hazard based on the Committee's assessment and assigned a numerical rating score.

These rating values are categorized by *HAZNY* criteria as follows:

321 to 400 HIGH HAZARD

241 to 320 MODERATELY HIGH HAZARD

161 to 240 MODERATELY LOW HAZARD

44 to 160 LOW HAZARD

Based on the Hazards Mitigation Planning Committee evaluation, *HAZNY* rated 38 possible hazard events as follows:

Hazard	Rating
FLOOD	302
COASTAL STORM	253
SEVERE STORM & THUNDER	246
FIRE	240
TRANS ACCIDENT HIGHWAY	230
WINDSTORM	230
WINTER STORM (SEVERE)	230
DAM FAILURE	224
UTILITY FAILURE	221
TERRORISM	219
ICE STORM	217
STORM SURGE / WAVE ACTION	216
HURRICANE	212
HAZMAT (IN TRANSIT)	210
EARTHQUAKE	202
OIL SPILL	201
LANDSLIDE	199
EXTREME TEMPS	196
TRANS ACCIDENT RAIL	194
EXPLOSION	192
WATER SUPPLY CONTAMINATION	182
HAZMAT (FIXED SITE)	168
STRUCTURAL COLLAPSE	164
EPIDEMIC	160
HAIL STORM	159
TORNADO	155

FUEL SHORTAGE	142
RADIOLOGICAL (FIXED SITE)	140
INFESTATION	136
RADIOLOGICAL (IN TRANSIT)	134
AIR CONTAMINATION	132
BLIGHT	128
ICE JAM	123
FOOD SHORTAGE	119
FUEL OIL SPILL	113
DROUGHT	101
CIVIL UNREST	96
WILDFIRE	94

HAZARDS THAT OCCUR WITH NO WARNING*

FIRE

TRANSPORTATION ACCIDENT HIGHWAY

UTILITY FAILURE

TERRORISM

HAZMAT (IN TRANSIT)

EARTHQUAKE

OIL SPILL

LANDSLIDE

EXPLOSION

HAZMAT (FIXED SITE)

STRUCTURAL COLLAPSE

RADIOLOGICAL (IN TRANSIT)

AIR CONTAMINATION

FUEL OIL SPILL

* No warning was selected from the Onset Tab.

HAZARDS THAT OCCUR MOST OFTEN*

COASTAL STORM

SEVERE STORM & THUNDER

FIRE

TRANSPORTATION ACCIDENT HIGHWAY

WINTER STORM (SEVERE)

*A frequent event was selected on frequency Tab.

HAZARDS THAT PRESENT THE GREATEST THREAT TO LIFE*

DAM FAILURE

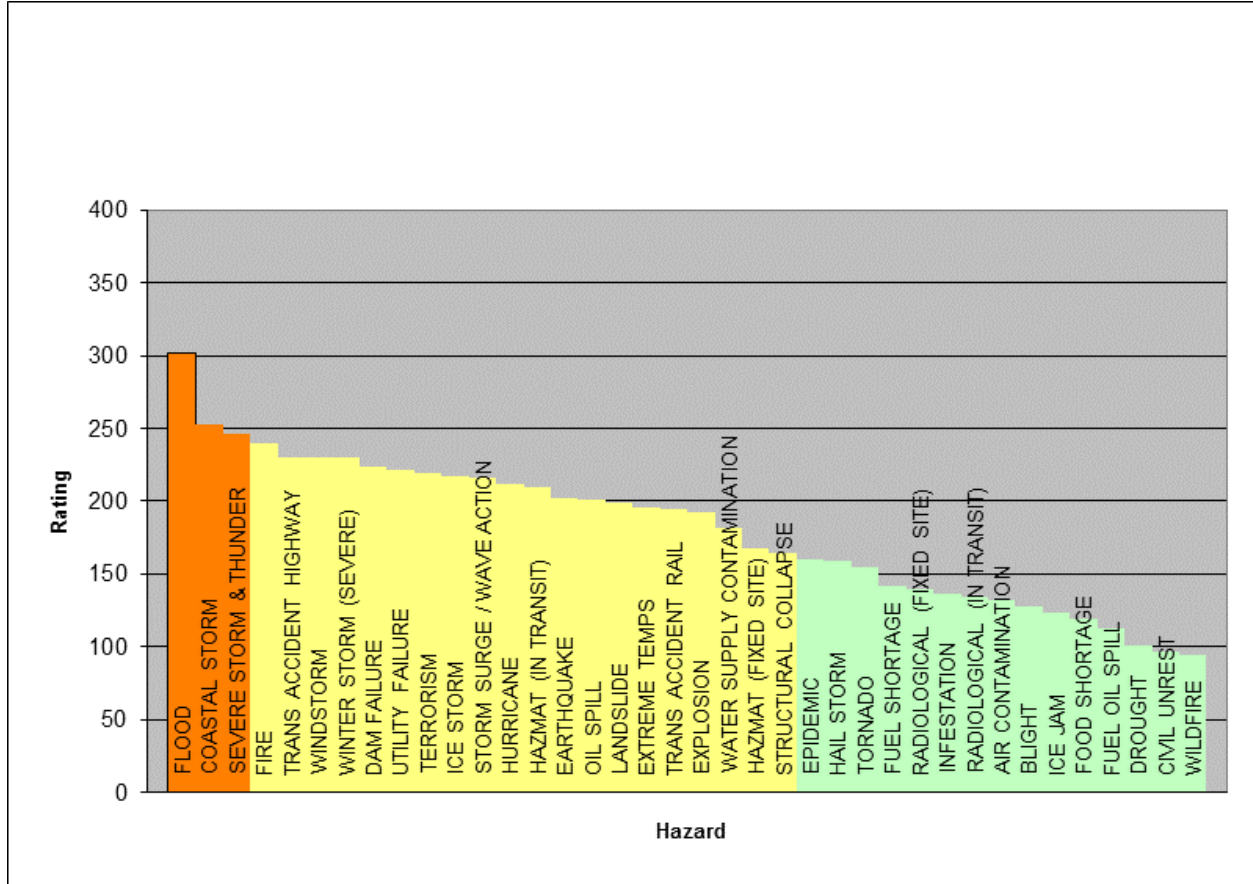
TERRORISM

WATER SUPPLY CONTAMINATION

EPIDEMIC

*Serious injury and death in large or extremely large numbers was selected from the Impact Tab.

Figure 1. Chart of Mamaroneck Potential Hazards vs. Ratings



HAZNY Scoring details

No hazards were rated as high (Score range between 321 – 400)

Hazards rated as moderately high (241-320): FLOOD, COASTAL STORM, and SEVERE STORM & THUNDER

FLOOD: 302, Moderately High Hazard

Potential Impact: Throughout a Large Region

Cascade Effects: Highly Likely

Frequency: A Regular Event

Onset: Several Hours Warning

Hazard Duration: Two to Three Days

Recovery Time: More Than Two Weeks

Impact:

- Serious Injury or Death is Likely, but not in Large Numbers
- Severe Damage to Private Property
- Severe Structural Damage to Public Facilities

COASTAL STORM: 253, Moderately High Hazard

Potential Impact: Throughout a Large Region

Cascade Effects: Highly Likely

Frequency: A Frequent Event

Onset: Several Days Warning

Hazard Duration: Two to Three Days

Recovery Time: Three Days to One Week

Impact:

- Serious Injury or Death Unlikely
- Moderate Damage to Private Property
- Moderate Structural Damage to Public Facilities

SEVERE STORM & THUNDER: 246, Moderately High Hazard

Potential Impact: Throughout a Small Region

Cascade Effects: Some Potential

Frequency: A Frequent Event

Onset: Several Hours Warning

Hazard Duration: Less Than One Day

Recovery Time: Three Days to One Week

Impact:

- Serious Injury or Death Unlikely
- Moderate Damage to Private Property
- Moderate Structural Damage to Public Facilities

Hazard(s) rated as moderately low (161-240): FIRE, TRANS ACCIDENT HIGHWAY, WINDSTORM, WINTER STORM (SEVERE), DAM FAILURE, UTILITY FAILURE, TERRORISM, ICE STORM, STORM SURGE / WAVE ACTION, HURRICANE, HAZMAT (IN TRANSIT), EARTHQUAKE, OIL SPILL, LANDSLIDE, EXTREME TEMPS, TRANS ACCIDENT RAIL, EXPLOSION, WATER SUPPLY CONTAMINATION, HAZMAT (FIXED SITE), STRUCTURAL COLLAPSE

FIRE: 240, Moderately Low Hazard

Potential Impact: Single Location

Cascade Effects: Highly Unlikely

Frequency: A Frequent Event

Onset: No Warning

Hazard Duration: Less Than One Day

Recovery Time: Less Than One Day

Impact:

- Serious Injury or Death is Likely, but not in Large Numbers
- Moderate Damage to Private Property
- Moderate Structural Damage to Public Facilities

TRANS ACCIDENT HIGHWAY: 230, Moderately Low Hazard

Potential Impact: Single Location

Cascade Effects: Some Potential

Frequency: A Frequent Event

Onset: No Warning

Hazard Duration: Less Than One Day

Recovery Time: Less Than One Day

Impact:

- Serious Injury or Death is Likely, but not in Large Numbers
- Little or No Damage to Private Property
- Little or No Structural Damage to Public Facilities

WINDSTORM: 230, Moderately Low Hazard

Potential Impact: Throughout a Large Region

Cascade Effects: Some Potential

Frequency: A Regular Event

Onset: Several Hours Warning

Hazard Duration: Less Than One Day

Recovery Time: One to Two Weeks

Impact:

- Serious Injury or Death Unlikely
- Moderate Damage to Private Property
- Moderate Structural Damage to Public Facilities

WINTER STORM (SEVERE): 230, Moderately Low Hazard

Potential Impact: Throughout a Large Region

Cascade Effects: Some Potential

Frequency: A Frequent Event

Onset: Several Days Warning

Hazard Duration: Two to Three Days

Recovery Time: Three Days to One Week

Impact:

- Serious Injury or Death Unlikely
- Little or No Damage to Private Property
- Little or No Structural Damage to Public Facilities

DAM FAILURE: 224, Moderately Low Hazard

Potential Impact: Throughout a Small Region

Cascade Effects: Highly Likely

Frequency: A Rare Event

Onset: Several Hours Warning

Hazard Duration: One Day

Recovery Time: More Than Two Weeks

Impact:

- Serious Injury or Death to Large Numbers
- Severe Damage to Private Property
- Severe Structural Damage to Public Facilities

UTILITY FAILURE: 221, Moderately Low Hazard

Potential Impact: Throughout a Small Region

Cascade Effects: Highly Likely

Frequency: A Regular Event

Onset: No Warning

Hazard Duration: One Day

Recovery Time: One to Two Days

Impact:

- Serious Injury or Death Unlikely
- Little or No Damage to Private Property
- Little or No Structural Damage to Public Facilities

TERRORISM: 219, Moderately Low Hazard

Potential Impact: Throughout a Large Region

Cascade Effects: Highly Likely

Frequency: A Rare Event

Onset: No Warning

Hazard Duration: Less Than One Day

Recovery Time: More Than Two Weeks

Impact:

- Serious Injury or Death to Large Numbers
- Moderate Damage to Private Property
- Moderate Structural Damage to Public Facilities

ICE STORM: 217, Moderately Low Hazard

Potential Impact: Throughout a Large Region

Cascade Effects: Highly Likely

Frequency: A Regular Event

Onset: Several Days Warning

Hazard Duration: Two to Three Days

Recovery Time: Three Days to One Week

Impact:

- Serious Injury or Death is Likely, but not in Large Numbers
- Little or No Damage to Private Property
- Moderate Structural Damage to Public Facilities

STORM SURGE / WAVE ACTION: 216, Moderately Low Hazard

Potential Impact: Throughout a Large Region

Cascade Effects: Some Potential

Frequency: A Regular Event

Onset: Several Days Warning

Hazard Duration: Two to Three Days

Recovery Time: One to Two Weeks

Impact:

- Serious Injury or Death Unlikely
- Moderate Damage to Private Property
- Moderate Structural Damage to Public Facilities

HURRICANE: 212, Moderately Low Hazard

Potential Impact: Throughout a Large Region

Cascade Effects: Highly Likely

Frequency: An Infrequent Event

Onset: Several Days Warning

Hazard Duration: One Day

Recovery Time: More Than Two Weeks

Impact:

- Serious Injury or Death is Likely, but not in Large Numbers
- Severe Damage to Private Property
- Moderate Structural Damage to Public Facilities

HAZMAT (IN TRANSIT): 210, Moderately Low Hazard

Potential Impact: Throughout a Small Region

Cascade Effects: Some Potential

Frequency: An Infrequent Event

Onset: No Warning

Hazard Duration: Less Than One Day

Recovery Time: More Than Two Weeks

Impact:

- Serious Injury or Death is Likely, but not in Large Numbers
- Little or No Damage to Private Property
- Moderate Structural Damage to Public Facilities

EARTHQUAKE: 202, Moderately Low Hazard

Potential Impact: Throughout a Large Region

Cascade Effects: Highly Likely

Frequency: A Rare Event

Onset: No Warning

Hazard Duration: Less Than One Day

Recovery Time: More Than Two Weeks

Impact:

- Serious Injury or Death is Likely, but not in Large Numbers
- Moderate Damage to Private Property
- Moderate Structural Damage to Public Facilities

OIL SPILL: 201, Moderately Low Hazard

Potential Impact: Several Locations

Cascade Effects: Highly Unlikely

Frequency: A Regular Event

Onset: No Warning

Hazard Duration: Less Than One Day

Recovery Time: Three Days to One Week

Impact:

- Serious Injury or Death Unlikely
- Little or No Damage to Private Property
- Little or No Structural Damage to Public Facilities

LANDSLIDE: 199, Moderately Low Hazard

Potential Impact: Single Location

Cascade Effects: Some Potential

Frequency: A Rare Event

Onset: No Warning

Hazard Duration: Less Than One Day

Recovery Time: More Than Two Weeks

Impact:

- Serious Injury or Death is Likely, but not in Large Numbers
- Severe Damage to Private Property
- Severe Structural Damage to Public Facilities

EXTREME TEMPS: 196, Moderately Low Hazard

Potential Impact: Throughout a Large Region

Cascade Effects: Some Potential

Frequency: A Regular Event

Onset: Several Days Warning

Hazard Duration: Four days to One Week

Recovery Time: Less Than One Day

Impact:

- Serious Injury or Death is Likely, but not in Large Numbers
- Little or No Damage to Private Property
- Little or No Structural Damage to Public Facilities

TRANS ACCIDENT RAIL: 194, Moderately Low Hazard

Potential Impact: Throughout a Large Region

Cascade Effects: Highly Likely

Frequency: A Rare Event

Onset: No Warning

Hazard Duration: Less Than One Day

Recovery Time: More Than Two Weeks

Impact:

- Serious Injury or Death is Likely, but not in Large Numbers
- Little or No Damage to Private Property
- Moderate Structural Damage to Public Facilities

EXPLOSION: 192, Moderately Low Hazard

Potential Impact: Single Location

Cascade Effects: Highly Unlikely

Frequency: A Rare Event

Onset: No Warning

Hazard Duration: Less Than One Day

Recovery Time: More Than Two Weeks

Impact:

- Serious Injury or Death is Likely, but not in Large Numbers
- Severe Damage to Private Property
- Severe Structural Damage to Public Facilities

WATER SUPPLY CONTAMINATION: 182, Moderately Low Hazard

Potential Impact: Throughout a Large Region

Cascade Effects: Highly Likely

Frequency: A Rare Event

Onset: Several Hours Warning

Hazard Duration: Two to Three Days

Recovery Time: Three Days to One Week

Impact:

- Serious Injury or Death to Large Numbers
- Little or No Damage to Private Property
- Little or No Structural Damage to Public Facilities

HAZMAT (FIXED SITE): 168, Moderately Low Hazard

Potential Impact: Several Locations

Cascade Effects: Some Potential

Frequency: An Infrequent Event

Onset: No Warning

Hazard Duration: Less Than One Day

Recovery Time: Less Than One Day

Impact:

- Serious Injury or Death is Likely, but not in Large Numbers
- Little or No Damage to Private Property
- Little or No Structural Damage to Public Facilities

STRUCTURAL COLLAPSE: 164, Moderately Low Hazard

Potential Impact: Single Location

Cascade Effects: Some Potential

Frequency: A Rare Event

Onset: No Warning

Hazard Duration: One Day

Recovery Time: More Than Two Weeks

Impact:

- Serious Injury or Death is Likely, but not in Large Numbers
- Little or No Damage to Private Property
- Moderate Structural Damage to Public Facilities

Hazard(s) rated as low (44-160): EPIDEMIC, HAIL STORM, TORNADO, FUEL SHORTAGE, RADIOLOGICAL (FIXED SITE), INFESTATION, RADIOLOGICAL (IN TRANSIT), AIR CONTAMINATION, BLIGHT, ICE JAM, FOOD SHORTAGE, FUEL OIL SPILL, DROUGHT, CIVIL UNREST, WILDFIRE

EPIDEMIC: 160, Low Hazard

Potential Impact: Throughout a Large Region

Cascade Effects: Some Potential

Frequency: A Rare Event

Onset: More Than One Week Warning

Hazard Duration: More Than One Week

Recovery Time: More Than Two Weeks

Impact:

- Serious Injury or Death to Large Numbers
- Little or No Damage to Private Property
- Little or No Structural Damage to Public Facilities

HAIL STORM: 159, Low Hazard

Potential Impact: Throughout a Large Region

Cascade Effects: Some Potential

Frequency: An Infrequent Event

Onset: Several Hours Warning

Hazard Duration: Less Than One Day

Recovery Time: Less Than One Day

Impact:

- Serious Injury or Death Unlikely
- Little or No Damage to Private Property
- Little or No Structural Damage to Public Facilities

TORNADO: 155, Low Hazard

Potential Impact: Throughout a Small Region

Cascade Effects: Highly Unlikely

Frequency: A Rare Event

Onset: Several Hours Warning

Hazard Duration: Less Than One Day

Recovery Time: More Than Two Weeks

Impact:

- Serious Injury or Death is Likely, but not in Large Numbers
- Moderate Damage to Private Property
- Moderate Structural Damage to Public Facilities

FUEL SHORTAGE: 142, Low Hazard

Potential Impact: Throughout a Large Region

Cascade Effects: Highly Likely

Frequency: A Rare Event

Onset: More Than One Week Warning

Hazard Duration: More Than One Week

Recovery Time: More Than Two Weeks

Impact:

- Serious Injury or Death Unlikely
- Little or No Damage to Private Property
- Little or No Structural Damage to Public Facilities

RADIOLOGICAL (FIXED SITE): 140, Low Hazard

Potential Impact: Single Location

Cascade Effects: Highly Unlikely

Frequency: A Rare Event

Onset: Several Hours Warning

Hazard Duration: More Than One Week

Recovery Time: More Than Two Weeks

Impact:

- Serious Injury or Death Unlikely
- Little or No Damage to Private Property
- Little or No Structural Damage to Public Facilities

INFESTATION: 136, Low Hazard

Potential Impact: Throughout a Large Region

Cascade Effects: Highly Unlikely

Frequency: A Rare Event

Onset: More Than One Week Warning

Hazard Duration: More Than One Week

Recovery Time: More Than Two Weeks

Impact:

- Serious Injury or Death is Likely, but not in Large Numbers
- Little or No Damage to Private Property
- Little or No Structural Damage to Public Facilities

RADIOLOGICAL (IN TRANSIT): 134, Low Hazard

Potential Impact: Single Location

Cascade Effects: Some Potential

Frequency: A Rare Event

Onset: No Warning

Hazard Duration: Less Than One Day

Recovery Time: Three Days to One Week

Impact:

- Serious Injury or Death is Likely, but not in Large Numbers
- Little or No Damage to Private Property
- Little or No Structural Damage to Public Facilities

AIR CONTAMINATION: 132, Low Hazard

Potential Impact: Several Locations

Cascade Effects: Some Potential

Frequency: A Rare Event

Onset: No Warning

Hazard Duration: Less Than One Day

Recovery Time: Less Than One Day

Impact:

- Serious Injury or Death is Likely, but not in Large Numbers
- Little or No Damage to Private Property
- Little or No Structural Damage to Public Facilities

BLIGHT: 128, Low Hazard

Potential Impact: Throughout a Large Region

Cascade Effects: Highly Unlikely

Frequency: A Rare Event

Onset: More Than One Week Warning

Hazard Duration: More Than One Week

Recovery Time: More Than Two Weeks

Impact:

- Serious Injury or Death Unlikely
- Little or No Damage to Private Property
- Little or No Structural Damage to Public Facilities

ICE JAM: 123, Low Hazard

Potential Impact: Several Locations

Cascade Effects: Highly Unlikely

Frequency: An Infrequent Event

Onset: More Than One Week Warning

Hazard Duration: Four days to One Week

Recovery Time: Three Days to One Week

Impact:

- Serious Injury or Death Unlikely
- Little or No Damage to Private Property
- Little or No Structural Damage to Public Facilities

FOOD SHORTAGE: 119, Low Hazard

Potential Impact: Throughout a Large Region

Cascade Effects: Highly Unlikely

Frequency: A Rare Event

Onset: More Than One Week Warning

Hazard Duration: More Than One Week

Recovery Time: One to Two Weeks

Impact:

- Serious Injury or Death Unlikely
- Little or No Damage to Private Property
- Little or No Structural Damage to Public Facilities

FUEL OIL SPILL: 113, Low Hazard

Potential Impact: Single Location

Cascade Effects: Highly Unlikely

Frequency: A Rare Event

Onset: No Warning

Hazard Duration: One Day

Recovery Time: Less Than One Day

Impact:

- Serious Injury or Death Unlikely
- Little or No Damage to Private Property
- Little or No Structural Damage to Public Facilities

DROUGHT: 101, Low Hazard

Potential Impact: Throughout a Large Region

Cascade Effects: Highly Unlikely

Frequency: A Rare Event

Onset: More Than One Week Warning

Hazard Duration: More Than One Week

Recovery Time: Less Than One Day

Impact:

- Serious Injury or Death Unlikely
- Little or No Damage to Private Property
- Little or No Structural Damage to Public Facilities

CIVIL UNREST: 96, Low Hazard

Potential Impact: Several Locations

Cascade Effects: Highly Unlikely

Frequency: A Rare Event

Onset: One Day Warning

Hazard Duration: Less Than One Day

Recovery Time: One to Two Days

Impact:

- Serious Injury or Death is Likely, but not in Large Numbers
- Little or No Damage to Private Property
- Little or No Structural Damage to Public Facilities

WILDFIRE: 94, Low Hazard

Potential Impact: Several Locations

Cascade Effects: Highly Unlikely

Frequency: A Rare Event

Onset: One Day Warning

Hazard Duration: One Day

Recovery Time: One to Two Days

Impact:

- Serious Injury or Death Unlikely
- Little or No Damage to Private Property
- Little or No Structural Damage to Public Facilities

Hazard Analysis Matrix - Village of Mamaroneck

		SCOPE							FREQUENCY		IMPACT						ONSET		DURATION																		
		Impact				Cascade Effect			Frequency		People		Private Property		Public Facilities		Warning		Hazard			Recovery															
	Rating	Single Location	Several Individual Locations	Small Region	Large Region	Highly Unlikely	Some Potential	Highly Likely	A Rare Event	An Infrequent Event	A Regular Event	A Frequent Event	Injury or Death Unlikely	Injury/Death Small #'s	Injury/Death Large #'s	Injury/Death Extreme #'s	Little or No Damage	Moderate Damage	Severe Damage	Little or No Damage	Moderate Damage	Severe Damage	No Warning	Several Hours Warning	Up to One Day Warning	Up to One Week Warning	More Than a Week Warning	Less Than One Day	One Day	Two to Three Days	Four days to One Week	More Than One Week	Less Than One Day	One to Two Days	Three Days to One Week	One to Two Weeks	More Than Two Weeks
Hazard																																					
FLOOD	302																																				
COASTAL STORM	253																																				
SEVERE STORM & THUNDER	246																																				
FIRE	240																																				
TRANS ACCIDENT HIGHWAY	230																																				
WINDSTORM	230																																				
WINTER STORM (SEVERE)	230																																				
DAM FAILURE	224																																				
UTILITY FAILURE	221																																				
TERRORISM	219																																				
ICE STORM	217																																				
STORM SURGE / WAVE ACTION	216																																				
HURRICANE	212																																				
HAZMAT (IN TRANSIT)	210																																				
EARTHQUAKE	202																																				
OIL SPILL	201																																				
LANDSLIDE	199																																				
EXTREME TEMPS	196																																				
TRANS ACCIDENT RAIL	194																																				
EXPLOSION	192																																				
WATER SUPPLY CONTAMINATION	182																																				
HAZMAT (FIXED SITE)	168																																				
STRUCTURAL COLLAPSE	164																																				
EPIDEMIC	160																																				
HAIL STORM	159																																				
TORNADO	155																																				
FUEL SHORTAGE	142																																				
RADIOLOGICAL (FIXED SITE)	140																																				
INFESTATION	136																																				
RADIOLOGICAL (IN TRANSIT)	134																																				
AIR CONTAMINATION	132																																				
BLIGHT	128																																				
ICE JAM	123																																				
FOOD SHORTAGE	119																																				
FUEL OIL SPILL	113																																				
DROUGHT	101																																				
CIVIL UNREST	96																																				
WILDFIRE	94																																				

Appendix 2. Meetings and Notices

VILLAGE OF MAMARONECK
REVISED (DATE)

Notice of Public Meeting
To Solicit Public Input
For the preparation of a
Pre-Disaster Hazard Mitigation Plan (PDHMP)
For the Village of Mamaroneck, NY
Date: **Monday, JUNE 27, 2011**
Time: 7:30 PM
Place: 169 Mount Pleasant Avenue

All interested residents are invited to attend a Public Meeting hosted by the Village of Mamaroneck Pre-Disaster Hazard Mitigation Planning Committee, which includes contractual, elected, appointed and citizen representatives to assist and contribute in the preparation of an All Hazard Mitigation Plan for the Village of Mamaroneck.

The Village is preparing this Pre-Disaster Plan with a grant from the Department of Homeland Security / Federal Emergency Management Association (FEMA) in the amount of \$37,500 . Additional administrative oversight and technical assistance is being provided by the NYS Division of Homeland Security & Emergency Services , Office of Emergency Management (NYS OEM), and the Westchester County Office of Emergency Management.

It is anticipated that a plan will be prepared in draft from the comments and considerations presented by the Committee Members and interested citizens in the Village of Mamareoneck community. A second Public Meeting will be held later this year for additional public input and comment on the draft plan, before it is considered ready for submission to NYS OEM and FEMA.

For further information, or if you have any questions, please call Village Hall at (914) 777-7703.

Agostino A. Fusco
Clerk-Treasurer
June 16, 2011



Larchmont-MamaroneckPatch 84°

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Government

Mamaroneck Village Assesses Perils That Beset It

Hazards panel seeks to identify the potential dangers, then map steps to lessen their impact.

By [Tom Bartley](#) | [Email the author](#) | June 29, 2011 | [Print](#)

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Tell Your Neighbors About Patch

A panel charged with imagining the very worst happening to Mamaroneck Village is seeking the public's very best thinking to anticipate and surmount any potential adversity.

"We want as much community input as possible," said Paul Ryan, a member of the All-Hazards Committee, which is compiling both a nightmare prospectus of calamities that could befall the village as well as a checklist of possible responses.

He spoke at the board of trustees' Monday night meeting in village hall. Ryan's panel—which includes village public safety, public works, and administration officials, among others—is working with a Long Island firm to identify the hazards.

The firm, [Environmental Technology Group](#) (ETG) Inc., provides consulting, environmental, engineering and science services, including multi-hazard mitigation plans, to clients in the United States and Latin America. The board contracted with ETG in March to prepare an all-hazard mitigation plan, with grant funds expected to cover the \$31,732 cost of the consultants' work.

The consultants, James E. Brower and Valerie H. Rifkin, attended Monday's meeting. Addressing the board, Brower also emphasized the need for the public's help in developing ideas "to mitigate these hazards."

An environmental health scientist, Brower has helped villages like Manorhaven, on Nassau County's north shore, and Patchogue, on Suffolk's south, to develop hazard mitigation plans. He said community committees like Mamaroneck's assess their risks and vulnerabilities to develop lists of potential natural and man-made threats. After the lists have been made, he said, they are scored by likelihood, combined with state and federal emergency plans and presented to the public for comment.

While Mamaroneck has until September, 2013 under a federally funded \$37,500 state grant to complete and adopt a mitigation plan, Assistant Village Manager Daniel J. Sarnoff said, "we would like to adhere to a schedule by which we submit a final plan," for the Federal Emergency Management Agency (FEMA) to review by next May, more than a year early.

Not surprisingly, natural disasters make up four of the top six threats facing Mamaroneck, Village Manager Richard Slingerland said. He identified them as flooding, a coastal storm, hazardous-materials spill, hurricane, severe rainstorm and rail or highway accidents.

The roll call of potential perils highlighted a relatively quiet and brief meeting in which the board also declared itself the lead agency on the Local Waterfront Revitalization Plan (LWRP) and later, in a split vote, extended its contract with—and payments to—another consultant, this one assisting with the LWRP update.

The consultant, Manhattan-based BFJ Planning, advises the village planning board. Mamaroneck retained BFJ under a \$40,000 contract in February 2010 to help the village update the LWRP. Now, however, citing extra work the firm has taken on in conducting added public information sessions and meetings of the LWRP update committee, BFJ has asked for an additional \$28,000. It got that sum Monday, but not before one trustee flatly refused and three others on the short-handed board swallowed hard before voting a reluctant "yes."

A village resident, Doreen Roney, expressed dismay with BFJ's request for further funding. In a letter to the mayor and trustees, she asked, "Doesn't this board have the fiduciary responsibility to taxpayers to appropriately manage programs, consultants and budgetary funds?"

Trustee John M. Hofstetter, declaring himself, "very nervous about spending \$28,000," voted against the measure. But Trustees Toni Pergola Ryan, Sid Albert and Louis N. Santoro, presiding as deputy mayor, provided the unenthusiastic approval. Ryan and Albert both noted what they said was a need for more public input, which inevitably adds hours and, at some point, dollars to a consultant's invoice. Santoro, casting the final assent, called it "the price we've got to pay to get this done."

Slingerland, in discussing potential hazards facing the community, noted the danger inherent in having two major arteries—a busy rail line and an interstate highway—coursing through this quiet suburb. With them come opportunities for calamitous accidents and massive disruptions.

Still, the emergencies deemed more likely to beset the village grow out of nature's fury. On that aspect Monday the board immediately received some of the public input it was seeking. Dan Natchez, a resident who regularly shares his views with the board, pointed out that The Nature Conservancy has extensively studied flooding along Mamaroneck's coast, among other places, and offers ready-made data that the hazards committee could consider.

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Village of Mamaroneck seeks input on hazard plan

Written by PAIGE RENTZ

Thursday, 30 June 2011 14:38

The Village of Mamaroneck is seeking public input on a plan that would help it identify and prepare for any disasters that could befall the community – and qualify for grant money to mitigate them.

The Federal Emergency Management Administration (FEMA) requires municipalities to compile a structured “pre-hazard mitigation plan” to qualify for a number of grant programs. Previously, local governments had a choice as to whether they wanted to implement a hazard mitigation plan or a Flood Mitigation Action Program in order to qualify for FEMA funds. After the devastating floods of 2007, the village completed a Flood Mitigation Action Program under FEMA guidelines, filing a final version in February 2008.

Subsequently, according to Assistant Village Manager Dan Sarnoff, “they changed the rules on us, and now we have to have an all-hazard plan in place.” Fortunately for the village, it has received a FEMA grant that covers 75 percent of the cost to complete the plan that will make it eligible for future grants.

As part of the required planning process for a local pre-disaster mitigation plan, the village held its first public information session at Monday’s Board of Trustees meeting. Though there isn’t a plan to present yet, Sarnoff explained that the village is seeking ideas from residents about potential hazards villagers face and ways the local government can help them prepare for and recover from them.

“Even though we are only 3.5 square miles, we have a sewage treatment plant, an industrial section,” said Sarnoff. “There are a lot of things we have to account for.”

The village staff, along with a consulting firm and a committee of village department heads and residents, met Monday afternoon to identify and prioritize the hazards that are the greatest threat to the village.

Village Manager Richard Slingerland identified the top six: flooding, coastal storm flooding, hazardous material contamination, hurricanes, severe storm and rain, and transportation accidents, both by roadway and rail.

Paul Ryan, one of the members of the village planning committee, said he was “surprised to look at the list and see how many things could happen. “I’m very happy to say we left out avalanche, one of the very few” items the village didn’t tick off on the checklist of disasters, which range from wildfires to tsunamis, thunderstorms to dam failure, tornadoes to terrorism.

James Brower of Environmental Technology Group out of Hauppauge, Long Island – the village’s consultants for the project – said his team will “try not to leave any stone unturned” as they evaluate the hazards and risks facing the village and identify the various vulnerable areas in the community.

From the evaluation phase, the team will move toward “looking at goals we’re trying to achieve in the community,” Brower said. Goals to mitigate the disasters can include measures such as studies, engineering plans or response procedures.

Once the document is complete, it is reviewed by the State Office of Emergency Management and is submitted for a 30-day public comment period before it gets sent off for a stamp of approval from the state and federal administrations.

The village hopes to have a plan ready to submit to the state by the end of January 2012.

Though the planning procedure requires the specific 30-day comment period, Brower said “feedback is continually sought out and welcomed.”

Village Trustee Toni Ryan (D) suggested Monday that the Mamaroneck hold a type of workshop or brainstorming session for residents to come present ideas.

“It’s a matter of public outreach,” said Village Manager Slingerland, who added that the village wants to get “ideas from people who have been affected by these things and how we can help.”

In the meantime, anyone who wishes to submit comments to the village can call (914) 777-7703, or email either Sarnoff at dsarnoff@vomny.org or Slingerland at rslingerland@vomny.org.

Editor [Stefani Kim stefani.kim@patch.com](mailto:stefani.kim@patch.com)

Larchmont-MamaroneckPatch

Government

Mamaroneck Public Asked For Feedback on Multi-Hazard Plan To Address Flooding

A flood mitigation plan is the first step in obtaining FEMA grants for the village.

By [Marc Ferris](#)

[Email the author](#)

March 27, 2012

The Village of Mamaroneck (VOM) has suffered more than its fair share of damages related to flooding within the past few years, with the disastrous Nor'easter of 2007 and, more recently, the short-lived yet destructive Tropical Storm Irene.

Since 1954, there have been 64 major disaster declarations in New York State, including 46 instances of hurricanes or flooding. Given the likelihood of a potential reoccurrence, the Village is looking to the past to help guide future prevention efforts with their first draft of the Local Multi-Hazard Mitigation Plan. The plan is available in print at the village offices and online on the [village's website here](#); the public comment period remains open through April 13, 2012.

Paid for by a \$37,500 grant from the Federal Emergency Management Agency (FEMA), the plan is the first step in the process of applying for more grants in the future to reduce risks for flooding.

James Brower, a consultant at Environmental Technology Group (ETG) of Hauppauge, NY, which prepared the document, presented an overview of the plan, designed to identify "critical hazards and provide remedies for these hazards." All hazards, not just flooding, are considered, though Valerie Rifkin of ETG joked that mine collapses and avalanches were "ruled out."

"We had to collect a lot of data," said Brower. "The public gave us some input in the early phases of the plan in hazard identification" and the plan includes, "flooding, fires, natural hazards such as hurricanes and so on. We even have to evaluate earthquakes—last year we had an earthquake and a hurricane in same year."

The plan considers damage assessment impacts and hazards to property as well as public safety and must be updated and revised every five years.

Mayor Norman Rosenblum noted that Larchmont is just starting its own hazard mitigation plan with the county, “so we’re a good year and a half ahead of them.” This could potentially have a “direct affect on potential funds available,” he added.

With flooding and coastal storms the major hazards identified by the plan, ETG mapped frequently flooded streets and provided guidelines for planned evacuations as well as assessed risks to critical facilities like schools, EMS depots, police buildings, the Department of Public Works (DPW) and the wastewater treatment facility. The plan also presents a damage analysis that identifies structures at risk, including buildings in the flood zones. The agency attempted to determine valuation replacement costs and ran a computer program simulating damage.

“We encourage residents to take a look at the plan and give feedback,” said Rifkin.

The next task is to “do some planning,” said Brower, which entails setting community objectives and selecting mitigation activities, including river dredging, removing obstructions from streams, changing building codes and improving zoning. After the development of a Draft Action Plan, the order of priorities would be set so “we’re not running around with list of projects,” said Brower. “Then we would go after funding for the most important ones right away.”

Speaking on behalf of the Coordinating Council of Neighborhood Associations, Dan Natchez praised the plan as being “exceedingly well written” and a “major step in the right direction, although he expressed concern that it represented an “after the fact plan,” less focused on prevention.

“It doesn’t really have a major outline of what to do to help try and prevent the hazards from occurring,” he said, continuing, “It addresses zoning in a limited way” and “could be beefed up dramatically.”

Paul Ryan, a member of the village’s Flood Mitigation Advisory Committee (since Noah’s Ark, joked the mayor), disagreed with Natchez’s assessment of the plan’s intent.

“It’s not an ‘after the fact plan,’ it’s a pre-fact plan. The work done on this helped us with Irene” and “educated people what to do in case we do have an event in the future—we will have an event in the future, hopefully a long, long time from now.”

In Westchester, 16 out of 44 municipalities have completed or are in the process of completing, such a plan, which is “not designed to sit on a shelf,” said Ryan. “We’re on the cutting edge and ours will be one of the best.”

The plan's effectiveness, he added, will involve educating the public via a multilingual, multimedia campaign.

"This is going to require a lot of education," said Trustee John Hofstetter. "This is an important document for people to pay attention to."

All-Hazard Mitigation Plan – Meeting with Planning Committee and ETG – June 9, 2011

A meeting was held with the All-Hazard Mitigation Planning Committee and Environmental Technology Group (ETG), Happaugue, NY in order to review the proposed timeline and next steps and information needs to prepare the All-Hazard Mitigation Plan for the Village of Mamaroneck. Those in attendance included Richard Slingerland (Village Manager), Daniel Sarnoff (Assistant Village Manager), Christopher Leahy (Chief of Police), Tony Iacovelli (Gen. Foreman of DPW), Paul Ryan (resident representative/Flood Mitigation Advisory Committee), and Past-Chief Dean DeLitta (Fire Department), Jim Brower (ETG) and Valerie Rifkin (ETG).

The Assistant Village Manager summarized the discussion of a meeting held earlier in the morning among himself, the Village Manager, Mr. Brower, Ms. Rifkin and Bill Seevers, also of ETG. Among the topics of discussion at the morning meeting with the review of the proposed timeline, said schedule was revised and will be updated by Ms. Rifkin and distributed to the Planning Committee.

The scheduling of a first public meeting was also discussed and it was determined that such a public meeting would be scheduled to be held on June 27, 2011 during the regularly scheduled meeting of the Board of Trustees. The purpose of the public meeting is to introduce the concept of an all-hazard mitigation plan to the Village residents and solicit their input. The Planning Committee discussed strategies to promote the public meeting and to encourage residents to attend. The Assistant Village Manager will work with the clerk's office to prepare the appropriate public notice.

The Assistant Village Manager reviewed with the Planning Committee the revised timeline, without covering each individual aspect of the timeline, the Assistant Village Manager highlighted six major milestones:

- **June 27, 2011** – First Public Meeting held
- **November 22, 2011** – Submission of first draft to Planning Committee
- **January 3, 2012** – Submission of First Draft of All-Hazard Plan to NYSOEM
- **February 20, 2011 – March 19, 2011** – Public Review and comment on Draft Plan
- **May 29, 2012** – Adoption of Plan by Village Board
- **May 30, 2012** – Submit Final Draft Plan to NYSOEM and FEMA

ETG confirmed their comfort with the schedule and believed it to be realistic. The Assistant Village Manager indicated that he reviewed the schedule with Tom Abbati from the New York State Office of Emergency Management and he also indicated that he believed it to be a realistic schedule.

Mr. Ryan indicated that in preparing the All-Hazard Mitigation Plan, the mitigation plan address the needs of individuals with disabilities in the development and implementation of mitigation strategies.

The Planning Committee reviewed the previous reports prepared by the Village and other agencies dealing with hazards/disasters that have occurred in the Village of Mamaroneck and identified additional studies not previously known. The Village Manager also distributed a copy of the Village of Mamaroneck Police Department's emergency response most recently updated in 2005.

The Planning Committee also reviewed agencies identified by ETG to be contacted in connection with a Hazard Mitigation Plan. Additional agencies not identified on the original list and correct contact information was given to ETG.

ETG reviewed the HAZNY process with the Planning Committee. As several members of the Committee participated in the preparation of the Flood Mitigation Action (FMA) Plan, they were familiar with the process. The Village Manager provided a copy of the HAZNY included with the FMA to the Planning Committee. ETG was unable to conduct the HAZNY analysis at the meeting, however, they indicated that they would send the HAZNY questionnaire to the Planning Committee.

The next meeting of the Planning Committee will be held subsequent to the first public meeting to be held on June 27, 2011 and the completion of the HAZNY. At that meeting, the Committee will provide input of storm hazards, discuss mitigation goals and objectives and mitigative measures that would be proposed by the Planning Committee.

All-Hazard Mitigation Plan – Meeting with Planning Committee and ETG – June 27, 2011

A meeting was held with the All-Hazard Mitigation Planning Committee and Environmental Technology Group (ETG), Happaugue, NY in order to conduct the HAZNY analysis to prepare the All-Hazard Mitigation Plan for the Village of Mamaroneck. Those in attendance included Richard Slingerland (Village Manager), Daniel Sarnoff (Assistant Village Manager), Dominick Falcone (Lt. - VMPD), Paul Ryan (resident representative/Flood Mitigation Advisory Committee), Jim Brower (ETG) and Valerie Rifkin (ETG).

Mr. Brower and Ms. Rifkin explained how HAZNY works why it is used as part of the preparation in the All Hazard Mitigation Plan.

The HAZNY analysis is largely a risk management tool which attempts to objectively rank the potential damage that can be caused by a hazard and takes into account frequency, property damage, casualties, etc. The Committee ruled out avalanche, mine collapse and tsunami as hazards that could be experienced in the Village of Mamaroneck. The Committee also Combined storm surge and wave action as well as combining storm and thunderstorm.

The members of the Committee spent approximately 2 ½ hours reviewing hazards and identifying the potential for damage that could be caused by each.

All-Hazard Mitigation Plan – Meeting with Planning Committee and ETG – July 22, 2011

A meeting was held with the All-Hazard Mitigation Planning Committee and Environmental Technology Group (ETG), Happaugue, NY in order to conduct the HAZNY analysis to prepare the All-Hazard Mitigation Plan for the Village of Mamaroneck. Those in attendance included Richard Slingerland (Village Manager), Daniel Sarnoff (Assistant Village Manager), Joseph Russo (Harbor Master), Tony Iacovelli (General Foreman – DPW) Chief Christopher Leahy (VMPD), Dean DeLitta (Past Chief – VMFD), Paul Ryan (resident representative/Flood Mitigation Advisory Committee), and Valerie Rifkin (ETG).

The results of the first attempt at HAZNY seemed to indicate that certain hazard events may have been inflated while others may have been not been considered high enough. This was likely due to fewer members at the June 27 meeting. Mr. Brower and Ms. Rifkin again explained how HAZNY works why it is used as part of the preparation in the All Hazard Mitigation Plan.

The members of the Committee spent approximately 2 ½ hours reviewing hazards and identifying the potential for damage that could be caused by each.

All-Hazard Mitigation Plan – Meeting with Planning Committee and ETG – August 23, 2011

A meeting was held with the All-Hazard Mitigation Planning Committee and Environmental Technology Group (ETG), Happaugue, NY in order to conduct the HAZNY analysis to prepare the All-Hazard Mitigation Plan for the Village of Mamaroneck. Those in attendance included Daniel Sarnoff (Assistant Village Manager), Joseph Russo (Harbor Master), Tony Iacovelli (General Foreman – DPW) Chief Christopher Leahy (VMPD), Paul Ryan (resident representative/Flood Mitigation Advisory Committee), Jim Brower (ETG) and Valerie Rifkin (ETG).

The steering committee reviewed the results of the 2nd HAZNY analysis and felt more comfortable with the results which indicated flooding as the greatest hazard faced by the Village of Mamaroneck. Other weather related events were also higher on the list. The purpose of the meeting was to establish goals and objectives for developing mitigative measures.

Dr. Brower and Ms. Rifkin provided handouts to the group and discussed the process of goals and objectives setting and the difference between the two. Mitigation alternatives or actions need to be prioritized based on certain considerations. FEMA recommends using the STAPLEE evaluation, as this process addresses all the major factors when weighing the costs to the benefits of implementing one action over another.

S – Social: Mitigation actions are acceptable to the community if they do not adversely affect a particular segment of the population, do not cause relocation of lower income people, and if they are compatible with the communities social and cultural values.

T – Technical: Mitigation actions are technically most effective if they provide long-term reduction of losses and have minimal secondary adverse impacts.

A – Administrative: Mitigation actions are easier to implement if the jurisdiction has the necessary staffing and funding.

P – Political: Mitigation actions can truly be successful if all stakeholders have been offered an opportunity to participate in the planning process and if there is public support of the action.

L – Legal: It is critical that the jurisdiction or implementing agency have the legal authority to implement and enforce a mitigation action.

E – Economical: Budget constraints can significantly deter the implementation of mitigation actions. Hence, it is important to evaluate whether an action is cost-effective, as determined by a cost-benefit review, and possible to fund.

E – Environmental: Sustainable mitigation actions that do not have an adverse effect on the environment, that comply with Federal, State, and local environmental regulations, and that are consistent with the community's environmental goals, have mitigation benefits while being environmentally sound.

All-Hazard Mitigation Plan – Meeting with Planning Committee and ETG – September 22, 2011

A meeting was held with the All-Hazard Mitigation Planning Committee and Environmental Technology Group (ETG), Happaugue, NY in order to conduct the HAZNY analysis to prepare the All-Hazard Mitigation Plan for the Village of Mamaroneck. Those in attendance included Richard Slingerland (Village Manager), Daniel Sarnoff (Assistant Village Manager), Joseph Russo (Harbor Master), Tony Iacovelli (General Foreman – DPW) Chief Christopher Leahy (VMPD), Paul Ryan (resident representative/Flood Mitigation Advisory Committee), Reggie Wilson (MEMS) Gail Vidales (citizen representative – Hispanic Resource Center). Jim Brower (ETG), Bill SeEVERS (ETG) and Valerie Rifkin (ETG).

The steering committee met to review the goals that were previously identified and discussed and prioritized possible mitigation activities. Specific capital projects discussed were implementation of projects to be recommended by US Army Corps of Engineers, purchase of additional emergency response equipment and administrative matters such as code amendments, and public education and outreach.

Appendix 3.
HAZUS-MH: Hurricane Event Report
3.1 Scenario 01/ Historical Model
3.2 Probabilistic Model
(10 Year –1,000 Year Return Periods)

Quick Assessment Report

October 8, 2011

Study Region : MamaroneckNY-hurricane-1
Scenario : Scenario-1
Scenario Description : User Defined
Peak Gust Wind Speed (mph) : 141

Regional Statistics

Area (Square Miles)	3
Number of Census Tracts	4
Number of People in the Region	18,464

General Building Stock

<i>Occupancy</i>	<i>Building Count</i>	<i>Dollar Exposure (\$ M)</i>
Residential	4,061	1,175
Commercial	83	202
Other	12	94
Total	4,156	1,474

Scenario Results

Number of Buildings Damaged

<i>Damage State</i>	<i>Residential</i>	<i>Commercial</i>	<i>Other</i>	<i>Total</i>
Minor	900	10	<10	900
Moderate	1,400	30	<10	1,400
Severe	800	40	<10	900
Destruction	600	<10	0	600
Total	3,800	80	<10	3,900

Shelter Requirements

Displaced Households (# Households)	3,300
Short Term Shelter (# People)	800

Economic Loss (\$ Millions)

Capital Stock	782
Residential Property	650
Commercial Property	87
Other Property	45
Business Interruption (Income)	92
Total Direct Economic Loss	874

Disclaimer:

The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.

HAZUS-MH: Hurricane Event Report

Region Name: MamaroneckNY-hurricane-1

Hurricane Scenario: Scenario-1

Print Date: Saturday, October 08, 2011

Disclaimer:

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General Description of the Region

HAZUS is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of HAZUS is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- New York

Note:

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 3.14 square miles and contains 4 census tracts. There are over 6 thousand households in the region and has a total population of 18,464 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 4 thousand buildings in the region with a total building replacement value (excluding contents) of 1,475 million dollars (2002 dollars). Approximately 98% of the buildings (and 80% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

HAZUS estimates that there are 4,156 buildings in the region which have an aggregate total replacement value of 1,475 million (2002 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure (\$1000)	Percent of Total
Residential	1,175,153	79.7%
Commercial	202,474	13.7%
Industrial	33,912	2.3%
Agricultural	3,161	0.2%
Religious	6,915	0.5%
Government	5,164	0.4%
Education	47,781	3.2%
Total	1,474,560	100.0%

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 7 schools, 2 fire stations, 2 police stations and no emergency operation facilities.

Hurricane Scenario

HAZUS used the following set of information to define the hurricane parameters for the hurricane loss estimate provided in this report.

Scenario Name: Scenario-1
Type: Deterministic
Maximum Peak Gust in Study Region: 141 mph
Storm Information: Deterministic scenario

User Defined Storm Track Input Data

Point	Latitude	Longitude	Time Step (hour)	Translation Speed (mph)	Radius To Max Winds (miles)	Max. Sustained Wind Speed (mph @ 10m)	Central Pressure (mBar)	Profile Parameter	Radius to Hurricane Force Winds (miles)
1	31.45	-75.64	--	15.00	20.00	120.00	955.00	--	--
2	40.29	-73.91	--	15.00	20.00	120.00	955.00	--	--
3	41.50	-73.71	--	15.00	20.00	120.00	955.00	--	--
4	45.59	-72.80	--	15.00	20.00	120.00	955.00	--	--

Building Damage

General Building Stock Damage

HAZUS estimates that about 2,946 buildings will be at least moderately damaged. This is over 71% of the total number of buildings in the region. There are an estimated 616 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of the HAZUS Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

Table 2: Expected Building Damage by Occupancy

Occupancy	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	6.48	0	21.46	0	32.38	0	28.63	0	11.05
Commercial	7	8.01	11	13.55	26	31.00	38	45.91	1	1.53
Education	0	7.21	0	10.98	1	28.20	2	52.95	0	0.66
Government	0	7.42	0	9.89	1	27.13	2	55.17	0	0.38
Industrial	0	9.34	0	12.69	1	30.19	1	46.07	0	1.70
Religion	0	7.81	0	18.54	0	34.93	0	37.88	0	0.84
Residential	263	6.47	927	22.82	1,411	34.74	847	20.85	614	15.12
Total	270		939		1,440		891		616	

Table 3: Expected Building Damage by Building Type

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	6	7.61	7	8.88	26	33.75	39	49.75	0	0.01
Masonry	56	7.67	125	17.06	281	38.44	212	28.99	57	7.85
MH	2	19.68	1	11.61	2	27.19	1	9.96	3	31.56
Steel	6	8.52	6	9.00	19	28.08	37	53.38	1	1.01
Wood	201	6.17	824	25.27	1,081	33.16	605	18.54	550	16.86

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (0%) are available for use. After one week, none of the beds will be in service. By 30 days, none will be operational.

Table 4: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		Probability of at Least Moderate Damage > 50%	Probability of Complete Damage > 50%	Expected Loss of Use < 1 day
Fire Stations	2	2	0	0
Police Stations	2	2	0	0
Schools	7	7	0	0

Induced Hurricane Damage

Debris Generation

HAZUS estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into three general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, and c) Trees. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 82,476 tons of debris will be generated. Of the total amount, Brick/Wood comprises 90% of the total, Reinforced Concrete/Steel comprises of 3% of the total, with the remainder being Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 3049 truckloads (@25 tons/truck) to remove the debris generated by the hurricane.

Social Impact

Shelter Requirement

HAZUS estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 3,267 households to be displaced due to the hurricane. Of these, 751 people (out of a total population of 18,464) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the hurricane is 874.1 million dollars, which represents 59.28 % of the total replacement value of the region's buildings.

Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 874 million dollars. 4% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 81% of the total loss. Table 4 below provides a summary of the losses associated with the building damage.

Table 5: Building-Related Economic Loss Estimates
(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
<u>Property Damage</u>						
	Building	451,953.00	51,504.80	8,480.63	17,264.51	529,202.94
	Content	198,117.06	34,625.30	7,248.28	11,524.67	251,515.31
	Inventory	0.00	703.39	905.45	64.66	1,673.50
	Subtotal	650,070.06	86,833.50	16,634.35	28,853.84	782,391.75
<u>Business Interruption Loss</u>						
	Income	35.62	9,937.02	90.45	193.98	10,257.09
	Relocation	35,465.87	7,395.68	492.89	3,007.49	46,361.93
	Rental	18,771.32	4,870.33	83.14	218.73	23,943.52
	Wage	83.25	10,319.37	155.20	619.95	11,177.76
	Subtotal	54,356.06	32,522.40	821.68	4,040.16	91,740.29
<u>Total</u>	Total	704,426.12	119,355.89	17,456.03	32,894.00	874,132.05

Appendix A: County Listing for the Region

New York

- Westchester

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
New York				
Westchester	18,464	1,175,153	299,407	1,474,560
Total State	18,464	1,175,153	299,407	1,474,560
Total Study Region	18,464	1,175,153	299,407	1,474,560

Quick Assessment Report

October 7, 2011

Study Region : MamaroneckNY-hurricane-1

Scenario : Probabilistic

Regional Statistics

Area (Square Miles)	3
Number of Census Tracts	4
Number of People in the Region	18,464

General Building Stock

Occupancy	Building Count	Dollar Exposure (\$ M)
Residential	4,061	1,175
Commercial	83	202
Other	12	94
Total	4,156	1,474

Scenario Results

Number of Residential Buildings Damaged

Return Period	Minor	Moderate	Severe	Destruction	Total
10	0	0	0	0	0
20	6	0	0	0	6
50	134	17	1	0	152
100	665	149	6	3	823
200	1,366	584	71	43	2,065
500	1,408	1,229	406	258	3,301
1000	979	1,412	800	573	3,764

Number of Buildings Damaged

Return Period	Minor	Moderate	Severe	Destruction	Total
10	0	0	0	0	0
20	6	0	0	0	6
50	136	18	1	0	154
100	678	153	7	3	841
200	1,390	602	77	43	2,112
500	1,429	1,259	432	258	3,378
1000	993	1,442	842	574	3,850

Shelter Requirements

Return Period	Displaced Households (#Households)	Short Term Shelter (#People)
10	0	0
20	0	0
50	7	1
100	67	15
200	302	69
500	1,459	335
1000	3,059	702

Economic Loss (x 1000)

ReturnPeriod	Property Damage (Capital Stock) Losses		Business Interruption (Income) Losses
	Residential	Total	
10	0	0	0
20	261	261	1
50	7,150	7,400	530
100	26,740	29,080	3,278
200	97,860	112,864	14,239
500	344,584	411,850	52,670
1000	616,405	740,142	87,287
Annualized	2,449	2,903	337

Disclaimer:

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HAZUS-MH: Hurricane Event Report

Region Name: MamaroneckNY-hurricane-1

Hurricane Scenario: Probabilistic 10-year Return Period

Print Date: Friday, October 07, 2011

Disclaimer:

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General Description of the Region

HAZUS is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of HAZUS is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- New York

Note:

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 3.14 square miles and contains 4 census tracts. There are over 6 thousand households in the region and has a total population of 18,464 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 4 thousand buildings in the region with a total building replacement value (excluding contents) of 1,475 million dollars (2002 dollars). Approximately 98% of the buildings (and 80% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

HAZUS estimates that there are 4,156 buildings in the region which have an aggregate total replacement value of 1,475 million (2002 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure (\$1000)	Percent of Total
Residential	1,175,153	79.7%
Commercial	202,474	13.7%
Industrial	33,912	2.3%
Agricultural	3,161	0.2%
Religious	6,915	0.5%
Government	5,164	0.4%
Education	47,781	3.2%
Total	1,474,560	100.0%

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 7 schools, 2 fire stations, 2 police stations and no emergency operation facilities.

Hurricane Scenario

HAZUS used the following set of information to define the hurricane parameters for the hurricane loss estimate provided in this report.

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

HAZUS estimates that about 0 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the region. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of the HAZUS Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

Table 2: Expected Building Damage by Occupancy : 10 - year Event

Occupancy	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	1	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	83	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	3	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	4	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	3	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	1	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	4,061	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Total	4,156		0		0		0		0	

Table 3: Expected Building Damage by Building Type : 10 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	78	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	732	100.00	0	0.00	0	0.00	0	0.00	0	0.00
MH	9	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	69	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	3,261	100.00	0	0.00	0	0.00	0	0.00	0	0.00

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (0%) are available for use. After one week, none of the beds will be in service. By 30 days, none will be operational.

Table 4: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		Probability of at Least Moderate Damage > 50%	Probability of Complete Damage > 50%	Expected Loss of Use < 1 day
Fire Stations	2	0	0	2
Police Stations	2	0	0	2
Schools	7	0	0	7

Induced Hurricane Damage

Debris Generation

HAZUS estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into three general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, and c) Trees. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 0 tons of debris will be generated. Of the total amount, Brick/Wood comprises 0% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 0 truckloads (@25 tons/truck) to remove the debris generated by the hurricane.

Social Impact

Shelter Requirement

HAZUS estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 0 households to be displaced due to the hurricane. Of these, 0 people (out of a total population of 18,464) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the hurricane is 0.0 million dollars, which represents 0.00 % of the total replacement value of the region's buildings.

Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 0 million dollars. 0% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 0% of the total loss. Table 4 below provides a summary of the losses associated with the building damage.

Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
<u>Property Damage</u>						
	Building	0.00	0.00	0.00	0.00	0.00
	Content	0.00	0.00	0.00	0.00	0.00
	Inventory	0.00	0.00	0.00	0.00	0.00
	Subtotal	0.00	0.00	0.00	0.00	0.00
<u>Business Interruption Loss</u>						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	0.00	0.00	0.00	0.00	0.00
	Rental	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.00	0.00	0.00	0.00
	Subtotal	0.00	0.00	0.00	0.00	0.00
<u>Total</u>	Total	0.00	0.00	0.00	0.00	0.00

Appendix A: County Listing for the Region

New York

- Westchester

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
New York				
Westchester	18,464	1,175,153	299,407	1,474,560
Total State	18,464	1,175,153	299,407	1,474,560
Total Study Region	18,464	1,175,153	299,407	1,474,560

HAZUS-MH: Hurricane Event Report

Region Name: MamaroneckNY-hurricane-1

Hurricane Scenario: Probabilistic 20-year Return Period

Print Date: Friday, October 07, 2011

Disclaimer:

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There are an estimated 4 thousand buildings in the region with a total building replacement value (excluding contents) of 1,475 million dollars (2002 dollars). Approximately 98% of the buildings (and 80% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

HAZUS estimates that there are 4,156 buildings in the region which have an aggregate total replacement value of 1,475 million (2002 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

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Government	5,164	0.4%
Education	47,781	3.2%
Total	1,474,560	100.0%

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 7 schools, 2 fire stations, 2 police stations and no emergency operation facilities.

Hurricane Scenario

HAZUS used the following set of information to define the hurricane parameters for the hurricane loss estimate provided in this report.

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

HAZUS estimates that about 0 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the region. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of the HAZUS Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

Table 2: Expected Building Damage by Occupancy : 20 - year Event

Occupancy	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	1	99.80	0	0.20	0	0.00	0	0.00	0	0.00
Commercial	83	99.72	0	0.28	0	0.00	0	0.00	0	0.00
Education	3	99.69	0	0.31	0	0.00	0	0.00	0	0.00
Government	4	99.67	0	0.33	0	0.00	0	0.00	0	0.00
Industrial	3	99.72	0	0.28	0	0.00	0	0.00	0	0.00
Religion	1	99.79	0	0.21	0	0.00	0	0.00	0	0.00
Residential	4,055	99.86	6	0.14	0	0.01	0	0.00	0	0.00
Total	4,150		6		0		0		0	

Table 3: Expected Building Damage by Building Type : 20 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	78	99.63	0	0.37	0	0.00	0	0.00	0	0.00
Masonry	729	99.62	3	0.37	0	0.01	0	0.00	0	0.00
MH	9	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	69	99.68	0	0.32	0	0.00	0	0.00	0	0.00
Wood	3,259	99.95	1	0.04	0	0.01	0	0.00	0	0.00

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (0%) are available for use. After one week, none of the beds will be in service. By 30 days, none will be operational.

Table 4: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		Probability of at Least Moderate Damage > 50%	Probability of Complete Damage > 50%	Expected Loss of Use < 1 day
Fire Stations	2	0	0	2
Police Stations	2	0	0	2
Schools	7	0	0	7

Induced Hurricane Damage

Debris Generation

HAZUS estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into three general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, and c) Trees. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 124 tons of debris will be generated. Of the total amount, Brick/Wood comprises 19% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 1 truckloads (@25 tons/truck) to remove the debris generated by the hurricane.

Social Impact

Shelter Requirement

HAZUS estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 0 households to be displaced due to the hurricane. Of these, 0 people (out of a total population of 18,464) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the hurricane is 0.3 million dollars, which represents 0.02 % of the total replacement value of the region's buildings.

Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 0 million dollars. 0% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 100% of the total loss. Table 4 below provides a summary of the losses associated with the building damage.

Table 5: Building-Related Economic Loss Estimates
(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
<u>Property Damage</u>						
	Building	210.65	0.00	0.00	0.00	210.65
	Content	50.32	0.00	0.00	0.00	50.32
	Inventory	0.00	0.00	0.00	0.00	0.00
	Subtotal	260.97	0.00	0.00	0.00	260.97
<u>Business Interruption Loss</u>						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	0.60	0.00	0.00	0.00	0.60
	Rental	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.00	0.00	0.00	0.00
	Subtotal	0.60	0.00	0.00	0.00	0.60
<u>Total</u>	Total	261.57	0.00	0.00	0.00	261.57

Appendix A: County Listing for the Region

New York

- Westchester

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
New York				
Westchester	18,464	1,175,153	299,407	1,474,560
Total State	18,464	1,175,153	299,407	1,474,560
Total Study Region	18,464	1,175,153	299,407	1,474,560

HAZUS-MH: Hurricane Event Report

Region Name: MamaroneckNY-hurricane-1

Hurricane Scenario: Probabilistic 50-year Return Period

Print Date: Friday, October 07, 2011

Disclaimer:

The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.

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General Description of the Region

HAZUS is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of HAZUS is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- New York

Note:

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 3.14 square miles and contains 4 census tracts. There are over 6 thousand households in the region and has a total population of 18,464 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 4 thousand buildings in the region with a total building replacement value (excluding contents) of 1,475 million dollars (2002 dollars). Approximately 98% of the buildings (and 80% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

HAZUS estimates that there are 4,156 buildings in the region which have an aggregate total replacement value of 1,475 million (2002 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure (\$1000)	Percent of Total
Residential	1,175,153	79.7%
Commercial	202,474	13.7%
Industrial	33,912	2.3%
Agricultural	3,161	0.2%
Religious	6,915	0.5%
Government	5,164	0.4%
Education	47,781	3.2%
Total	1,474,560	100.0%

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 7 schools, 2 fire stations, 2 police stations and no emergency operation facilities.

Hurricane Scenario

HAZUS used the following set of information to define the hurricane parameters for the hurricane loss estimate provided in this report.

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

HAZUS estimates that about 18 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the region. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of the HAZUS Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

Table 2: Expected Building Damage by Occupancy : 50 - year Event

Occupancy	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	1	97.33	0	2.31	0	0.28	0	0.07	0	0.01
Commercial	81	97.11	2	2.62	0	0.26	0	0.01	0	0.00
Education	3	96.68	0	3.11	0	0.21	0	0.00	0	0.00
Government	4	96.66	0	3.13	0	0.21	0	0.00	0	0.00
Industrial	3	97.76	0	2.14	0	0.08	0	0.01	0	0.00
Religion	1	97.64	0	2.28	0	0.07	0	0.01	0	0.00
Residential	3,909	96.27	134	3.29	17	0.43	1	0.02	0	0.00
Total	4,002		136		18		1		0	

Table 3: Expected Building Damage by Building Type : 50 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	75	96.67	2	3.17	0	0.17	0	0.00	0	0.00
Masonry	693	94.65	31	4.21	8	1.12	0	0.03	0	0.00
MH	9	99.85	0	0.12	0	0.03	0	0.00	0	0.00
Steel	67	97.06	2	2.68	0	0.25	0	0.01	0	0.00
Wood	3,165	97.06	91	2.79	5	0.14	0	0.01	0	0.00

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (0%) are available for use. After one week, none of the beds will be in service. By 30 days, none will be operational.

Table 4: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		Probability of at Least Moderate Damage > 50%	Probability of Complete Damage > 50%	Expected Loss of Use < 1 day
Fire Stations	2	0	0	2
Police Stations	2	0	0	2
Schools	7	0	0	7

Induced Hurricane Damage

Debris Generation

HAZUS estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into three general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, and c) Trees. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 1,601 tons of debris will be generated. Of the total amount, Brick/Wood comprises 58% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 37 truckloads (@25 tons/truck) to remove the debris generated by the hurricane.

Social Impact

Shelter Requirement

HAZUS estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 7 households to be displaced due to the hurricane. Of these, 1 people (out of a total population of 18,464) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the hurricane is 7.9 million dollars, which represents 0.54 % of the total replacement value of the region's buildings.

Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 8 million dollars. 1% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 96% of the total loss. Table 4 below provides a summary of the losses associated with the building damage.

Table 5: Building-Related Economic Loss Estimates
(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
<u>Property Damage</u>						
	Building	5,910.20	158.94	17.24	45.12	6,131.50
	Content	1,239.48	23.30	3.31	1.46	1,267.55
	Inventory	0.00	0.56	0.44	0.09	1.09
	Subtotal	7,149.68	182.80	20.98	46.68	7,400.15
<u>Business Interruption Loss</u>						
	Income	0.00	22.73	0.00	0.00	22.73
	Relocation	228.87	14.54	0.35	0.99	244.76
	Rental	245.51	8.57	0.00	0.00	254.08
	Wage	0.00	8.06	0.00	0.00	8.06
	Subtotal	474.38	53.90	0.35	0.99	529.63
<u>Total</u>	Total	7,624.06	236.71	21.34	47.67	7,929.78

Appendix A: County Listing for the Region

New York

- Westchester

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
New York				
Westchester	18,464	1,175,153	299,407	1,474,560
Total State	18,464	1,175,153	299,407	1,474,560
Total Study Region	18,464	1,175,153	299,407	1,474,560

HAZUS-MH: Hurricane Event Report

Region Name: MamaroneckNY-hurricane-1

Hurricane Scenario: Probabilistic 100-year Return Period

Print Date: Friday, October 07, 2011

Disclaimer:

The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.

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General Description of the Region

HAZUS is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of HAZUS is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- New York

Note:

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 3.14 square miles and contains 4 census tracts. There are over 6 thousand households in the region and has a total population of 18,464 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 4 thousand buildings in the region with a total building replacement value (excluding contents) of 1,475 million dollars (2002 dollars). Approximately 98% of the buildings (and 80% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

HAZUS estimates that there are 4,156 buildings in the region which have an aggregate total replacement value of 1,475 million (2002 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure (\$1000)	Percent of Total
Residential	1,175,153	79.7%
Commercial	202,474	13.7%
Industrial	33,912	2.3%
Agricultural	3,161	0.2%
Religious	6,915	0.5%
Government	5,164	0.4%
Education	47,781	3.2%
Total	1,474,560	100.0%

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 7 schools, 2 fire stations, 2 police stations and no emergency operation facilities.

Hurricane Scenario

HAZUS used the following set of information to define the hurricane parameters for the hurricane loss estimate provided in this report.

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

HAZUS estimates that about 163 buildings will be at least moderately damaged. This is over 4% of the total number of buildings in the region. There are an estimated 3 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of the HAZUS Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

Table 2: Expected Building Damage by Occupancy : 100 - year Event

Occupancy	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	1	82.05	0	13.02	0	3.31	0	1.48	0	0.14
Commercial	68	81.95	11	13.39	3	4.15	0	0.50	0	0.00
Education	2	79.52	0	14.87	0	5.12	0	0.49	0	0.00
Government	3	79.50	1	14.65	0	5.32	0	0.52	0	0.00
Industrial	3	85.34	0	11.59	0	2.76	0	0.30	0	0.01
Religion	1	84.17	0	13.36	0	2.37	0	0.10	0	0.00
Residential	3,238	79.73	665	16.38	149	3.66	6	0.16	3	0.08
Total	3,315		678		153		7		3	

Table 3: Expected Building Damage by Building Type : 100 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	63	80.45	11	14.49	4	4.88	0	0.18	0	0.00
Masonry	561	76.68	113	15.37	56	7.61	2	0.30	0	0.04
MH	9	96.31	0	2.64	0	0.83	0	0.01	0	0.20
Steel	57	81.91	9	12.73	3	4.74	0	0.62	0	0.00
Wood	2,656	81.44	536	16.44	62	1.90	4	0.13	3	0.09

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (0%) are available for use. After one week, none of the beds will be in service. By 30 days, none will be operational.

Table 4: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		Probability of at Least Moderate Damage > 50%	Probability of Complete Damage > 50%	Expected Loss of Use < 1 day
Fire Stations	2	0	0	0
Police Stations	2	0	0	0
Schools	7	0	0	0

Induced Hurricane Damage

Debris Generation

HAZUS estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into three general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, and c) Trees. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 5,854 tons of debris will be generated. Of the total amount, Brick/Wood comprises 70% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 164 truckloads (@25 tons/truck) to remove the debris generated by the hurricane.

Social Impact

Shelter Requirement

HAZUS estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 67 households to be displaced due to the hurricane. Of these, 15 people (out of a total population of 18,464) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the hurricane is 32.4 million dollars, which represents 2.19 % of the total replacement value of the region's buildings.

Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 32 million dollars. 3% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 90% of the total loss. Table 4 below provides a summary of the losses associated with the building damage.

Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
<u>Property Damage</u>						
	Building	21,917.84	1,182.87	161.03	390.36	23,652.10
	Content	4,822.58	362.54	82.25	139.49	5,406.86
	Inventory	0.00	8.22	10.88	1.77	20.87
	Subtotal	26,740.42	1,553.63	254.15	531.62	29,079.82
<u>Business Interruption Loss</u>						
	Income	0.00	183.46	2.36	46.02	231.84
	Relocation	1,166.33	218.55	16.62	84.06	1,485.56
	Rental	1,068.16	116.60	1.80	4.90	1,191.46
	Wage	0.00	180.54	4.06	184.28	368.87
	Subtotal	2,234.48	699.15	24.83	319.27	3,277.73
<u>Total</u>	Total	28,974.91	2,252.78	278.98	850.88	32,357.55

Appendix A: County Listing for the Region

New York

- Westchester

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
New York				
Westchester	18,464	1,175,153	299,407	1,474,560
Total State	18,464	1,175,153	299,407	1,474,560
Total Study Region	18,464	1,175,153	299,407	1,474,560

HAZUS-MH: Hurricane Event Report

Region Name: MamaroneckNY-hurricane-1

Hurricane Scenario: Probabilistic 200-year Return Period

Print Date: Friday, October 07, 2011

Disclaimer:

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General Description of the Region

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The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- New York

Note:

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 3.14 square miles and contains 4 census tracts. There are over 6 thousand households in the region and has a total population of 18,464 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 4 thousand buildings in the region with a total building replacement value (excluding contents) of 1,475 million dollars (2002 dollars). Approximately 98% of the buildings (and 80% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

HAZUS estimates that there are 4,156 buildings in the region which have an aggregate total replacement value of 1,475 million (2002 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure (\$1000)	Percent of Total
Residential	1,175,153	79.7%
Commercial	202,474	13.7%
Industrial	33,912	2.3%
Agricultural	3,161	0.2%
Religious	6,915	0.5%
Government	5,164	0.4%
Education	47,781	3.2%
Total	1,474,560	100.0%

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 7 schools, 2 fire stations, 2 police stations and no emergency operation facilities.

Hurricane Scenario

HAZUS used the following set of information to define the hurricane parameters for the hurricane loss estimate provided in this report.

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

HAZUS estimates that about 721 buildings will be at least moderately damaged. This is over 17% of the total number of buildings in the region. There are an estimated 43 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of the HAZUS Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

Table 2: Expected Building Damage by Occupancy : 200 - year Event

Occupancy	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	1	50.32	0	28.21	0	13.33	0	6.93	0	1.21
Commercial	42	50.76	21	25.20	15	18.40	5	5.60	0	0.05
Education	1	49.34	1	24.75	1	19.37	0	6.54	0	0.00
Government	2	49.31	1	23.80	1	19.97	0	6.92	0	0.00
Industrial	2	52.41	1	23.94	1	18.30	0	5.20	0	0.15
Religion	1	52.14	0	28.91	0	15.67	0	3.28	0	0.00
Residential	1,996	49.15	1,366	33.65	584	14.38	71	1.76	43	1.06
Total	2,044		1,390		602		77		43	

Table 3: Expected Building Damage by Building Type : 200 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	36	46.60	19	23.85	19	24.67	4	4.88	0	0.00
Masonry	342	46.68	198	27.02	168	22.94	21	2.80	4	0.56
MH	7	75.06	1	11.57	1	9.57	0	0.62	0	3.18
Steel	34	49.93	15	22.00	15	21.04	5	6.99	0	0.05
Wood	1,654	50.72	1,176	36.07	342	10.50	51	1.55	38	1.17

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (0%) are available for use. After one week, none of the beds will be in service. By 30 days, none will be operational.

Table 4: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		Probability of at Least Moderate Damage > 50%	Probability of Complete Damage > 50%	Expected Loss of Use < 1 day
Fire Stations	2	0	0	0
Police Stations	2	0	0	0
Schools	7	0	0	0

Induced Hurricane Damage

Debris Generation

HAZUS estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into three general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, and c) Trees. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 16,175 tons of debris will be generated. Of the total amount, Brick/Wood comprises 81% of the total, Reinforced Concrete/Steel comprises of 1% of the total, with the remainder being Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 530 truckloads (@25 tons/truck) to remove the debris generated by the hurricane.

Social Impact

Shelter Requirement

HAZUS estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 302 households to be displaced due to the hurricane. Of these, 69 people (out of a total population of 18,464) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the hurricane is 127.1 million dollars, which represents 8.62 % of the total replacement value of the region's buildings.

Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 127 million dollars. 3% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 85% of the total loss. Table 4 below provides a summary of the losses associated with the building damage.

Table 5: Building-Related Economic Loss Estimates
(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
<u>Property Damage</u>						
	Building	74,603.37	6,515.83	1,079.73	2,161.65	84,360.57
	Content	23,256.97	3,202.52	755.88	1,110.76	28,326.14
	Inventory	0.00	70.64	97.12	9.87	177.63
	Subtotal	97,860.34	9,788.99	1,932.73	3,282.28	112,864.34
<u>Business Interruption Loss</u>						
	Income	0.73	414.73	8.13	63.78	487.38
	Relocation	6,691.53	1,220.61	108.52	471.47	8,492.12
	Rental	3,853.11	674.25	11.64	28.95	4,567.95
	Wage	1.72	427.20	13.80	248.65	691.36
	Subtotal	10,547.09	2,736.78	142.09	812.85	14,238.81
<u>Total</u>	Total	108,407.43	12,525.77	2,074.82	4,095.13	127,103.15

Appendix A: County Listing for the Region

New York

- Westchester

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
New York				
Westchester	18,464	1,175,153	299,407	1,474,560
Total State	18,464	1,175,153	299,407	1,474,560
Total Study Region	18,464	1,175,153	299,407	1,474,560

HAZUS-MH: Hurricane Event Report

Region Name: MamaroneckNY-hurricane-1

Hurricane Scenario: Probabilistic 500-year Return Period

Print Date: Friday, October 07, 2011

Disclaimer:

The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.

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General Description of the Region

HAZUS is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of HAZUS is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- New York

Note:

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 3.14 square miles and contains 4 census tracts. There are over 6 thousand households in the region and has a total population of 18,464 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 4 thousand buildings in the region with a total building replacement value (excluding contents) of 1,475 million dollars (2002 dollars). Approximately 98% of the buildings (and 80% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

HAZUS estimates that there are 4,156 buildings in the region which have an aggregate total replacement value of 1,475 million (2002 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure (\$1000)	Percent of Total
Residential	1,175,153	79.7%
Commercial	202,474	13.7%
Industrial	33,912	2.3%
Agricultural	3,161	0.2%
Religious	6,915	0.5%
Government	5,164	0.4%
Education	47,781	3.2%
Total	1,474,560	100.0%

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 7 schools, 2 fire stations, 2 police stations and no emergency operation facilities.

Hurricane Scenario

HAZUS used the following set of information to define the hurricane parameters for the hurricane loss estimate provided in this report.

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

HAZUS estimates that about 1,949 buildings will be at least moderately damaged. This is over 47% of the total number of buildings in the region. There are an estimated 258 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of the HAZUS Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

Table 2: Expected Building Damage by Occupancy : 500 - year Event

Occupancy	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	18.57	0	31.28	0	26.55	0	18.12	0	5.48
Commercial	16	19.02	19	22.40	26	31.53	22	26.61	0	0.44
Education	1	16.88	1	19.66	1	31.30	1	32.06	0	0.10
Government	1	17.03	1	18.08	1	31.11	1	33.72	0	0.06
Industrial	1	21.83	1	21.20	1	30.71	1	25.53	0	0.73
Religion	0	18.61	0	28.83	0	31.52	0	20.96	0	0.08
Residential	760	18.72	1,408	34.66	1,229	30.27	406	10.00	258	6.34
Total	778		1,429		1,259		432		258	

Table 3: Expected Building Damage by Building Type : 500 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	14	17.35	13	16.68	30	38.21	22	27.75	0	0.00
Masonry	138	18.91	187	25.51	276	37.64	107	14.62	24	3.31
MH	4	43.36	1	15.25	2	22.93	0	4.29	1	14.17
Steel	13	19.20	11	16.47	22	32.04	22	31.93	0	0.37
Wood	616	18.89	1,254	38.46	874	26.81	287	8.81	229	7.02

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (0%) are available for use. After one week, none of the beds will be in service. By 30 days, none will be operational.

Table 4: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		Probability of at Least Moderate Damage > 50%	Probability of Complete Damage > 50%	Expected Loss of Use < 1 day
Fire Stations	2	2	0	0
Police Stations	2	2	0	0
Schools	7	7	0	0

Induced Hurricane Damage

Debris Generation

HAZUS estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into three general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, and c) Trees. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 46,229 tons of debris will be generated. Of the total amount, Brick/Wood comprises 87% of the total, Reinforced Concrete/Steel comprises of 2% of the total, with the remainder being Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 1651 truckloads (@25 tons/truck) to remove the debris generated by the hurricane.

Social Impact

Shelter Requirement

HAZUS estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 1,459 households to be displaced due to the hurricane. Of these, 335 people (out of a total population of 18,464) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the hurricane is 464.5 million dollars, which represents 31.50 % of the total replacement value of the region's buildings.

Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 465 million dollars. 4% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 81% of the total loss. Table 4 below provides a summary of the losses associated with the building damage.

Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
<u>Property Damage</u>						
	Building	245,452.41	26,860.35	4,406.75	9,295.56	286,015.07
	Content	99,131.24	16,555.52	3,565.51	5,756.86	125,009.13
	Inventory	0.00	345.46	446.73	33.62	825.81
	Subtotal	344,583.65	43,761.33	8,418.98	15,086.04	411,850.01
<u>Business Interruption Loss</u>						
	Income	15.69	5,249.70	45.76	82.08	5,393.23
	Relocation	21,170.89	4,305.11	318.11	1,780.59	27,574.70
	Rental	11,034.13	2,684.11	45.81	124.12	13,888.16
	Wage	36.66	5,422.30	78.34	277.01	5,814.31
	Subtotal	32,257.36	17,661.22	488.02	2,263.80	52,670.40
<u>Total</u>	Total	376,841.01	61,422.55	8,907.00	17,349.84	464,520.40

Appendix A: County Listing for the Region

New York

- Westchester

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
New York				
Westchester	18,464	1,175,153	299,407	1,474,560
Total State	18,464	1,175,153	299,407	1,474,560
Total Study Region	18,464	1,175,153	299,407	1,474,560

HAZUS-MH: Hurricane Event Report

Region Name: MamaroneckNY-hurricane-1

Hurricane Scenario: Probabilistic 1000-year Return Period

Print Date: Friday, October 07, 2011

Disclaimer:

The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Hurricane. These results can be improved by using enhanced inventory data.

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General Description of the Region

HAZUS is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of HAZUS is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The hurricane loss estimates provided in this report are based on a region that includes 1 county(ies) from the following state(s):

- New York

Note:

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 3.14 square miles and contains 4 census tracts. There are over 6 thousand households in the region and has a total population of 18,464 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 4 thousand buildings in the region with a total building replacement value (excluding contents) of 1,475 million dollars (2002 dollars). Approximately 98% of the buildings (and 80% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

HAZUS estimates that there are 4,156 buildings in the region which have an aggregate total replacement value of 1,475 million (2002 dollars). Table 1 presents the relative distribution of the value with respect to the general occupancies. Appendix B provides a general distribution of the building value by State and County.

Table 1: Building Exposure by Occupancy Type

Occupancy	Exposure (\$1000)	Percent of Total
Residential	1,175,153	79.7%
Commercial	202,474	13.7%
Industrial	33,912	2.3%
Agricultural	3,161	0.2%
Religious	6,915	0.5%
Government	5,164	0.4%
Education	47,781	3.2%
Total	1,474,560	100.0%

Essential Facility Inventory

For essential facilities, there are no hospitals in the region with a total bed capacity of no beds. There are 7 schools, 2 fire stations, 2 police stations and no emergency operation facilities.

Hurricane Scenario

HAZUS used the following set of information to define the hurricane parameters for the hurricane loss estimate provided in this report.

Scenario Name:	Probabilistic
Type:	Probabilistic

Building Damage

General Building Stock Damage

HAZUS estimates that about 2,857 buildings will be at least moderately damaged. This is over 69% of the total number of buildings in the region. There are an estimated 574 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 6 of the HAZUS Hurricane technical manual. Table 2 below summarizes the expected damage by general occupancy for the buildings in the region. Table 3 summarizes the expected damage by general building type.

Table 2: Expected Building Damage by Occupancy : 1000 - year Event

Occupancy	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	7.43	0	22.68	0	32.06	0	27.46	0	10.37
Commercial	7	8.85	12	14.51	26	31.49	36	43.80	1	1.34
Education	0	8.05	0	11.99	1	29.12	2	50.31	0	0.53
Government	0	8.25	0	10.82	1	28.13	2	52.50	0	0.30
Industrial	0	10.25	0	13.54	1	30.55	1	44.07	0	1.58
Religion	0	8.25	0	19.12	0	34.89	0	36.96	0	0.78
Residential	297	7.32	979	24.12	1,412	34.77	800	19.69	573	14.10
Total	306		993		1,442		842		574	

Table 3: Expected Building Damage by Building Type : 1000 - year Event

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	6	8.28	7	9.55	27	34.58	37	47.57	0	0.01
Masonry	62	8.47	131	17.94	284	38.84	201	27.42	54	7.34
MH	2	21.44	1	12.06	2	27.12	1	9.41	3	29.97
Steel	6	9.33	7	9.71	20	28.88	35	51.15	1	0.92
Wood	230	7.04	872	26.75	1,076	32.99	571	17.52	512	15.70

Essential Facility Damage

Before the hurricane, the region had no hospital beds available for use. On the day of the hurricane, the model estimates that 0 hospital beds (0%) are available for use. After one week, none of the beds will be in service. By 30 days, none will be operational.

Table 4: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		Probability of at Least Moderate Damage > 50%	Probability of Complete Damage > 50%	Expected Loss of Use < 1 day
Fire Stations	2	2	0	0
Police Stations	2	2	0	0
Schools	7	7	0	0

Induced Hurricane Damage

Debris Generation

HAZUS estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into three general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, and c) Trees. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 78,378 tons of debris will be generated. Of the total amount, Brick/Wood comprises 90% of the total, Reinforced Concrete/Steel comprises of 3% of the total, with the remainder being Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 2892 truckloads (@25 tons/truck) to remove the debris generated by the hurricane.

Social Impact

Shelter Requirement

HAZUS estimates the number of households that are expected to be displaced from their homes due to the hurricane and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 3,059 households to be displaced due to the hurricane. Of these, 702 people (out of a total population of 18,464) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the hurricane is 827.4 million dollars, which represents 56.11 % of the total replacement value of the region's buildings.

Building-Related Losses

The building related losses are broken into two categories: direct property damage losses and business interruption losses. The direct property damage losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the hurricane. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the hurricane.

The total property damage losses were 827 million dollars. 4% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 81% of the total loss. Table 4 below provides a summary of the losses associated with the building damage.

Table 5: Building-Related Economic Loss Estimates

(Thousands of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
<u>Property Damage</u>						
	Building	429,222.57	48,399.57	7,993.01	16,124.31	501,739.46
	Content	187,182.15	32,217.71	6,793.89	10,640.71	236,834.46
	Inventory	0.00	658.21	849.44	60.63	1,568.28
	Subtotal	616,404.72	81,275.49	15,636.34	26,825.64	740,142.20
<u>Business Interruption Loss</u>						
	Income	31.86	9,331.60	84.99	177.44	9,625.90
	Relocation	34,017.66	7,032.55	473.50	2,836.48	44,360.19
	Rental	17,916.46	4,607.23	78.53	205.56	22,807.78
	Wage	74.46	9,700.45	145.82	572.82	10,493.55
	Subtotal	52,040.44	30,671.84	782.84	3,792.30	87,287.42
<u>Total</u>	Total	668,445.16	111,947.33	16,419.18	30,617.94	827,429.62

Appendix A: County Listing for the Region

New York

- Westchester

Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
New York				
Westchester	18,464	1,175,153	299,407	1,474,560
Total State	18,464	1,175,153	299,407	1,474,560
Total Study Region	18,464	1,175,153	299,407	1,474,560

Appendix 4. Repetitive Loss Property Data

Repetitive Loss / Severe Repetitive Loss Property Data for the Village of Mamaroneck, NY								
County Name	County Nbr	State Name	Community Name	Comm Nbr	Zone	Losses	Total Paid	Run Date
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	2	4,570.00	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A01	2	4,013.00	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A07	2	11,831.80	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A07	4	7,882.40	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A07	2	30,381.24	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A08	3	100,647.89	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	B	4	8,216.37	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A05	3	77,654.17	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	C	2	19,304.97	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A07	2	13,172.11	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	2	8,256.47	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A09	4	145,402.01	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	2	60,961.96	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	3	85,608.95	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	X	2	46,870.55	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	B	2	8,588.00	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	B	2	14,717.04	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	4	8,505.54	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	B	2	2,546.50	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	B	6	52,459.17	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	4	100,863.94	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	B	7	104,599.24	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	6	85,536.22	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	5	41,403.53	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	C	3	34,452.04	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	5	141,182.17	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A14	4	53,297.64	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	V08	2	18,095.46	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	VE	4	298,429.46	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	2	2,430.00	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	2	32,237.12	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	3	88,140.56	11/30/2011

WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	2	92,965.86	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	5	76,740.03	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	5	59,425.50	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	4	80,653.26	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	2	4,681.00	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	4	76,993.06	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	3	53,150.48	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	B	7	69,286.45	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	3	13,377.82	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	3	43,125.23	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A05	3	15,244.83	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A14	4	44,187.35	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A07	3	31,745.31	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A07	2	5,660.45	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	4	44,140.09	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	7	82,921.16	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	2	4,915.20	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	3	189,812.75	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	X	5	185,431.71	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	C	3	17,676.05	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	C	3	26,361.52	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	C	3	7,833.75	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	C	3	6,706.54	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	C	3	16,948.45	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	C	3	18,162.47	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	C	3	31,763.91	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	C	3	269,273.25	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	C	3	28,828.40	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	C	3	53,644.10	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	C	3	16,467.85	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	C	3	24,465.80	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	3	33,246.47	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	VE	2	72,874.65	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A08	2	12,752.02	11/30/2011

WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A	2	13,377.20	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	V08	3	44,674.39	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	V08	2	32,102.63	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	C	2	22,462.62	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	C	3	90,331.84	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	4	132,560.08	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	C	3	153,362.33	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A07	3	144,010.31	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A09	2	13,472.76	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	X	2	28,208.95	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	C	2	23,052.10	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	B	2	10,792.91	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	3	33,298.80	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A09	5	93,689.40	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A07	2	32,875.22	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	C	3	6,387.94	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A07	3	11,970.18	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	3	13,592.86	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	3	83,171.62	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	2	707,355.15	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	2	240,543.08	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	11	3,191,089.88	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	2	9,808.09	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	2	15,676.28	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	3	368,905.61	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	3	82,357.88	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A07	3	3,680.44	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	2	71,401.32	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	2	50,168.62	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	4	13,169.23	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	2	37,339.21	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A07	5	13,934.46	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A07	3	65,409.73	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A	6	89,906.04	11/30/2011

WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A07	2	2,731.33	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A07	4	20,726.39	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	7	148,244.63	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A07	2	6,853.15	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A07	4	56,429.30	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A07	3	98,626.17	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A07	3	91,401.32	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	C	3	37,535.07	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	B	3	19,609.70	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	B	2	7,851.60	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	B	4	123,176.36	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	8	360,794.33	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A07	2	11,063.75	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	2	10,677.52	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	B	3	46,861.86	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A07	5	43,075.94	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	B	4	44,221.49	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	2	21,106.59	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	2	8,997.55	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	2	2,017.13	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	3	48,997.35	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	2	16,011.28	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	3	29,638.65	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	D	2	8,438.07	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	2	4,179.91	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	6	143,873.22	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	C	2	3,198.60	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	3	37,345.85	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	4	13,138.08	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	2	84,403.56	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	3	51,550.00	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	5	94,106.31	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	3	44,251.65	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	3	10,388.13	11/30/2011

WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A07	3	34,350.20	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	2	3,602.09	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A07	2	82,885.76	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	6	160,825.19	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	2	15,476.51	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	8	296,949.86	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	2	66,564.82	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	3	56,391.44	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	2	46,956.22	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A01	2	12,406.84	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A07	3	17,730.91	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A07	2	58,483.47	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	X	5	16,644.39	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	3	15,658.30	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	4	11,912.50	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	6	46,204.30	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	8	101,557.95	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	3	12,262.30	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	X	3	31,797.55	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	2	5,628.15	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	10	59,051.39	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	B	4	9,023.50	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A07	2	227,957.49	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A07	2	70,555.72	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	2	5,513.31	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	C	3	19,023.51	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A07	2	13,728.08	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	C	5	77,098.19	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	2	76,289.95	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	2	13,968.61	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	X	4	14,085.36	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A08	2	4,987.85	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	B	2	10,171.00	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	V09	2	56,098.28	11/30/2011

WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	VE	2	61,613.17	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A07	4	12,624.50	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A08	3	49,667.07	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	2	2,641.00	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	5	35,278.66	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	C	3	36,440.38	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	2	5,510.17	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	2	83,820.97	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	5	17,864.34	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	5	73,530.54	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	2	33,630.98	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	2	63,291.45	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	8	94,580.93	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	4	56,378.37	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	2	169,943.96	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	C	2	5,045.80	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A07	3	49,952.07	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	2	20,559.46	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	X	3	17,058.59	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	2	43,556.93	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	C	2	6,846.00	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A08	4	190,370.82	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A05	6	167,159.76	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	AE	5	97,715.60	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	C	2	132,333.90	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A05	3	9,188.83	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	C	2	6,527.79	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	C	3	3,617.25	11/30/2011
WESTCHESTER COUNTY	119	NEW YORK	MAMARONECK, VILLAGE OF	360916	A10	3	81,477.87	11/30/2011
						638	14,599,449.44	

Appendix 5. Public Comments on Draft Plan

PUBLIC COMMENTS

ON

DRAFT MULTI-
HAZARD PLAN*

*THESE COMMENTS WERE RECEIVED FROM VILLAGE OF MAMARONECK RESIDENTS AND ARE INCLUDED FOR HISTORICAL PURPOSES. THE COMMENTS ATTACHED HERETO DO NOT REPRESENT AN OFFICIAL POSITION OF THE VILLAGE OF MAMARONECK

LOCAL MITIGATION PLAN REVIEW TOOL

Jurisdiction: Village of Mamaroneck, NY	Title of Plan: Local Multi-Hazard Mitigation Plan	Date of Plan: January 27, 2012
Local Point of Contact: Dan Sarnoff	Address: Village of Mamaroneck 123 Mamaroneck Avenue Mamaroneck, NY 10543	
Title: Assistant Village Manager		
Agency: Village of Mamaroneck		
Phone Number: 914-777-7703	E-Mail: dsarnoff@vomny.org	

State Reviewer: Not reviewed	Title:	Date:
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FEMA Reviewer: Paul Hoole	Title: Hazard Mitigation Planner	Date: March 6, 2012
Cathleen Carlisle	Hazard Mitigation Planner	April 6, 2012
Date Received in FEMA Region <i>(insert #)</i>	February 26, 2012 (1 st draft)	
Plan Not Approved		
Plan Approvable Pending Adoption	April 3, 2012 (1 st Draft)	
Plan Approved		

SECTION 1: REGULATION CHECKLIST

INSTRUCTIONS: The purpose of the Checklist is to identify the location of relevant or applicable content in the Plan by Element/sub-element and to determine if each requirement has been ‘Met’ or ‘Not Met.’ The ‘Required Revisions’ summary at the bottom of each Element must be completed by FEMA to provide a clear explanation of the revisions that are required for plan approval.

1. REGULATION CHECKLIST		Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)				
ELEMENT A. PLANNING PROCESS				
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	Sections 1A-1C Section 1E Appendix 2	Met		
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))	Section 3A, 3B and 3D Appendix 2	Met		
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Section 1D Section 2 Appendix 2	Met		
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Sections 1E, 5B, 7 and 11	Met		
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	Section 9.A.2	Met		
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))	Sections 9.A.1, Sections 9B - 9E	Met		
<u>ELEMENT A: REQUIRED REVISIONS</u> No required revisions. Please see recommended “Opportunities for Improvement.”				
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT				
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	Section 4	Met		
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))	Section 4	Met		

1. REGULATION CHECKLIST		Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)				
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))	Section 5	Met		
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	Section 5.D.2.1	Met		
<u>ELEMENT B: REQUIRED REVISIONS</u>				
No required revisions.				
Please see recommended "Opportunities for Improvement."				
ELEMENT C. MITIGATION STRATEGY				
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))	Section 1 Section 7.A.5	Met		
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))	Sections 4, 5, and 6	Met		
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	Section 6.A	Met		
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))	Section 7	Met		
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	Section 7 and 8	Met		
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))	Section 9	Met		
<u>ELEMENT C: REQUIRED REVISIONS</u>				
No required revisions.				
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)				
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))		NA		
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))		NA		

1. REGULATION CHECKLIST		Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)				
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))			NA	
<u>ELEMENT D: REQUIRED REVISIONS</u>				
Not applicable because this plan is not updating a previously approved plan.				
ELEMENT E. PLAN ADOPTION				
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))		Section 1 and 10		Not Met
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))			NA	
<u>ELEMENT E: REQUIRED REVISIONS</u>				
E1. This plan has not yet been adopted.				
ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)				
F1.			NA	
F2.			NA	
<u>ELEMENT F: REQUIRED REVISIONS</u>				
Not applicable because there are no additional state requirements.				

SECTION 2: PLAN ASSESSMENT

INSTRUCTIONS: The purpose of the Plan Assessment is to offer the local community more comprehensive feedback on the quality and utility of the plan in a narrative format. The audience for the Plan Assessment is not only the plan developer/local community planner, but also elected officials, local departments and agencies, and others involved in implementing the Local Mitigation Plan

A. Plan Strengths and Opportunities for Improvement

This section provides a discussion of the strengths of the plan document and identifies areas where these could be improved beyond minimum requirements.

Element A: Planning Process

Plan Strengths

- The plan is very well written. The narrative is straight forward and clear. The graphics and pictures are excellent.
- The plan includes a strong process for monitoring and evaluating the implementation of the plan. Monthly, quarterly and annual reports will help ensure success.

Opportunity for Improvement

- It appears that blanks have been inserted in Section 2 of the plan as placeholders for meeting dates. The dates should be inserted into the plan for the final draft and statements in Section 3 that say what “will be” done should be changes to state what was done.
- The plan (page 9-8) anticipates preparing an updated plan in the 5th year and completing the update within two months. It would be better to allow more time. An update to the plan is more than just edits to the original plan. It includes a reconsideration of the threats, a new assessment of the village’s vulnerabilities, new mitigation actions, and a reporting on what was and was not implemented. The public will also need to be involved and the entire planning process for the update will need to be documented. While this can be relatively quickly, especially if the Village stays on top of the plan’s implementation, it probably is best to assume a longer planning period.
- Appendix 2 provides documents on the planning process, but some of the meetings were not documented. We strongly recommend including this documentation in the plan. For example, plan should include minutes from each of the planning meetings, copies of the correspondence with stakeholders, and the names and titles of those stakeholders contacted. Consider the appendix a good location to add information to the “institutional memory” of the village. If there is staff turnover, this documentation will aid them when updating the plan. Good documentation will help them avoid reinventing the wheel.

Element B: Hazard Identification and Risk Assessment

Plan Strengths

- The plan makes an excellent point that a 100-year flood is caused by a storm with a 1% chance of occurring in any given year, and therefore a “100-year” flood could occur more than once in a relatively short period of time. This is a point that is often misunderstood by citizens.
- Several hazard and planning maps are included in the Appendix and the Risk Assessment including a map of the 100 and 500 year floodplains and the hurricane inundation zone.

Opportunities for Improvement

- The plan makes note of the village’s intent to follow the CRS planning process and why this will benefit the village. The plan would be improved if a general description of the NFIP program was added and if the plan included a brief discussion of what the villages currently does to mitigate flooding as a participant in the NFIP. This is a good opportunity to point out that the village has been active in flood mitigation, even as more needs to be done.
- The village has many repetitive loss properties and severely loss properties, which the plan intends to address. However, there is little data presented in the plan on the number of such properties and the financial impact of repetitive losses. The plan would make a stronger case for addressing these properties if data is included and analyzed. (See attached file).
- Regarding the earthquake hazard: There is a thorough discussion of the earthquake hazard and potential risks, including a discussion of potential risks from Indian Point. The Village does not consider earthquake a significant hazard and states that mitigating earthquake risk is a lower priority. Nonetheless, the Village should consider including earthquakes as a hazard of concern, and providing a brief vulnerability analysis and mitigation action (possible examples could include a public awareness/education action - an action to enhance the local building code with respect to earthquakes). We have included a file showing the annualized loss figures for New York Counties. **(3-risk-3e-eq-ny-county-annualized-loss-map+table).**

Note on the use of the HAZNY program:

- Regarding the advantages and limitations of the HAZNY program— please see the attached file: **3-risk-3 hazny-use**. In this plan, the HAZNY was used as a preliminary step to screen hazards in this plan, however, the plan included additional information on profiling and vulnerability analysis that does meet the requirements.

Element C: Mitigation Strategy

Plan Strengths

- The discussion of each proposed action in Section 7 helps explain the action and the reason for the action. This builds support for the action and provides an effective and exemplary level of specificity.
- The action plan in Section 8 reflects considerable thought, especially with respect to scheduling of actions. This forethought on implementation is another good example.
- The plan includes a strong process for monitoring and evaluating the implementation of the plan. Monthly, quarterly and annual reports will help ensure success.

Opportunity for Improvement

- None – a job well done!

Element D: Plan Update, Evaluation, and Implementation (*Plan Updates Only*)

- Not applicable because this plan is not an update of a previously approved plan.

B. Resources for Implementing Your Approved Plan

- *The federal funds which are potentially available are listed on Table 8-1 in the plan.*
- *The village is encouraged to review the State of New York announcement on the availability of Hazard Mitigation Grant Program (HMGP) funding. Information can be found at:*
<http://www.dhSES.ny.gov/oem/programs/hmGP.cfm>

Please note that Letters of Intent and HMGP applications may be submitted prior to the formal approval of the village's plan. The awarding of funds cannot take place until the plan is adopted by the village and documentation of this adoption is provided to the State.

Daniel Sarnoff

From: Sue McCrory [smccrory@mac.com]
Sent: Monday, April 09, 2012 8:57 AM
To: vrifkin@enviroexpertsetg.com; Daniel Sarnoff
Cc: RLord@dhss.ny.gov
Subject: Comments on Village of Mamaroneck Multi- Hazard Mitigation Plan
Attachments: 10-02-0681P-360916-102D.pdf; ATT00001.htm; Re Village of Mamaroneck Continues to Allow Rebuilding Without complying with Flood Rules.pdf; ATT00002.htm

To Whom It May Concern:

I am a resident of the Village of Mamaroneck concerned about flooding and committed to making this flood-prone community "reasonably safe from flooding." I have reviewed the draft Multi-Hazard Mitigation Plan and offer the following comments:

Background and Hazard Identification & Rankings

Generally, the findings of the first five sections seem reasonable. If past is prologue, then floods and windstorms are the hazards we should try to mitigate. In reviewing these first five sections of the draft report, I had the the following comments and concerns:

(1) Westchester County Flood Guide was not considered a relevant planning document. (p. 25 of plan) See <http://www.westchestergov.com/planningdocs/reports/FLOODGUIDE.pdf>. I was not sure whether you knew of this document and rejected it or were unfamiliar with it.

(2) You cite as a source of information the "Village of Mamaroneck Flood Insurance Study." (p.25) In 2007, FEMA did a Westchester County-study in place of earlier studies of specific political jurisdictions. I am not aware of a current Village of Mamaroneck Flood Insurance Study. I believe our prior study has been superseded by the 2007 County Study. (See the same issue at 4-3 or p. 43 of pdf) I believe the report should acknowledge that our coastal study is decades old and that FEMA will be updating it --with likely implications for our flood zones --including a new coastal zone between V and A where smaller waves will have the possibility of damaging structures.
See https://www.rampp-team.com/documents/newjersey/nj_ny_coat_kickoff_7dec11_final_12-13-2011.pdf

(3) The LWRP 2011 update has not been adopted but there is a prior version that remains in effect. (p.39 or 3-7)

(4) Please indicate whether any comments were received by the communities invited to comment. The sentence on 3-7 (p. 40 of the pdf) fails to distinguish between no-comments and insignificant comments.

(5) The report claims certain neighborhoods have experienced "the most damage from flooding." (p. 60 pdf or p. 4-20). Please clarify the empirical basis for making this determination. Were you able to analyze and summarize past FEMA flood claims? How is "most damage" determined? These streets exclude areas like Flagler Drive where coastal exposure is high so the statement being made is powerful ...if it is supportable by hard data.

(6) The definition of "base flood" is somewhat informal (p.64 of the pdf, 4-24) given the legal and regulatory background to this term. I urge you to conform this discussion to the FEMA definition, that is:

"The flood having a one percent chance of being equaled or exceeded in any given year. This is the regulatory standard also referred to as the "100-year flood." The base flood is the national standard used by the NFIP and all Federal

agencies for the purposes of requiring the purchase of flood insurance and regulating new development. Base Flood Elevations (BFEs) are typically shown on Flood Insurance Rate Maps (FIRMs)."

(7) This (p 4-25) sentence is hard to understand, "The Village of Mamaroneck's close proximity to the coast line would result in a higher risk and intensity of a hurricane." Maybe all you are trying to say is that coastal communities have greater exposure to the risk of hurricanes? I wasn't sure.

(8) Your table 4-4 incorrectly shows the 1938 hurricane to be category 5. It was a 3.

(9) The Dec 1992 storm caused a death in Mamaroneck --at the Hampshire Country Club-- a driver who drowned.

(10) The population vulnerable to storms excludes those streets subject to coastal storms. Are you assuming that the word storms--as used in this report -- exclude coastal storms or hurricanes? I was surprised residences on streets within the flood zone including Orienta and Shore Acres neighborhoods were excluded from this list. (See p. 132 or 5-17)

(11) Section 5.D.2.2 implies that the 100-year flood is not based on hurricane activity. I believe this is incorrect --at least for the coastal areas.

(12) The transect elevation information was revised by FEMA in a LOMR after the FIS was published. The data in the table you have displayed were found to be incorrect and have been corrected by FEMA. (p. 18 of pdf or 5-43). I have attached the LOMR revising the transects.

(13) Table 5-10 shows estimates based on manual counts from Westchester County Base Maps and Land Use Designation Maps. Particularly important for this table is whether a structure that has been counted as "subject to flood hazards" is a pre-FIRM building or one built to NFIP construction standards. I believe it is urgently important that the Village inventory those structures that are in the flood zone and are "reasonably safe from flooding" from those that are in the flood zone and have not been constructed to be "reasonably safe from flooding." An important planning goal is to move as many structures as possible from the "not safe from flooding" category to the "reasonably safe from flooding" category and lower the \$ value at risk.

(14) Your analysis of floodplain related damages is calculated based on the Village of Mamaroneck FIS, 2007 for a calculation of Base Flood Elevation less lower Floor Depths. Please verify that this analysis is based on BFEs in the FIRM, not the erroneous transect information from the FIS. Again, this table would be more helpful with the total number of structures in each class.

(15) It would be helpful to have the methodology used for Village-provided building counts used in Table 5-17. To the extent that the Village will be trying to manage its exposure to hurricanes, knowing how counts are done helps to assure that any future updates can employ the same methods to measure progress over time.

Comments on the Second Half of the Report

Goals and objectives: I would strongly suggest that the Village have a goal of making this community's properties reasonably safe from flooding by elevating its housing stock above the BFE. Street-by-street, we should know which houses are reasonably safe from flooding and which are not and this plan should provide the framework and analysis for that measurement. "What gets measured gets done" is an old management adage. Wouldn't it be nice to know how many houses on each block are "reasonably safe from flooding" and each 5-year update, re-analyze this number? Then, the Village could measure clear progress --or lack thereof--to its mitigation goal.

Comments of Section 7 --Review of Mitigation Activities

The mitigation activities appear to focus on municipal structural projects rather than property protection and preventive measures with no projects proposed for natural resources. (How about replacing the net loss of hundreds of Village trees in the past decade?) Perhaps I am more skeptical than the plan writers about our ability to control the forces of storms but I think this mitigation approach is biased to extraordinarily expensive projects that we simply may not be able to afford.

Dredging is a never-ending game that won't change the flood levels substantially. I think this activity promises little long-term benefit.

Catch basin cleaning is quite spotty in the Village and no doubt contributes to street flooding. This is a low-cost maintenance activity that needs better management and reporting. I urge this report to specify a frequency for catch basin cleaning and a reporting responsibility. This activity needs better management controls.

I do not understand the mitigation approach of "enhancing inspections." Do you mean that the Village needs to enforce flood zone compliance rules and inspect to identify violations? During the preparation of this plan, the Village experienced August 2011 storms Irene and Lee. Many properties were flood-damaged but flood zone rules were not consistently enforced during re-building. Certain properties --such as 1616 N. James -- should have been elevated since their repeated flood damages qualified as "substantial improvements" under the Code. Because the owner of that house was politically connected and also served on the Citizen's Flood Mitigation Committee --as well as the one to develop the All Hazard Mitigation Plan --the rules were not enforced. I have attached a summary of this case to show the need for elevation of this building. I have reported the issue to the Village but so far as I know, no violation has been issued. I do not know how to solve this problem of failure to enforce codes but it is a very pressing issue. On my own block, a new house built in the V-zone was not elevated on piers or pilings despite specific instruction by State officials to do so. The owner submitted plans to elevate on piers but then simply built solid foundation walls and extensively filled the V-zone site. The Village has issued no violation. (See attached emails.)

From a water quality perspective, I understand the need to continue relining and refurbishing storm and sanitary sewers. However, the report fails to address or inventory the number of streets that are without storm drains and/or the number of properties that are not hooked up to municipal sewer. Fixing what is present is helpful but there is also a problem of streets without storm drains.

Section 7.B.1.10 is called "Develop a Plan and Change Code to Base Flood Elevation (BFE)+2. My reading of the Village of Mamaroneck Code is that our current law already requires the lowest floor --including the basement-- to be elevated to BFE+2 so I am confused about this proposal (§186-5C). The V-zone requirements (§186-5D) apply to the lowest horizontal structural member -- not the lowest floor-- and are also BFE+2. The present code already requires utilities to be raised as well as HVAC replacements to be placed above base flood elevation.

Section 7.B.1.11 is too vague to be meaningful. Please be specific about the code and regulatory provisions that need to be improved.

Section 7.B.2.1--elevating housing stock -- is an this item deserving of much greater priority I understand that the priority is lower because of the projected costs of elevating but I believe you have overstated the costs and I would ask you to substantiate the report's average estimate of \$250,000 for elevating a property. FEMA has a publication that estimates the costs depending on type of structure. A-zone structures with stem wall foundations -- a very common foundation in this area --are much less expensive to elevate than \$250K. You should also be aware that ICC coverage of standard FEMA policies would provide \$30,000 towards elevating a building but nobody in the Village seems familiar with this coverage. I doubt this coverage was used after

either of the last two flooding events. In my own view, raising individual homes is a much more productive effort than infrastructure changes. We need to identify funding sources, find mechanisms to house families temporarily while their houses are elevated and one-by-one elevate or remove at-risk properties from the flood zone. We need to study what other communities have done and make this a higher priority. At a minimum, people should develop plans to accomplish this and have permits pre-approved so that the work could be done quickly after damage from a flood.

Section 7.b.2.2. "Reinforce Existing Structures to Ensure they are Flood Safe" is too non-specific to evaluate. Are we talking about reinforcing structures that are not elevated? If the properties are elevated, what kinds of reinforcement do you believe will be necessary? If this recommendation relates to installing flood walls and dams, that deserves discussion...at least as an interim improvement until structures can be elevated but the section's implications are simply not comprehensible to a general reader.

Section 7.B.2.4 Update Emergency Operation Plan and Evacuation Plan. Thank you for making this item the highest priority. If this plan accomplishes nothing else, this step alone would be a worthwhile improvement over the experience of Irene. Please try to accelerate the timeframe. I live in a V-zone, with four neighboring couples over 80 years of age --some no longer driving. Some elderly folks also live in a 5-story condo building on the street. Despite the fact that Irene was tracked for more than a week before it came to this area, our evacuation notice was approximately 24 hours...and was given by harbor police officers who walked around and handed out evacuation notices. If you look at the emergency notices on the VOM website, you will see that these are all outdated. Nobody uses that link because it's not maintained in current fashion. I got no blast phone calls and no emails from the Village about the pending storm. Revising communication protocols and assigning one individual the ultimate responsibility for emergency center operations are desperately needed. (7.B.2.6)

Section 7B.2.4 Check Vulnerability, Stability of Sea Walls, Docks, Pilings, Gas Tanks. Most of these are privately owned but located on State land and I am unaware of any authority by the Village to inspect these or order their repair. These are discretionary, not required structures, and the general regulatory sentiment is that hardened shorelines are worse for flooding than natural barriers. It is my understanding that FEMA's flood maps assume that these structures would fail in a catastrophic storm since none of the seawalls in this area are certified to protect from the 1 percent storm. I think this recommendation needs more research and analysis.

Section 7.B.4.1 et al. CRS Program. While this is a fine objective, realistically, the Village's enforcement of flood zone rules is so lax that we should worry about being dropped from the NFIP or being put on probation rather than seeking premium reductions. The Village is presently considering weakening our flood prevention local law to eliminate the need for elevating a house based on "cumulative" substantial improvement or damage. That means we will not elevate SRL properties unless one-time damage is greater than 50 percent of the pre-loss value of the structure. Any improvement I make in the V-zone needs a floodplain development permit (\$200), a wetlands permit (\$200), a building permit (variable cost based on improvement valuation) and a certificate of occupancy or compliance (fees being introduced). There are also escrow funds demanded for engineering and land use board review that total in the thousands of dollars. The regulatory cost and burden is so high that property-owners will simply do the work without permits or without complying with law.

Section 7.B.4.3. SRL Property Inventory. It would be helpful for this plan to explain how the Village will identify SRL properties. To the best of my knowledge, the Village does not receive information on FEMA flood claims payments. Without such information, SRLs are hard to identify if property owners did not obtain permits or accurately report their expenses to repair flood damages.

Section 7.B.5.6-8. Please specify which emergency facilities need to be relocated and clarify that expensive equipment exposed to flooding will not be installed at any location that is not reasonably safe from flooding.

Section 7.B.6.4 Establish Long Term Plan to Protect Coastal Residences. As a V-zone resident who owns a pre-FIRM house, I am curious as to what type of activities might even be considered. Would the Village look to structural solutions --such as building levees to protect the harbor area? Would they establish coastal A-zones to elevate coastal residences on piers? It would be helpful were this document more specific than simply proposing another plan.

Section 8.H.3. There is a claim that raising homes in the floodplain will require changes to the zoning code, floodplain management requirements, subdivision regulations, or housing standards. Is this an empirically-based claim? For example, have houses below the base flood elevation been analyzed to show that if these were elevated, they would exceed height limitations? I have heard this claim oft-made but so far as I know, these codes do not block elevation of homes. Rather it is the cost and inconvenience of doing so that makes property owners pursue repair rather than elevation.

Section 9.A.2. Public Participation. It is extremely unrealistic to expect that "the public" will be involved in the multi-hazard plan revision and updating process because public comments are generally unwelcome in this administration. Public commenters are often limited to comments of 2 or 5 minute duration for complex subjects --even when only one or two individuals wish to comment. Significant public policy issues are discussed in executive sessions rather than in open meetings --in violation of NYS Open Meetings law. (Most recently, there was an illegal executive session to discuss a planned FEMA visit.) I believe this draft cannot seriously claim that the public will "continue to be involved in the revision and updating process." It takes considerable time and effort to review a 400 page plan. Who wants to do so only to have their comments ignored?

Section 9.A.3 Incorporation with Other Activities. The Village of Mamaroneck Comprehensive Plan has been adopted so this section should be updated. Its discussion on flood mitigation policies and long-term goals was disappointing. In particular, the comprehensive plan proposes residential development in areas prone to flooding such as Hoyt Avenue and Fenimore Road making residents such as myself concerned that there is no administration commitment to making this Village reasonably safe from flooding. I personally tried on multiple occasions to make the mitigation of flood damages a priority in our planning efforts. The Village policy makers declined to do so.

Thanks for your consideration of these comments.

Sincerely,
Suzanne McCrory

From: William Nechamen <wsnecham@gw.dec.state.ny.us>
Subject: **Re: Village of Mamaroneck Continues to Allow Rebuilding Without complying with Flood Rules**
Date: December 27, 2011 2:41:27 PM EST
To: Sue McCrory <smccrory@mac.com>
Cc: Mark Lewis <melewis@gw.dec.state.ny.us>, Patrick Ferracane <plferrac@gw.dec.state.ny.us>

Ms. McCrory:

I reviewed the Village's Local Law for Flood Damage Prevention (Local Law Number 11 of 2007) and have verified that the village has a definition for cumulative substantial improvement well as a repetitive damage clause. Cumulative substantial improvement is defined as any reconstruction, rehabilitation, addition or other improvement of a structure that equals or exceeds 50% of the market value of the structure at the time of the improvement or repair when counted cumulatively for ten years.

The repetitive substantial damage definition is flood related damages sustained by a structure on two separate occasions during a 10-year period for which the cost of repairs at the time of such flood event, on the average, equals or exceeds 25% of the market value of the structure before the damage occurred.

Based on the chart that you enclosed, it is indeed possible that the N. James structure met the threshold of two flood related damages averaging over 25% of the market value of the structure. However, there would have to be verification of the market value and of the losses suffered. The current FEMA insurance data does not verify the amount of the 2011 loss. However that data may be incomplete.

We currently have an extreme backlogged need for community visits due to the wide spread flooding this year. I will put Mamaroneck Village on our list to receive a community visit over the coming year.

Sincerely,

William Nechamen

William Nechamen, CFM
Chief Floodplain Management Section
Bureau of Flood Protection and Dam Safety
New York State Department of Environmental Conservation
625 Broadway, 4th Floor
Albany, NY 12233-3504
518-402-8146
Fax: 518-402-9029

wsnecham@gw.dec.state.ny.us>>> Sue McCrory <smccrory@mac.com> 12/27/2011
12:09 PM >>>

Dear Mr. Nechamen:

Happy New Year! I hope you have enjoyed the holidays --which during my years of government service were incredibly quiet with so many folks using annual leave rather than forfeiting it. I hope the season brought some time off for you as well.

I write again to raise issues about flood zone non-compliance in the Village of Mamaroneck. You may know that John Winter left Mamaroneck and we had serious flooding again with the Irene/Lee storms this summer.

After the storms, a vocal group of repeat flooding victims began to petition the Village Board of Trustees to spend Village funds to remove the terminus of Glendale Road in Harrison that formed an obstruction in the river separating Mamaroneck from Harrison. The Village Manager said the removal would lower flood levels by 0.1 foot --pretty nominal--but the residents believe this "road to nowhere" exacerbates their flooding problems. In presenting their case, the property owners submitted a schedule of repeat flood damages that each address had suffered. One house on the river --1616 N. James -- had 4 separate flooding incidents since 2004, totaling more than the current assessed value of the structure. The last two episodes alone each represented more than 25 percent damage to the structure and should have required rebuilding in accordance with the flood rules enacted locally in 2007.

I am forwarding an email that I received in response to a FOIL request for floodplain development permits for properties that had experienced the greatest serial damages. I was incredibly despondent to learn that none had been issued. For example, according to Town of Mamaroneck assessment rolls (as of June 1, 2011 --the date closest to the damages from Irene/Lee) 1616 N. James (parcel number 8-10-143) had a total assessed

value of \$10,300 of which 4000 was land. The property's total market value was assessed at \$559,783. That gives a value for the structure of \$342,391. The flood damages to this structure in 2011 were reported to be \$133,000 in 2011 and \$116,000 in April 2007 -- each more than the 25 percent threshold that if twice met during a 10-year period, qualifies the 2011 rebuilding as a "substantial improvement." Rather than being elevated, the property was repaired to its former state--apparently without any permits being issued.

It is quite clear to me that the Village of Mamaroneck continues to overlook the flood damage prevention requirements despite the frequency and severity of past storm losses. There seems to be no consequence to property owners or the Village for failure to construct according to flood zone rules. Obviously, I began to see this problem on my own block with the Ottinger rebuilding --which remains unresolved. The fact that you personally informed the Village that the Ottinger property needed an open foundation and both the owners and building inspectors nonetheless allowed a closed foundation to be built demonstrates the local mindset that state and federal regulators are not serious about these rules and that ultimately they will not be enforced. I assume that the Ottinger property continues to enjoy flood insurance, just as I assume 1616 N. James does. I know you have been incredibly diligent in your dealings with the Village of Mamaroneck, but flood insurance construction requirements continue to receive lip service only. Until you exercise your enforcement authority to make an example of how non-compliant construction will be addressed, we have no hope of making Mamaroneck reasonably safe from flooding.

I have attached the spreadsheet of the flood damages in the Harbor Heights area that was presented to the Board of Trustees. I have no way of verifying the information but I assume that you have access to FEMA flood insurance payments to confirm the reported figures. The Town of Mamaroneck 2011 Final Assessment Roll can be found at its website. Page 443 of this document gives the James Street addresses, pp. 451-457 contain other addresses on the schedule. I did not do a detailed analysis for other properties. The Winfield address may be another candidate if it is covered by federal flood insurance and loss figures for 2011 can be obtained.

Thank you for your help with this matter.

Best regards,
Sue McCrory
914 698-5686



Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	Village of Mamaroneck Westchester County New York	NO PROJECT	UPDATE
	COMMUNITY NO.: 360916		
IDENTIFIER	Ottinger Property	APPROXIMATE LATITUDE & LONGITUDE: 40.947, -73.729 SOURCE: USGS QUADRANGLE DATUM: NAD 83	
ANNOTATED MAPPING ENCLOSURES		ANNOTATED STUDY ENCLOSURES	
TYPE: FIRM* NO.: 36119C0353F DATE: September 28, 2007		DATE OF EFFECTIVE FLOOD INSURANCE STUDY: September 28, 2007 TRANSECT DESCRIPTIONS TABLE: 7	

Enclosures reflect changes to flooding sources affected by this revision.

* FIRM - Flood Insurance Rate Map; ** FBFM - Flood Boundary and Floodway Map; *** FHBM - Flood Hazard Boundary Map

FLOODING SOURCE(S) & REVISED REACH(ES)

East Basin - approximately 1,000 feet northeast of the intersection of East Boston Road and Mamaroneck Avenue

SUMMARY OF REVISIONS

This LOMR is being issued to update Table 7 (Transect Descriptions) of the effective FIS report and a labeling error on Panel 36119C0353F of the effective FIRM for Westchester County, New York (All Jurisdictions), both dated September 28, 2007. The original modeling data and historical FIS reports were reviewed and used to update Table 7, employing the appropriate conversion factor for the NAVD datum. This LOMR updates the flood hazard designation for the East Basin area from Zone VE on the effective FIRM panel to Zone AE. The updates to Table 7 and the labeling on Panel 36119C0353F did not result in changes to the Base Flood Elevations (BFEs) on any FIRM panels for this community.

DETERMINATION

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 6730 Santa Barbara Court, Elkridge, MD 21075. Additional Information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

Todd A. Steiner, Program Specialist
Engineering Management Branch
Mitigation Directorate



Federal Emergency Management Agency
Washington, D.C. 20472

**LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)**

COMMUNITY INFORMATION

APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

COMMUNITY REMINDERS

We based this determination on the base (1-percent-annual-chance) flood discharges computed in the FIS for your community without considering subsequent changes in watershed characteristics that could increase flood discharges. Future development of projects upstream could cause increased flood discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on flood discharges subsequent to the publication of the FIS report for your community and could, therefore, establish greater flood hazards in this area.

Your community must regulate all proposed floodplain development and ensure that permits required by Federal and/or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 8730 Santa Barbara Court, Elkridge, MD 21075. Additional information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

A handwritten signature in black ink, appearing to read "Todd A. Steiner".

Todd A. Steiner, Program Specialist
Engineering Management Branch
Mitigation Directorate



Federal Emergency Management Agency
Washington, D.C. 20472

**LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)**

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Ms. Mary A. Colvin
Acting Director, Federal Insurance and Mitigation Division
Federal Emergency Management Agency, Region II
26 Federal Plaza, 13th Floor
New York, NY 10278-0002
(212) 680-3622

STATUS OF THE COMMUNITY NFIP MAPS

We will not physically revise and republish the FIRM and FIS report for your community to reflect the modifications made by this LOMR at this time. When changes to the previously cited FIRM panel(s) and FIS report warrant physical revision and republication in the future, we will incorporate the modifications made by this LOMR at that time.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 6730 Santa Barbara Court, Elkridge, MD 21075. Additional Information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

A handwritten signature in black ink, appearing to read "Todd A. Steiner".

Todd A. Steiner, Program Specialist
Engineering Management Branch
Mitigation Directorate



Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

PUBLIC NOTIFICATION OF REVISION

This revision is effective as of the date of this letter. Any requests to review or alter this determination should be made within 30 days and must be based on scientific or technical data.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 6730 Santa Barbara Court, Elkridge, MD 21075. Additional Information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

A handwritten signature in black ink, appearing to read "Todd A. Steiner".

Todd A. Steiner, Program Specialist
Engineering Management Branch
Mitigation Directorate

Transects were spaced close together in areas of complex topography and dense development. In areas having more uniform characteristics, they are spaced at larger intervals. It was also necessary to locate transects in areas where unique flooding existed and in areas where computed wave heights varied significantly between adjacent transects.

Each transect was taken perpendicular to the shoreline and extended inland to a point where wave action ceased. Along each transect, wave heights and elevations were computed considering the combined effects of changes in ground elevation, vegetation, and physical features. The stillwater elevations for the 1percent annual chance flood were used as the starting elevations for these computations. Wave heights were calculated to the nearest 0.1 foot, and wave elevations were determined at whole-foot increments along the transects. The location of the 3-foot breaking wave for determining the terminus of the V zone (area with velocity wave action) was also computed at each transect. Table 7, "Transect Descriptions," provides a listing of the transects location and stillwater starting elevations, as well as maximum wave crest elevations.

TABLE 7 - TRANSECT DESCRIPTIONS

<u>TRANSECT</u>	<u>LOCATION</u>	<u>ELEVATION (FEET NA VD)</u>	
		<u>STILLWATER¹</u>	<u>WAVE CREST²</u>
1	South corporate limits to Glen Island	11.8	15.0
2	Davids Island	11.8	18.0
3	Glen Island to Pine Island	11.8	18.0
4	Pine Island to Echo Bay Place extended	11.7	18.0
5	Echo Bay Place extended to Duck Point	11.7	18.0

¹Because of map scale limitations, the 100-year stillwater may not be shown on the FIRM.

²Because of map scale limitations, the maximum wave elevation may not be shown on the FIRM.

REVISED TO
REFLECT LOMR
EFFECTIVE: April 6, 2010

REVISED
DATA

TABLE 7 - TRANSECT DESCRIPTIONS - continued

<u>TRANSECT</u>	<u>LOCATION</u>	<u>ELEVATION (FEET NA VD)</u>	
		<u>STILLWATER¹</u>	<u>WAVE CREST²</u>
6	Duck Point to Echo Island	11.7	18.0
7	Echo Island to Premium Point Road extended	11.6	17.0
8	From Larchmont/Mamaroneck corporate limits to Premium Point	11.6	17.0
9	Premium Mill Pond shoreline and Premium River shoreline	11.7	17.0
10	Southeast corner of Premium Mill Pond to Bay Avenue, extended	11.7	17.0
11	Bay Avenue, extended, to northern corporate limits	11.6	17.0
12	Larchmont Harbor	11.6	18.0
13	Western corporate limits to approximately 1,500 feet east of western corporate limits	11.6	18.0
14	Approximately 1,500 feet east of western corporate limits to Seven Oaks Lane, extended	11.6	18.0
15	Seven Oaks Lane, extended, to Orienta Point	11.5	17.0
16	Orienta Point to mouth of Otter Creek	11.5	17.0
17	Mouth of Otter Creek to approximately 1,400 feet east of mouth of Otter Creek	11.5	17.0
18	Approximately 1,400 feet east of mouth of Otter Creek to eastern corporate limits	11.5	15.0

←
**REVISED
DATA**

**REVISED TO
REFLECT LOMR
EFFECTIVE: April 6, 2010**

¹Because of map scale limitations, the 100-year stillwater may not be shown on the FIRM.

²Because of map scale limitations, the maximum wave elevation may not be shown on the FIRM.

TABLE 7 - TRANSECT DESCRIPTIONS - continued

<u>TRANSECT</u>	<u>LOCATION</u>	<u>ELEVATION (FEET NA VD)</u>	
		<u>STILLWATER¹</u>	<u>WAVE CREST²</u>
19	From the southwestern corporate limits to Maries Neck	11.5	17.0
20	From Maries Neck to Milton Point	11.5	17.0
21	From Milton Point to Playland Beach	11.4	17.0
22	From Playland Beach to the southern end of Manursing Island	11.4	17.0
23	From the southern end of Manursing Island to the northern end of North Manursing Island	11.3	18.0
24	From the northern end of North Manursing Island to the northeastern corporate limits	11.2	18.0
25	Southern corporate limits to access road off Harbor Drive, extended	11.2	16.0
26	Access road off Harbor Drive, extended, to the Byram River	11.2	15.0

←
REVISED
DATA

¹Because of map scale limitations, the 100-year stillwater may not be shown on the FIRM.

²Because of map scale limitations, the maximum wave elevation may not be shown on the FIRM.

Figure 2 is a profile for a typical transect illustrating the effects of energy dissipation and regeneration on a wave as it moves inland. This figure shows the wave elevations being decreased by obstructions, such as buildings, vegetation, and rising ground elevations, and being increased by open, unobstructed wind fetches.

REVISED TO
REFLECT LOMR
EFFECTIVE: April 6, 2010

COORDINATING COUNCIL OF NEIGHBORHOOD ASSOCIATIONS

% 916 East Boston Post Road

Mamaroneck NY, 10543

914-698-5678

dan.n@dsnainc.com

Mayor Rosenblum and Board of Trustees
Village of Mamaroneck
123 Mamaroneck Avenue
Mamaroneck, NY 10543

RE: Village of Mamaroneck's PROPOSED Multi Hazard Mitigation Plan

Dear Mayor Rosenblum and Board of Trustees;

The Coordinating Council of Neighborhood Associations has reviewed the Multi Hazard Mitigation Plan and finds for the most part it is well written and covers a lot of ground. However there are a few points that need to be made:

- a) The most pressing and long term hazard facing the Village is *flooding*. It is known, it will continue and it will get worse.
- b) The plan as written is focused on what to do AS AND AFTER a hazard is or has occurred. The approaches are reasonable and meaningful. Notification of an impending hazard allows prudent action on the part of those in the Village including evacuation from areas prone to flooding
- c) The largest omission is ***failure to focus on revisiting the zoning to avoid the creation of residential housing where none presently exists in areas that are known to flood.*** If one simply uses the FEMA standards, this means that one can create significant numbers of new as well as high density housing in areas that are known to flood (as presently allowed in the Village's Master Plan) resulting in the *evacuations of hundreds of additional people* from that which has happened in the last floods.
- d) The report should be *more proactive to suggest prevention of new residential development in areas that flood where such residential development does not presently exist.*
- e) *Review other zoning regulations to make them also proactive allowing as well as encouraging remediation measures to prevent flood damage* including raising of the heights of existing residences and raising shoreline protection features and property elevations to be more meaningful to the uses prescribed. For instance in storms it is encouraged that boaters haul their boats and place them in marinas. But the elevations of these properties, for the most, are at low elevations so the boats would simply float off the property and down the streets (as has occurred on previous occasions).
- f) **The zoning reviews and changes have the highest cost benefit ratio of all potential improvements within the Hazard Mitigation Plan and should be identified and prioritized as such.**
- g) The plan should include *more detailed historic quantification evaluation data analysis as to cost of the various resources in responding to various hazards so better cost benefit effectiveness planning can be undertaken.* (This should include, among others) the cost of evacuations, shelters, fire, police, red cross and other responders and volunteers)

We have also taken the liberty of suggesting some editing in marking mode for portions of Sections 6, 7, and 8 in along the lines that begin to touch on the issues expressed above. The attachments are in *word documents in marking mode* allowing one to easily see the suggested changes,

If you have any questions or wish to discuss these comments please give us a call.

Sincerely,



Daniel S. Natchez

On behalf of all the participating neighborhood associations and as
President of the Shore Acres Property Owners Association

Cc: Richard Sligerland, Village Manager
Dan Sanoff, Assistant village Manager

Valerie Rifkin vrifkin@enviroexpertsetg.com
Environmental Technology Group, Inc.
300 Wheeler Road – Suite 307
Hauppauge, NY 11788

Paul Hoole Paul.Hoole@fema.dhs.gov
Mitigation Planning
FEMA/NYS Joint Field Office
FEMA-40-20-DR-NY
10 Jupiter Lane
Albany, NY 12205

Rick Lord via email RLord@dhsses.ny.gov
Chief of Mitigation Programs & Agency Preservation Officer
NYS Division of Homeland Security & Emergency Services
NYS OEM | Office of Emergency Management
1220 Washington Avenue | Albany, NY 12226-2251
518.292.2370 landline | 518.322.4983 fax | 518.867.9482 cell

Sandra K. Knight, PhD, PE, D.WRE via email Sandra.Knight@fema.dhs.gov
Deputy Associate Administrator Mitigation
Federal Emergency Management Agency
1800 S. Bell Street
Arlington, VA 20598

Neighborhood Associations

Nora Lucas
203 Beach Avenue
Mamaroneck, NY 10543

April 12, 2012

RE: Comments on Village of Mamaroneck Multi-Hazard Mitigation Plan

To Whom It May Concern:

Please find attached a marked up copy of the Multi-Hazard Mitigation Plan with my comments and suggestions.

In general, the plan is an excellent start, but fails to address measures to prevent flooding -- the most persistent environmental hazard faced by this Village and one for which we are woefully unprepared. Our physical situation and geographic patterns make us vulnerable to flooding, but our planning and building policies do not take strong enough measures to mitigate the adverse impacts of future flooding.

Please make sure that this plan is not simply an item to be “checked off” in the quest for applying for FEMA and other grant funds, but one that also mitigates the potential effects of future floods.

Specifically, the plan does not address proposed Local Law I-2012 “Removing Cumulative from Chapter 186” a shocking step away from the Village’s responsibility to work to make the village more flood safe and to stop properties from having repeat flood losses. In 2007 the Village added a provision to the Flood Damage Prevention Law requiring houses to be made compliant with flood zone construction standards based upon cumulative flood damage or reconstruction. That was a strong step towards making individual flood prone properties safer from flooding. Now, the Village is backtracking yet this change has not been factored into the Multi-Hazard Plan. This plan’s claim to address properties with serious repeat flood losses appears to be nothing more than an empty promise.

Additionally, our newly-adopted Master Plan proposes to modify zoning in the flood-prone commercial district to encourage multi-family residential construction. Currently there is a proposal before the Village to re-zone one parcel in that same district for a school use. None of these eventualities are considered or planned for in the Multi-Hazard Plan. If the Village is intent on such steps, the potential adverse impacts of those measures should be factored into this plan, which after all, is designed to “mitigate” them.

I would also suggest that the Plan overstates public involvement. There was no means for the public to learn of the progress of the plan until it was finally drafted. The All-Hazard Mitigation Plan meeting minutes found in the Appendix do not list any members of the public other than Ex-officio members representing other committees. Village Calendars indicate that the April 18, 2011 and June 9, 2011 All-Hazard Committee meetings were closed to the public. A Trustee urged that there be a public workshop given the widespread community concern about flooding,

but such a workshop was never held. Furthermore, our Board of Trustees allows only 2 minutes for public comment at Regular Board Meetings –making clear that the March 13, 2012 Notice was not an opportunity for extensive public comment on this 400-page document. There was never a formal notice soliciting written comments. This plan was developed behind closed doors.

I would urge the Village to publish the comments that are received on the website for all to see and to make every effort to inform the public which of their suggestions have been adopted, also explaining the rationale for the exclusion of any suggestions that are not incorporated into the revised plan..

Thank You for your consideration.

Sincerely,

Nora Lucas

Nora Lucas

Doreen Roney
143 Highview St.
Mamaroneck, NY 10543

April 12, 2012

Re; Comments regarding Multi Hazard Mitigation Plan

To Whom It May Concern,

I've read the draft Multi Hazard Mitigation plan and in general found it as an excellent starting point and from what I read a work in progress. I am troubled the fact that that on many occasions certain information that I have brought to the attention of the Board of Trustees, and village manager at many public meetings is missing from this plan. As a lifelong resident who has witnessed flooding in this community for over several decades, there are areas in this village that flood, however are not captured in the 2007 FEMA firm. It is imperative that this matter is addressed going forward at the very least from an emergency planning and emergency resource management perspective.

For the most part topography has not changed in these outside the 100 year flood areas however the 2007 FEMA firm did. This is well illustrated when you compare historical FEMA firms to the 2007 FEMA firm. I am familiar with this in at least 2 riverine flood areas; south of Hoyt Avenue/railroad tracks on Bishop and Stanley Avenues and on Fenimore Rd to the northwest of I-95. Within the following publications please note numerous pictures depicting this flooding in areas outside of the 2007 FEMA mapped flood zones:

<http://larchmont.patch.com/articles/public-requests-a-more-readable-waterfront-revitalization-plan-in-mamaroneck-village#photo-8331130> and <http://larchmont.patch.com/articles/county-promises-flood-mitigation-money-to-larchmont-and-mamaroneck#photo-7531830> and <http://larchmont.patch.com/articles/the-village-of-mamaroneck-underwater> and <http://larchmont.patch.com/articles/families-still-displaced-in-mamaroneck-village-local-agencies-band-together#photo-7532461>

Our recently adopted village Comprehensive Master Plan documents this issue on page 58 as follows:

There are certain areas of the Village that, while not located within a FEMA-mapped 100-year floodplain, nonetheless experience frequent flooding and related damage during storm events. Based on this concern, the

Village should coordinate with both FEMA and with appropriate property owners to ensure that official flood maps reflect the most accurate and up-to-date information, and are based on clear evidence of flooding history. In addition, some members of the public have suggested that the Village create local flood-risk zones to recognize these flood-prone areas that may not be within a FEMA floodplain (and therefore not subject to NFIP regulations). It is understood that creation of such localized flood-risk zones would not change the administration of NFIP regulations, i.e. property owners within the local zones would not be required to purchase flood insurance. But the local zones – which would most likely be zoning overlay zones – could be regulated by local laws and actions, which could be highly effective in addressing specific flooding issues. **This**

plan does not recommend the creation of any specific local flood-risk zones;however, the Village, based on the recommendations of the All-Hazard Plan and the Flood Mitigation Advisory Committee, may wish to pursue their creation, through appropriate revisions to Chapters 186 (Flood Damage Prevention; Erosion and Sediment Control) and 342 (Zoning) of the Village Code. This issue should be part of a separate, comprehensive study that is based on data and documented flooding experience, with the full cooperation of FEMA representatives and affected property owners.

I am also concerned about the safety and well being of those not only living within flood zones needing evacuation, but also at the same time being prepared to deal with emergencies during flooding to those neighborhoods cut off from emergency services by flood waters. From what I'm told there may have been 2 flood related deaths in Mamaroneck. One supposed event where someone drowned in the vicinity of Hampshire Country Club driving through flood waters long ago. A definite unfortunate event occurred in 2007 when my former neighbor required medical assistance and there was difficulty and delay reaching the area due to flood waters. Evaluating risks, manpower, possible assistance from neighboring municipalities with those areas cut off and egress routes are very important considerations in planning for emergencies. For example the street that I live on becomes a virtual island cut off from emergency services and a possible route on higher ground is Winged Foot Country Club which is gated closed to prevent thoroughfare of traffic.

I bring these matters to your attention now as my concerns were not brought forth to committee as I had expected. Public information meetings and outreach to the community regarding commentary on this draft Multi Hazard Mitigation Plan have been sparse. In June 2011 this plan was not drafted for review as yet and on March 27, 2012 this plan was first presented publically by the consultants with the close of public comments on this today. I hope there will be further meetings and some outreach with much publicity to all community members in the future to help gain input such as you desire.

Thank you for your consideration.

Sincerely,

Doreen Roney

Daniel Sarnoff

From: Sue McCrory [smccrory@mac.com]
Sent: Sunday, April 15, 2012 10:10 AM
To: Daniel Sarnoff; vrifkin@enviroexpertsetg.com
Subject: Additional comments on the All-Hazard Plan
Attachments: Village of Mamaroneck-3.pdf; ATT00001.htm; Village of Mamaroneck follow-up-4.pdf; ATT00002.htm

Dear Mr. Sarnoff and Ms. Rifkin:

I have attached the NYSDEC report from its community assistance visit as well as a follow-up letter written after meeting with Mr. Winter.

I believe this information should be included in the discussion of the regulatory requirement that the plan address the "continued compliance with NFIP requirements." 44CFR§201.6(c)(3)(ii).

I believe you should also be addressing the letter from FEMA dated January 26, 2012 that discusses the property at 818 The Crescent --that is mentioned as one of serious non-compliance in the 2007 report.

In effect, the all-hazard plan should address the problem that the Village has had serious compliance issues with NFIP regulations. If this plan is going to direct mitigation efforts, we must honestly assess our practices to date.

Sincerely,

Sue McCrory

New York State Department of Environmental Conservation

Division of Water

Bureau of Flood Protection and Dam Safety, 4th Floor

625 Broadway, Albany, New York 12233-3504

Phone: (518) 402-8185 • FAX: (518) 402-8082

Website: www.dec.ny.gov



Alexander B. Grannis
Commissioner

January 17, 2008

John Winter
Village of Mamaroneck
169 Mt. Pleasant Ave.
Mamaroneck, NY 10543

Re: Community Assistance Visit for the National Flood Insurance Program

Mr. Winter:

Thank you for taking the time to meet with me and Bernard Lohmann on January 15, 2008 to discuss the National Flood Insurance Program (NFIP) and development within the floodplains of the Village of Mamaroneck.

This letter is intended to document what was discussed during the meeting:

- 1) We discussed the fact that the Village of Mamaroneck has a new local law for flood damage prevention, effective July 20, 2007, and that it was in fact in Section 186 of your Village Code.
- 2) We discussed the fact that the Village of Mamaroneck has newly adopted Flood Insurance Rate Maps, which became effective September 28, 2007, which you have a copy of in your office.
- 3) We reviewed the list of structures in the floodplain which were identified during the floodplain inspection that Bernie and I conducted on June 26, 2007 (which is attached for your information). We discussed some of the properties with more serious problems such as 818 The Crescent, one at the corner of Constable and Orienta, some on Flagler and some on Graecen Point. As we understand it, the properties with improperly constructed break-away walls will be corrected prior to issuance of the Certificates of Occupancy.

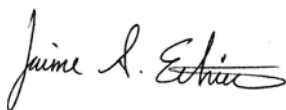
We appreciate you pulling the building permit files for some of the properties on the list while we were there. We were pleased to see that most of the properties in question had floodplain development permits and elevation certificates. We recommend that you review the remainder of the list to ensure that the proper documentation is there and if materials are missing, we urge you to inform the residents, so that the Village may be in compliance with the NFIP.

- 4) We also discussed some questions that you had regarding the NFIP, substantial improvement and the requirements for substantially improved structures.
- 5) We then conducted a drive through inspection of the floodplain and the development in question.
- 6) I left you with a CD with a variety of NFIP materials for your information. The CD contains:
 - 1) NFIP Technical Bulletins
 - 2) Common Questions about Flood Insurance
 - 3) Elevation Certificate
 - 4) FEMA 480- NFIP Desk Reference
 - 5) Floodplain Construction Requirements in NYS
 - 6) Floodplain and Floodway Development Guidance
 - 7) Letter of Map Change Applications
 - 8) NFIP FIRM Grandfather Rules

As was understood, for any properties missing the necessary materials for development in the floodplain, you will either be getting those materials or informing the residents that their structures may need to be retrofitted to meet the requirements of the NFIP.

I will be forwarding my notes to FEMA indicating that the Village of Mamaroneck is in compliance with the National Flood Insurance Program. Again, we thank you for your time and if you have any questions regarding the NFIP, I can be reached at (518) 402-8149.

Regards,



Jaime Ethier
Floodplain Management Coordinator

Cc: Bernard Lohmann, NYSDEC Regional Floodplain Management Coordinator
Richard Einhorn, FEMA Region II

FEDERAL EMERGENCY MANAGEMENT AGENCY COMMUNITY VISIT REPORT			O.M.B. NO. 3067-0198 Expires November 30, 1991
<p align="center">PAPERWORK BURDEN DISCLOSURE NOTICE</p> <p>Public reporting burden for this form is estimated to vary from 2 to 4 hours per response. The estimate includes the time for National Flood Insurance Program (NFIP) community officials to search existing data sources, gather the data needed, and provide information to a FEMA, or State representative who will subsequently complete the form. The information is used by FEMA to assess the effectiveness of a community's implementation of the NFIP and to offer assistance to the community where such a need is identified. Send comments regarding the burden estimate or any aspect of the collection, including suggestions for reducing the burden, to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, D.C. 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0198), Washington, D.C. 20503.</p> <p align="center">INSTRUCTIONS</p> <p>A community Visit Report indicating the findings must be completed after each community visit. The report should not be completed during the meeting with the local officials or provided to the local officials to complete. The Community Visit Report and any other relevant documentation should be completed and on file in the FEMA regional office within 30 days from the date of the visit.</p> <p>Section I and Section III - Part A and Part B - Self Explanatory</p> <p>Section II - "Name of Local Official" is the name of the designated local official with the responsibility, authority, and means to implement the NFIP requirements. "Address" and "Telephone Number" is the address and telephone number of the local official. Attach list of all attendees.</p> <p>Section IV - This section indicates the date that the CAV is closed. A CAV can be considered closed when all program deficiencies have been corrected and violations identified have been remedied to the maximum extent possible, and all follow-up action(s) have been completed. The date the CAV is closed will be completed and initialed by the FEMA regional office ONLY.</p> <p>Attach any other documentation related to the visit, e.g., chronology of contacts, correspondence, resolution of issues, community ordinance.</p>			
SECTION I			
1.NAME OF COMMUNITY Mamaroneck (V)	2. STATE New York	3. COMMUNITY ID NUMBER 360916	4. COUNTY Westchester
5.VISIT CONDUCTED BY Jaime Ethier & Bernard Lohmann	6. AGENCY NYSDEC		7. DATE OF VISIT 01/15/2008
SECTION II			
8. NAME OF LOCAL OFFICIAL John Winter, Building Inspector		9. TELEPHONE NUMBER 914-777-7731	
10. ADDRESS OF LOCAL OFFICIAL Village of Mamaroneck 169 Mt. Pleasant Ave. Mamaroneck, NY 10543			
SECTION III - FINDINGS			
PART A: Refer to subparagraph 6-2b in the NFIP Guidance for Conducting CAC's and CAV's for guidance in completing questions 1-4. Circle appropriate response.			
1. Are there any problems with the community's floodplain management regulations? Local Law #11 of 2007			NONE
2. Are there problems with the community's administrative and enforcement procedures? Permits by ex-BI		MINOR	
3. Are there engineering or other problems with the maps or Flood Insurance Study? New Maps			NONE
4. Are there any other problems in the community's floodplain management program?			NONE
5. Are there any problems with the Biennial Report data? (Attach a copy showing the updated Biennial Report information.)			NO
6. Are there any programmatic issues or problems identified ? (Programmatic problems may relate to the nation or region as a whole, not merely to an individual community)			NO
7. Are there any potential violations of the community's floodplain management regulations (Check appropriate category) <input checked="" type="checkbox"/> A potential violation of violations has/have been identified. <input type="checkbox"/> No violations have been identified. <input checked="" type="checkbox"/> Actions are being taken on the part of the community to remedy the violation(s) identified during the CAV. For each structure identified as a potential violation, attach appropriate documentation per the guidance provided in subparagraph 5-2d of the NFIP Guidance for Conducting Community Assistance contacts and Community Assistance Visits.			

SECTION III - (Cont.)

PART B: (NARRATIVE) - Attach a narrative statement addressing each of the following. Identify each page of the narrative with the following: Name of community, date of CAV, and name of person conducting the CAV.

1. BACKGROUND. Include in this section a brief statement on the reasons the community was selected for the CAV. Also, include in this section any relevant background information such as the history of the community's floodplain management program history of flooding in the community, a general description of the character of the flood hazard and floodplain development, availability of sites for development outside the SFHA.

2. Reference Part A, questions 1-4. Provide a narrative statement of the findings for a serious or minor answers in questions 1-4.

3. Programmatic Issues. Describe any programmatic issues or problems identified as a result of this CAV or as a result of a number of CAV's conducted over a period of time. Indicate whether the program or issues supports the need for a rule change, the development of a manual or guidance document, a statement of policy by FEMA, or whether the problem or issue can be resolved through the issuance of a guidance memorandum from FEMA or by the provision of technical assistance.

4. Section 1362, NFIP Flood Damaged Property Purchase Program. If properties have been acquired under Section 1362, provide a brief description for each of the following:

- a. Is the use of the land consistent with the community's Land Reuse Plan for open space or for recreational use?
- b. Are structures or other improvements located on the land, except rest rooms, open on all sides and functionally related to the open space or recreational use or are properly elevated or floodproofed?
- c. Is the property maintained in good condition and all debris or other improvements such as concrete slabs or foundations which are not part of the reuse plan removed?

5. E.O. 11988 Floodplain Management. Describe any known or probable Federally funded actions which have taken place in the SFHA which appear to be inconsistent with E.O. 11988-Floodplain Management.

6. Other findings. Describe in this section any other issues related to the community's floodplain management program. Examples of these activities include: post-flood mitigation programs, disaster preparedness efforts, relocation programs other than those related to Section 1362, a description of any unique or innovative floodplain management procedures or programs along with any recommendations related to transferability to other communities.

7. Follow-up. Provide a narrative statement as to the type of follow-up assistance provided at the time of the CAV or any additional follow-up which is needed to assist the community in resolving or preventing any future program deficiencies or violations, e.g., community needs assistance in revising its floodplain management regulations, local officials need workshop to provide detailed information on the NFIP and its requirements, local officials need a floodproofing workshop, local officials need assistance in updating the community's permit procedures. Include a schedule for completing any follow-up promised to the community, e.g., recommended date for conducting a workshop.

8. Community Action Needed. Provide a narrative statement as to the appropriate community actions that should take place to resolve the particular issue or problems, e.g., revise floodplain management permit form, update floodplain management regulations, require elevation certificates. Include a schedule setting out the expected time for the community to resolve the problem or issue, or for which some type of action is expected, e.g., expected date for adoption of the local floodplain management regulations.

SECTION IV - Completed by the FEMA regional office.

DATE CAV CLOSED

INITIALS

PART B: (NARRATIVE)

1. Background: The Village of Mamaroneck has had an open CAV for the past few years. There has been a considerable amount of development in the floodplain considering the built-out nature of the Village. Much of the new development in the floodplain has been demolitions and rebuilds. The Village has a new Building Inspector, John Winter, as of the fall of 2007.

2. Reference Part A, questions 1-4: The Village has a new FIRM and Local Law as of the summer of 2007. The previous building inspector, Richard Carroll (now retired), was cooperative, but slow to provide documentation for development in the floodplain. There were a few houses that raised serious concerns concerning development in the floodplain and unfortunately, Mr. Carroll seemed to be doing little to remedy those issues. Mr. Winter appears to be coming in with the intention to address previous issues with construction in the Village.

There were a few houses in the coastal hazard zones (one on Constable Drive and another on The Crescent) which had improper break-away walls. Mr. Winter has issued stop work orders and consent orders to ensure that the break-away walls are properly constructed prior to any consideration for Certificates of Occupancy. He will also look into other properties that may have floodplain development issues.

3. Programmatic Issues: None

4. Section 1362, NFIP Flood Damaged Property Purchase Program: There are no 1362 properties.

5. E.O. 11988 Floodplain Management: There are no issues with E.O. 11988.

6. Other findings: None

7. Follow-up: Although he seems versed in the NFIP, Mr. Winter plans to attend a workshop when it is offered in the area. DEC left him with some NFIP materials (technical bulletins, FEMA 480, and other information). DEC will plan on an informal follow-up in the future.

8. Community Action Needed: The Village intends on reviewing the attached list of properties to ensure all necessary permits were issued and elevation certificates were obtained. For those properties missing materials, Mr. Winter will try and get copies of needed materials and/or inform residents of potential issues with the NFIP.