INCORPORATED VILLAGE/TOWN OF MOUNT KISCO, NEW YORK

FINAL

MULTI-HAZARD MITIGATION PLAN

October 2013

Submitted to

Village/Town of Mount Kisco

104 Main Street

Mount Kisco, New York 10549

Prepared By

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

Village/Town of Mount Kisco, NY
Multi-Hazard Mitigation Plan

Table of Contents

Page Number

5 – Assessing the Impacts

6 – Setting Goals and Objectives

7 – Review Mitigation Activities

8 – Draft Action Plan

List of Figures

List of Figures (Continued)

Folded Pocket Maps

List of Tables

List of Tables (Continued)

APPENDICES

Attachments and Supporting Documents

Incorporated Village/Town of Mount Kisco
Multi-hazard Mitigation Plan

Summary Statement

This Multi-Hazard Mitigation Plan is for the jurisdiction of the Village/Town of Mount Kisco, Westchester County, New York (See Figure 0-1). This Plan identifies and assesses natural and manmade hazards that could adversely impact the community. It proposes feasible mitigation activities for the Village/Town which could reduce the impacts of an identified hazard. The Plan follows the Federal Emergency Management Administration (FEMA) guidance for developing hazard mitigation plans.

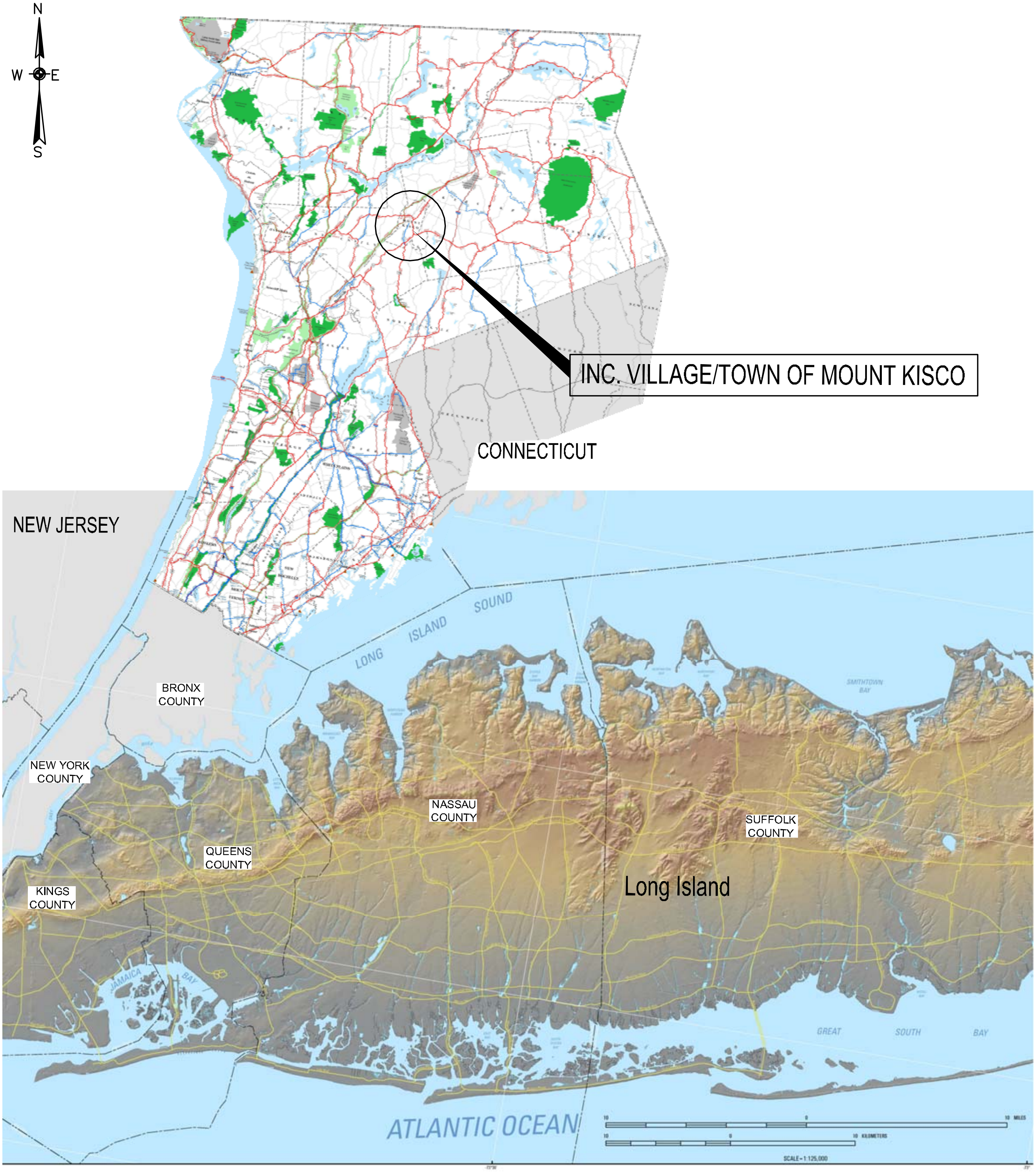
Background Information

The Village of Mount Kisco, New York, was incorporated in 1875 within portions of the Towns of Bedford and New Castle. In 1978 it became a Town in its own right as a combined Village/Town. (http://en.wikipedia.org/wiki/Mount_Kisco,_New_York)

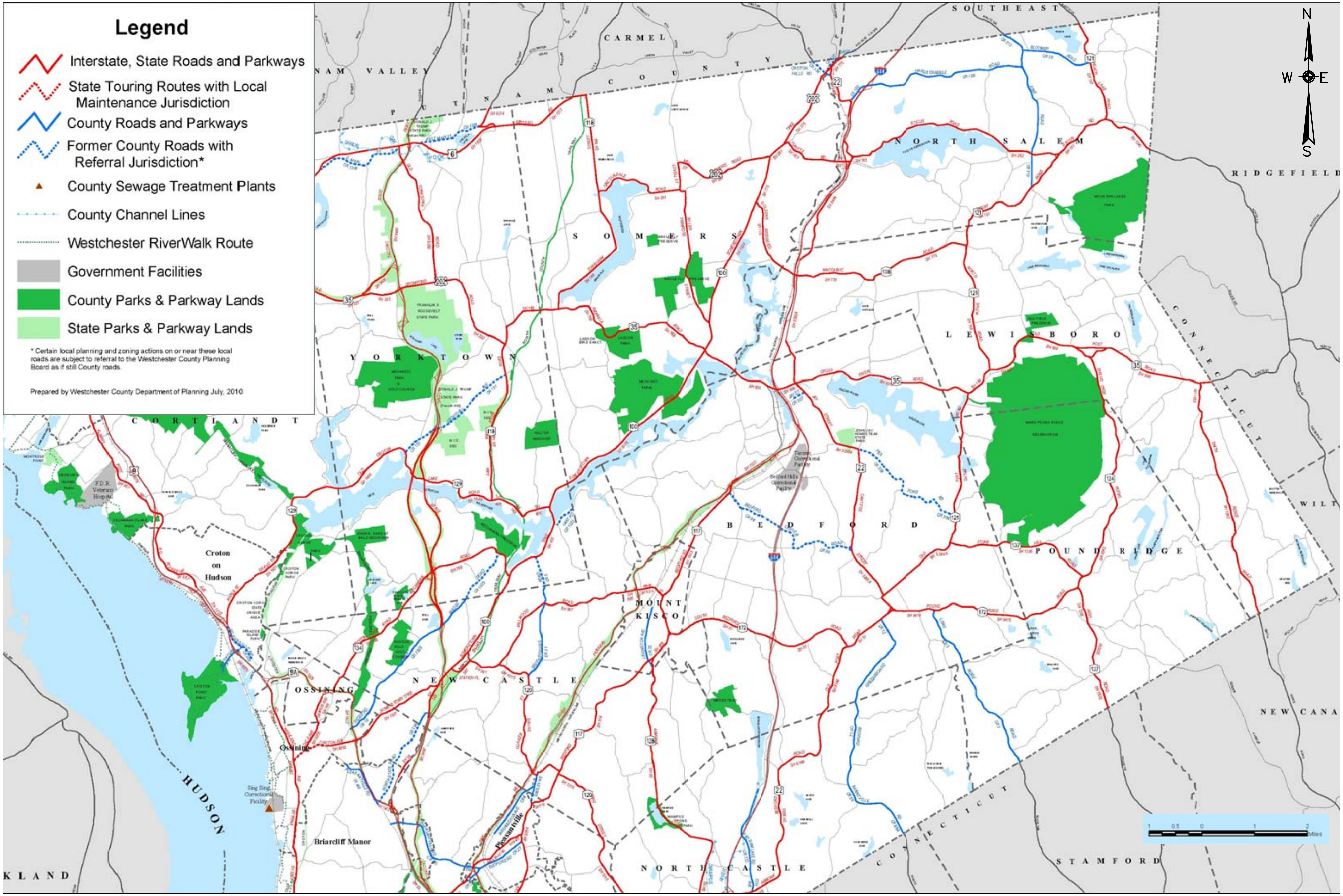
The Village is bounded on the west by the Town of New Castle and on the east by the Town of Bedford (See Figure 0-2.) Today the Village is largely a commuter and residential community with a population of 10,877. (U.S. Census, 2010)

Flooding has long been identified as a major problem in the Village. Mount Kisco has, on several occasions, been impacted by major storms, floods and other hazards that have caused damage to property. (See Section 4.) Several areas of the Village are located in designated flood zones according to the Village Flood Insurance Rate Maps (FIRM) and Flood Insurance Studies (FIS). The Village is prone to and has experienced serious flooding problems recently and over the years.

This Plan contains information obtained from a variety of Federal, State and local sources. Flood information shown on the maps in this Plan are approximate and based on existing data sources such as current FIRM and FIS documents.



ETG Environmental Technology Group, Inc. 300 WHEELER ROAD, SUITE 307, HAUPPAUGE, NEW YORK 11788	Project Name Incorporated Village/Town of Mount Kisco Multi-Hazard Mitigation Plan	Figure Title Regional Location Map for Mount Kisco, NY	Figure 0-1 DWN BY: AJZ CHK BY: JB SCALE: AS SHOWN DATE: 02/12/13



Environmental Technology Group, Inc. 300 WHEELER ROAD, SUITE 307, HAUPPAUGE, NEW YORK 11788	Project Name Incorporated Village/Town of Mount Kisco Multi-Hazard Mitigation Plan	Figure Title Map of Northern Westchester County, NY	Figure 0-2 DWN BY: AJZ CHK BY: JB SCALE: AS SHOWN DATE: 02/12/13

Requirements

This Multi-Hazard Mitigation Plan follows FEMA regulations and guidelines for mitigation planning. (See 44 CFR Part 201, FEMA Example Plans 2003 and current 2012 guidance. 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 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 Grant Program. This Multi-Hazard Mitigation Plan for the Village/Town of Mount Kisco incorporates all probable hazards. Under the Community Rating System (CRS) Program, each homeowner’s flood insurance cost could be reduced from 5% to 50%.

Plan Process

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/Town Hazard Mitigation Planning Committee, the Board of Trustees, the Mayor’s Office, Village Manager, several operating departments in the Village including the Fire Department, Police Department, Public Works, participating citizens, Westchester County Department of Emergency Services and the New York State Office of Emergency Management (NYSOEM). The purpose of this Plan is to address both the past and probable future hazards and to develop action items to mitigate identified hazards. These actions are intended to protect citizens, businesses, properties and infrastructures in the Village. 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 and 2012.

The first 8 steps of this planning process are:

Step 1- Organize Resources

Step 2- Involve the Public

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 development process of the Multi-Hazard Mitigation Plan. The last two steps are action items which the Village can take once the Plan is approved by FEMA and adopted by the Village Board of Trustees. They include:

Step 9- Implement, Evaluate and Revise the Plan

Step 10- Adopt the Plan.

Public Participation

The public was invited to participate in development of the plan through the local newspaper, postings in public places and the Village Web Page. Village residents had the opportunity to participate, provide input in public meetings and express concerns about the flood hazards they face on a regular basis. The residents provided input for actions that would aid in mitigating the problems. The public will be involved in the Plan's revision and updating process. Public input on key issues will be encouraged and notices and progress will be published in local papers. The Village posts updates on their Website http://www.mountkisco.org/Pages/index

Assessment of Hazards and Vulnerability

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 was prepared and each hazard is ranked according to their importance. This hazard assessment was based on evaluating the frequency of occurrence, extent and severity of impact to property and people, cascading effects on other hazards, duration of the hazard, warning time prior to onset, and recovery time from the hazard. Historical records and documents for each hazard impacting the Village were summarized and evaluated. Based on the assessment of each hazard profile, only the most significant hazards were analyzed further for a detailed impact analysis, proposed mitigation measures and a cost benefit evaluation.

Goals and Objectives

Five major Goals were developed with the aid of the Hazard Mitigation Committee. These include:

1. Avoid and reduce the impacts from flood hazards
2. Protect the community from catastrophic disasters to avoid loss of life and injury
3. Protect public and private property and infrastructure from catastrophic disasters
4. Protect environmental and natural resources
5. Promote mitigation efforts through existing programs and partnerships

In addition, 22 objectives were formulated as a means to obtain these goals. (See Section 6.) Setting of goals and objectives are an important part of the strategy for planning mitigative actions.

Mitigation Strategies

As part of the strategy, specific activities or actions were identified to reduce the risk of identified hazards. Priorities were established for mitigation activities based on these analyses and the goals and objectives set for the community. Mitigative actions were assembled that were effective, feasible and met the objectives specified in Section 6. Approximate costs were compared to the benefits identified.

Prepare Action Plan

Twenty-three mitigation activities were proposed to correct principal hazards evaluated in the Plan. The purpose of this action plan is to identify which tasks will be implemented first and to outline the strategy for implementation of each of the items. Most of the proposed activities are dependent on funding from State or Federal grants. The Action Plan is a working document which is expected to change as conditions and needs vary. Tables in Section 8 provide action items and priorities, approximate costs, administrative responsibility, schedule and/or duration of the activity and possible funding sources. The cost and benefits for each proposed activity were then evaluated and priorities established in the hazard mitigation action Plan.

Implementation

Once this Plan is approved by the Village/Town Board of Mount Kisco and FEMA, it is then implemented, updated and modified by the Village according to Step 9 in Section 9. Five-year updates will include the success of implementing the Plan’s activities, availability of funds, availability of new hazard information and changes in priorities.

Incorporated Village/Town of Mount Kisco
Multi-Hazard Mitigation Plan

Section 1 - Planning Process

1.A Background Information

This single jurisdiction Multi-Hazard Mitigation Plan has been developed for the Village/Town of Mount Kisco which is located in Westchester County, New York. (See previous Figure 0-2, 1.1 and 1-2 below.) This Plan identifies and assesses natural and manmade hazards that could adversely impact the community. The Plan then proposes and evaluates feasible mitigation activities for Mount Kisco, which meet identified goals and objectives and mitigate the identified hazards based on priorities, costs and benefits. The Village of Mount Kisco will coordinate with any future multi-jurisdictional plan prepared by Westchester County.

1.A.1 Mount Kisco Background Information

The Village of Mount Kisco, New York was incorporated as a Village in 1875 within portions of the Town of Bedford and New Castle in Westchester County. In 1978 the Village became a Town in its own right forming a single jurisdiction. Mount Kisco is a community that is both a village and a town in Westchester County, New York.
(http://en.wikipedia.org/wiki/Mount_Kisco,_New_York) Since the Village and Town of Mount Kisco are coterminous, the Village is understood to include the Town. The Village of Mount Kisco is located in north central Westchester County at 41.199927 North Latitude and 73.718035 West Longitude. (US Census, 2010)

The Village is bounded on the west by the Town of New Castle and on the east by the Town of Bedford. (See Figure 1-1) The Village has a land area of 3.1 square miles (8.1 km^2) with an elevation of 302 ft (92 m). About 611 acres consists of open space and 30.8% of the land is Municipality. (See Table 1-1) (Westchester Co. Dept. of Planning, 2010.) The population density of the Village is about 5,370/sq. mi.

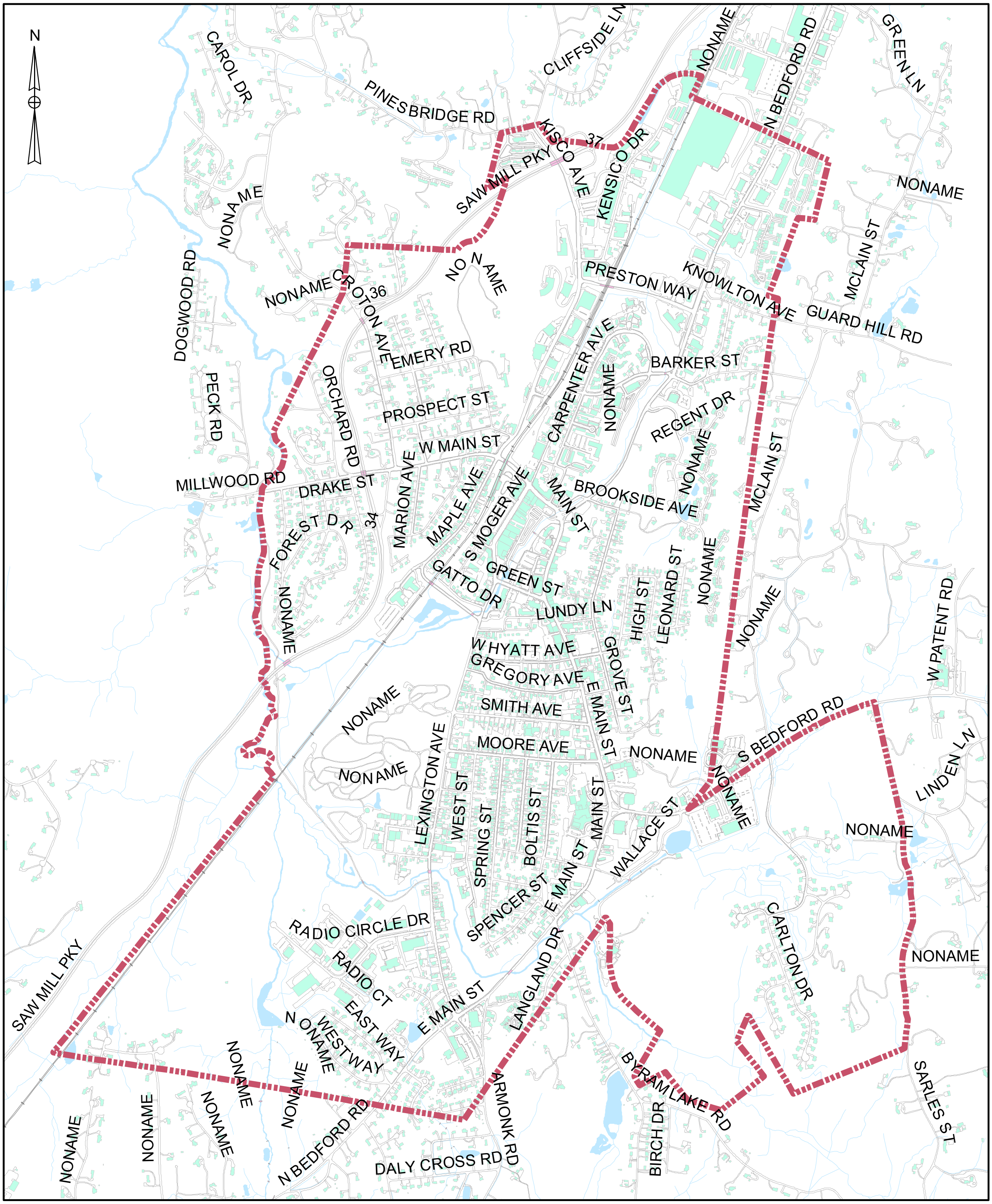


Figure 1-1
Village of Mount Kisco Boundary

Legend

Municipal Boundaries

ETG
Environmental Technology Group, Inc.
300 WHEELER ROAD, SUITE 307, HAUPPAUGE, NEW YORK 11788

Incorporated Village/Town of Mount Kisco
Multi-Hazard Mitigation Plan

0 1,000 2,000 3,000 4,000 Feet

DWN BY: YS
CHK BY: JB
SCALE: AS SHOWN
DATE: 02/11/13

Basemap Information by Westchester County GIS

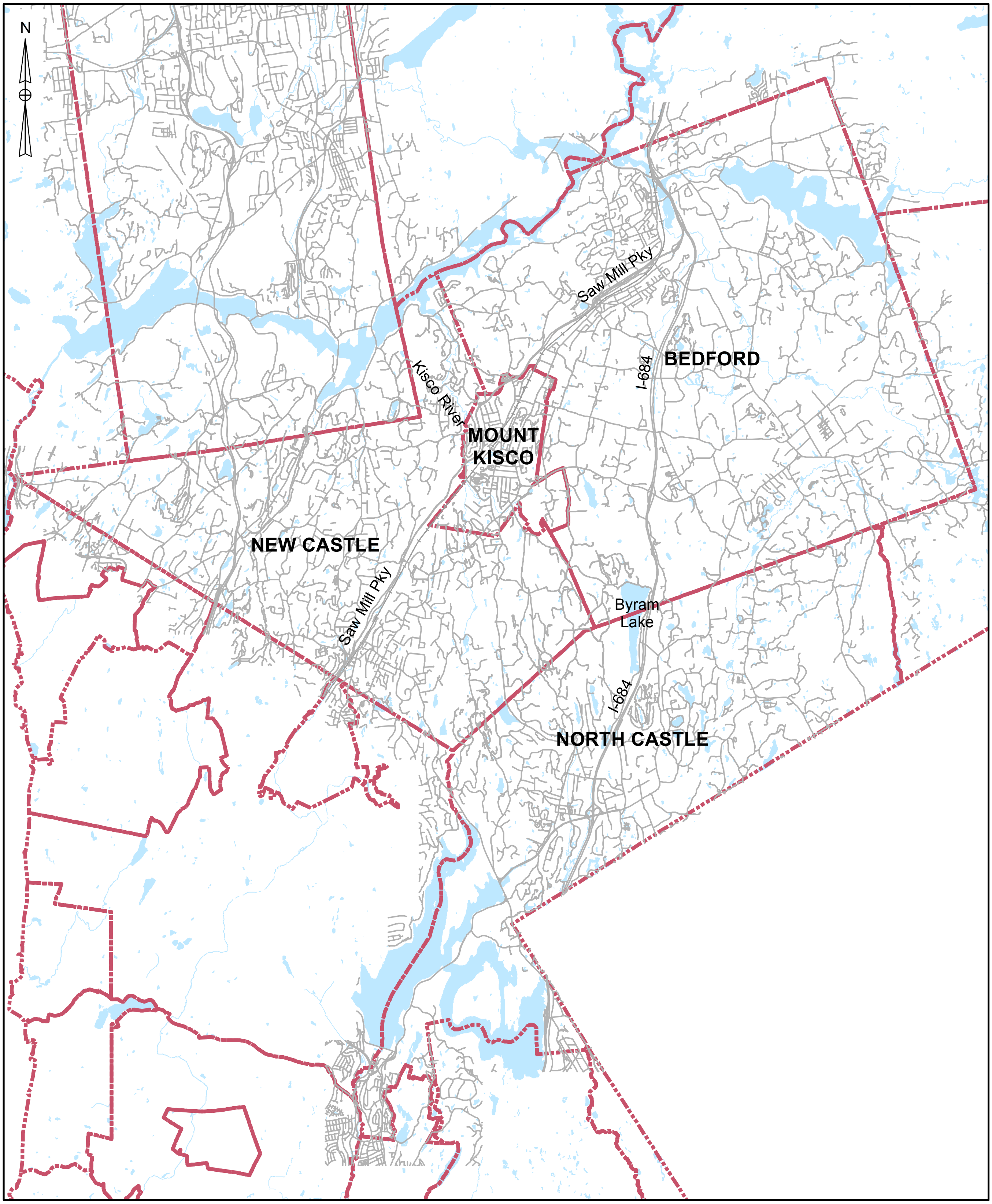


Figure 1-2
Village of Mount Kisco & Surrounding Area

ETG
Environmental Technology Group, Inc.
300 WHEELER ROAD, SUITE 307, HAUPPAUGE, NEW YORK 11788

Incorporated Village/Town of Mount Kisco
Multi-Hazard Mitigation Plan

0 7,500 15,000 22,500 30,000 Feet

Basemap Information by Westchester County GIS

DWN BY: YS
CHK BY: JB
SCALE: AS SHOWN
DATE: 01/31/13

Table 1-1. Mount Kisco Open Space Acreage

Total Open Space Acres	Municipal Acreage	Percent Municipality	State Park Acres	Local Parks Acres
6 11	1,980	30.8%	55	121

Source: - Westchester County Department of Planning, 2010. Databook.

Mount Kisco has a temperate coastal climate with an average high July temperature of 82 degrees Fahrenheit. The average minimum temperature in January is 34 degrees. The highest and lowest recorded temperature since 1948 in White Plains was 102 degrees in 1966 and minus 10 degrees in 1961 and 1979. The average annual rainfall is 51.3 inches.

1.A.2 Demographics

The population was 16,638 in the 2010 census with a population density of 5,370/mi^2. (Table 1-2), US Census Bureau, 2010.) The Village population increased 8.55% from 15,327 in 2000 to 16,638 in the 2010 census. There were 5,956 occupied housing units in the Village and the average income was $79,084. The racial makeup of the Village in 2010 was 77.2% White, 3.8% Black or African American, 0.5% Native American, 4.5 % Asian, 12.5% from other races. A sizeable population of 4,087 Hispanics reside in the Village.

The Village is largely a residential and a commuter community. A number of small businesses, retail stores, financial facilities and medical offices are located in the downtown area. Mount Kisco is socioeconomically diverse with most residents being middle to upper middle class professionals.

Table 1-2 Mount Kisco Demographics.

Total Population	Population Density	White	African American	Asian	Hispanic	Average Households	Average Income .
16,638	*5,370*	*13,320*	*763*	*875*	*4,087*	*5,956*	*$79,084*

(US Census, 2010)

1.A.3 Characteristics of Mount Kisco

The main commercial area in Mount Kisco is Main Street and South Moger Avenue which is often referred to as Shoppers Park. The Village is home to a number of residential neighborhoods, each with its own characteristics. Today the Village of Mount Kisco serves as a commuter's home for individuals working in southern Westchester County and Manhattan.

Housing is a varied mix of apartment buildings, co-ops, condominiums, townhouses, typical suburban homes, historic Colonials and Victorians and large estates. Commercially, many of the Village shops and restaurants cater to an affluent clientele. Shops include boutiques, luxury jewelers, home décor, and trendy eateries. National chain stores such as Target, Gap, Staples and others are located in Mount Kisco.

Interstate 684, a major highway about 2.5 miles east of the village, connects the northeast region from New York City to Boston via I-84 at Brewster, NY. The Saw Mill River Parkway extends from the Bronx northeast through Mount Kisco terminating at I-684 5 miles north of the Village center. The Parkway prohibits commercial traffic but I-684 is busy commercial transportation route for the region. The Metro-North Railroad runs from New York City, north/south through the center of the Village and terminates north at Wassaic NY.

The Village's hilly terrain slopes upward from 300 to 500 feet above sea level at the railroad station (see Figure 4-1**).** Elevations are about 360 feet above sea level on the southern boundary. The Branch Brook, which runs through the center of the Village joins the Kisco River to the south and west of the Village. This stream contributes to frequent flooding in the Village. Drainage from the Village also flows into the wetlands to the west.

The Village receives its water from Byram Lake Reservoir which is owned and operated by the Village of Mount Kisco (see Figure 1-2). It is about 2.1 miles south of the Village and lies within the Towns of Bedford and North Castle. The Water Department provides potable water from this reservoir to Mount Kisco.

1.A.4 Village/Town Government

The coterminous Village/Town of Mount Kisco is governed by a Mayor and four trustees (one of whom is appointed Deputy Mayor by the Mayor at the beginning of each term). They are responsible for government administration, budget approval and taxes, appointing Village/Town officials and specialized board members and act as Mount Kisco's Board of Police Commissioners. The current Mayor is J. Michael Cindrich. The current Deputy Mayor is George Griffin. The other Trustees are George L. Griffin, Peter Grunthal and Anthony C. Markus.

The Village operates under a Council-Manager form of government, where the elected Mayor and Trustees set Village policy and the full-time Village Manager oversees the day-to-day operations of the Village. (See Figure 1-3.) The Manager also carries out the policies and directives enacted by the Board. The Village administration is responsible for departmental services which include fire and police protection, public works, snow removal, street and sewer repair and park maintenance. Services also include parking, building permits, zoning and planning issues and code enforcement. The Village Department of Public Works performs solid waste collection and recycling. Figure 1-3 shows the organization and services of the Village.

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 1-3.) These include budget, traffic, master planning, planning, parks and recreation. Several of these boards may be active in implementing this Hazard Mitigation Plan.

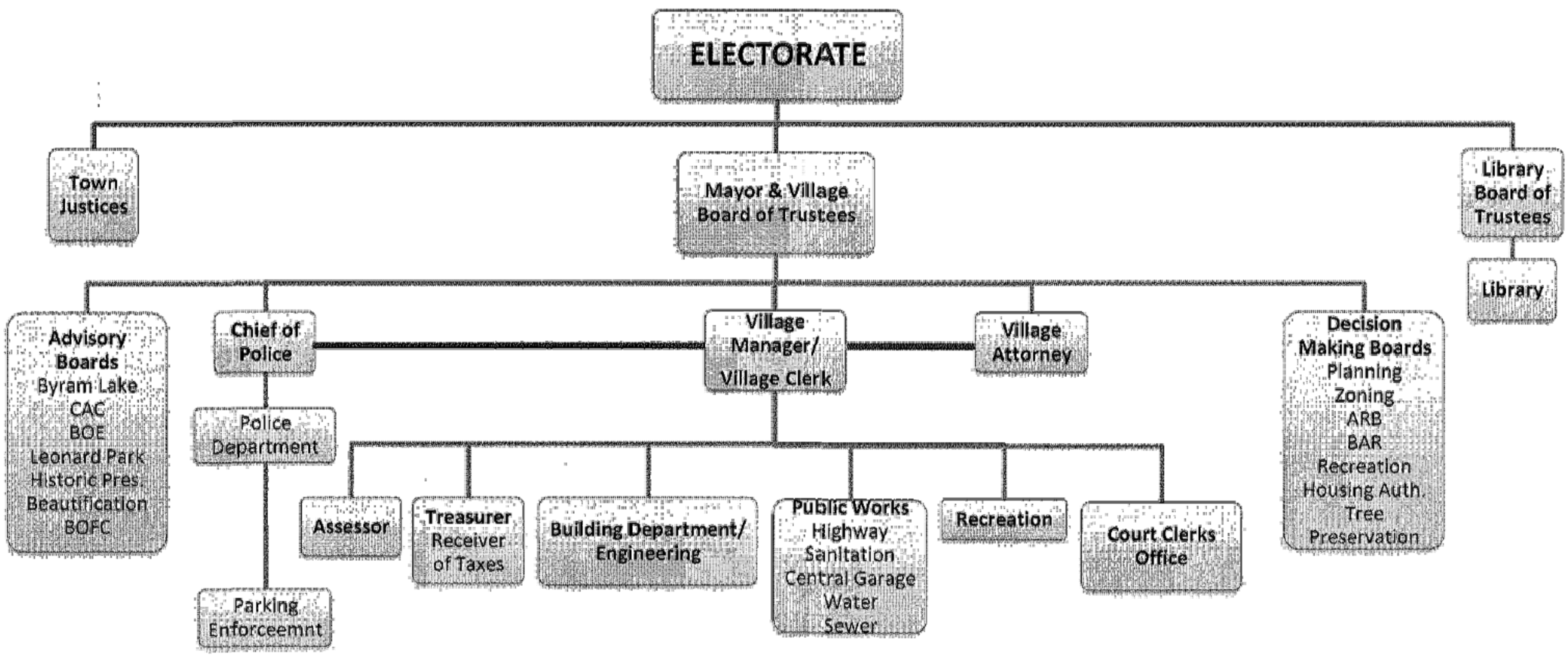
1.A.5 Village/Town Services

Emergency Services

The Village has separate services for Police Department, Fire Department and Ambulance Corps.

Fire and Rescue Services: The Village of Mount Kisco is protected by an all-volunteer Fire Department that operates out of four Fire companies serving Mount Kisco and portions of New Castle and Bedford. The four member companies each have their own set of line officers

Village/ Town of Mount Kisco Organizational Chart



ETG Environmental Technology Group, Inc. 300 WHEELER ROAD, SUITE 307, HAUPPAUGE, NEW YORK 11788	Project Name Incorporated Village/Town of Mount Kisco Multi-Hazard Mitigation Plan	Figure Title Organizational Chart	Figure 1-3 DWN BY: AJZ CHK BY: JB SCALE: AS SHOWN DATE: 04/10/13

and administrative officers. The companies: Union Hook & Ladder Co. No. 1, Mutual Engine & Hose Co. No. 1; Independent Fire Company; and Rescue Fire Police operate out of three fire stations with 200 volunteers. The Independent Fire Company has approximately 65 members. The Department operates with four engines, two aerials, two rescues, one utility truck and four chief's vehicles and responds to approximately 600 fire emergencies a year.

The Mount Kisco Volunteer Fire Department covers approximately 3 square miles, half of which is in Mount Kisco proper, and the other half in sections of the Towns of New Castle and Bedford. The Fire Department protects a population of approximately 18,000 people. There is one engine company for the north side of town and one engine company for the south side. The ladder company and rescue company are located in the center. The type of fire alarm and location dictate which companies respond. The Mount Kisco Volunteer Fire Department is dispatched by 60-Control, the Westchester County Department of Emergency Services.

Mount Kisco Volunteer Ambulance Corps: This emergency service is located at 310 Lexington Avenue. It provides medical and emergency assistance to all Village residents and neighboring towns. It is staffed by a dedicated group of volunteers. The volunteers include trained drivers, Emergency Medical Technicians (EMT's) and administrative staff.

Mount Kisco Police Department: The police play an integral role in maintaining order in the Village. The Mount Kisco Police Department is run by a Chief and is comprised of 4 Lieutenants, 5 Sergeants, 3 Detectives and 20 Patrol Officers.

1.B Plan Requirements and Supervision

1.B.1 FEMA Requirements

The Federal Emergency Management Administration (FEMA) requires municipalities to compile a structured hazard mitigation plan to qualify for several 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. The Village is required to prepare a Multi-hazard Mitigation Plan that meets current Federal requirements if it wishes to apply for FEMA funding. FEMA authorized funding in Fiscal Year 2011 under the Pre-Disaster Mitigation program for the Village of Mount Kisco, 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 FEMA's Hazard Mitigation Handbook, July 2012 (Draft) and FEMA regulations and guidelines, which were discussed below. 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.

This Multi-Hazard Mitigation Plan follows 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 for all probable hazards, assessing the 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 Mount Kisco 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%.

1.B.2 Planning Steps

This Plan addresses both the known past and potential future hazards and develops action items that 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

Step 3 Coordinate with other 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.

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. The Village Board of Trustees, the Mayor's Office and the Village Manager, several operating departments in the Village including the Mount Kisco Fire, Police and Public Works provided information and input for the Plan. Participating citizens, Westchester County Department of Emergency Services and the New York State Office of Emergency Management (NYSOEM) were additional resources.

Organizing the Village resources: This is a first step in the planning process. The Village's administrative staff was crucial to the organization of the Hazard Mitigation Planning Committee and in working with the consultant during the development of the Plan. The Village Manager, James Palmer, Assistant, Joseph Cerretani and the Village staff were active in coordinating resources and public involvement and providing information for the development of the Plan. Village officials, the Hazard Mitigation Planning Committee, and community participants' reviewed and commented on this Plan.

Using a standard review process FEMA evaluates and comments on the Draft Plan. These comments are resolved and incorporated into the Draft Final Plan prior to approval. The Draft Final Plan is then presented to the Village Board of Trustees for approval and acceptance and then forwarded by NYSOEM to FEMA for review and approval.

Where applicable, Geographic Information Systems (GIS) maps that identify hazard locations, critical facilities, and vulnerabilities were incorporated 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 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 were 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 provided for 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.

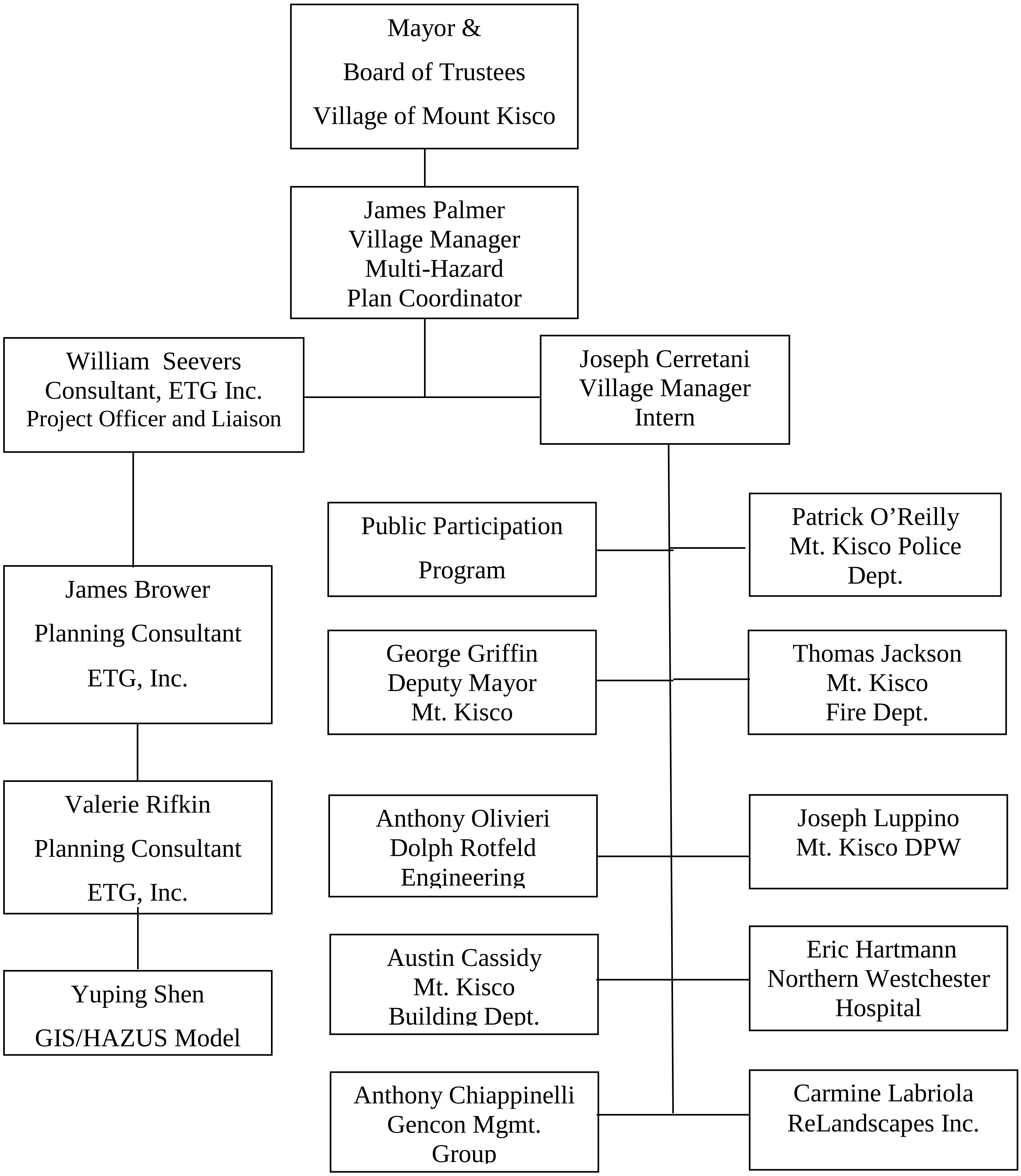
This Plan will be updated and modified by the Village according to Step 9 in Section 9. Updates will include the success of implementing the Plan's activities, availability of funds, availability of new information and changes in priorities.

1.C Supervision and Direction of the Plan

The planning process included the formation of a project team which coordinated with the Village staff (Figure 1-4). Village officials, the Planning Committee, and community participants reviewed and commented on the Plan. FEMA staff will then review and comment on the Draft Plan so that issues 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 1-4 shows the team members involved in the planning process. Key to the success of the process was the coordination of Village officials, the Consultant, stakeholders and the public.
James Palmer, the Village Manager, was the designated coordinator of the Multi-Hazard Mitigation Plan. 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 1-4. Hazard Mitigation Planning Committee and Consultants



ETG worked closely with the Manager, and his assistant, 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, assessing the hazards and in preparing several sections of the Plan. The GIS mapping, HAZUS modeling and technical assistance were provided by ETG consultant Yuping Shen.

1.D Hazard Mitigation Planning Committee

A Hazard Mitigation Planning Committee was appointed by the Village Manager to provide input, guidance, review and information needed to develop the Multi-Hazard Mitigation Plan. (See Figure 1-4) It contained key representatives of the Village who provided various services for the Village affected by the proposed plan. James Palmer 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. Joseph Cerretani, the Village Manager Assistant 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. The viewpoints of the Committee regarding hazards of concern and mitigation needs have been solicited through formal meetings. The Committee met frequently during the preparation of the plan to discuss the progress of the Plan and to provide input into the process (see Table 1-4). 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 and 7 of the Plan. The committee included a diverse group representing different services in the Village.

The Hazard Mitigation 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.E 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 Mount Kisco website: http://www.mountkisco.org/Pages/index provided a good resource for public involvement. The community 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.

1.F Planning Activities

A kickoff meeting to plan and organize the process was held with Village Manager and staff on July 9, 2012 at the Mount Kisco Village Hall. Figure 1-4 shows the staffing used for the developing the Plan. Supervision and direction of the process is discussed in Section 1B below. Table 1-3 lists 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
- Regular meetings and discussions with the Hazard Mitigation Committee,
- Review, comment of the Plan by the Village community

- Review and approval by the Village /Town Board of Trustees
- 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 Development Plans
- 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
- Federal Disaster Mitigation Act of 2000
- New York State Hazard Mitigation Plan
- FEMA "How-to Guide" (FEMA 386)
- FEMA “Local Mitigation Planning Handbook” July 3, 2012
- National Weather Service Information
- USGS Information

Table 1-3 Key Activities, Meetings and Milestones.

Date	Event	Key Participants
	Board of Trustees authorize the plan	Village Board of Trustees
6/18/2012	Award consultant contract	Village Board of Trustees, Village Mgmt.[1]
7/9/2012	Project initiation and kickoff meeting with Village representatives	Village Mgmt., Consultant[2]
8/23/2012	1st Committee meeting project review, hazards HAZNY analysis	Village Mgmt., Consultant, Committee[3]
9/27/2012	2nd Committee meeting review of goals and objectives	Village Mgmt., Consultant, Committee
10/22/2012	1st Public Meeting. briefing on hazards and plan process	Village Board of Trustees, Consultant, Public[4]
12/12/2012	3th Committee meeting – review of mitigation measures	Village Mgmt., Consultant, Committee
2/14/2013	Submit 1st Draft for Committee review	Village Mgmt., Committee
3/28/2013	4th Committee Meeting – review comments on Draft Plan	Village Mgmt., Consultant, Committee
	5th Committee Meeting – review	Consultant
	Submit Draft Plan to NYSOEM /review and comment by FEMA	Village Mgmt.
	Respond to FEMA Crosswalk comments	FEMA, Consultant
	Begin 30-day Public Review Period	Public, Participating Partners[5]
	2nd Public meeting, Draft Plan Presentation	Village Board of Trustees, Public
	Close of Public Comment period	Public
	Resolve FEMA and Public Comments	Village Mgmt., Consultant, FEMA
	Incorporate all Final Comments in Plan	Consultant
	Adoption of Plan by Village Board	Village Board of Trustees
	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 Mount Kisco Hazard Mitigation Committee. **4.** Public - Village of Mount Kisco residents. **5.** Participating Partners – Organizations having an interest in the Plan.

1.G Formal Community Process and Approval

The preparation of this Multi-Hazard Mitigation Plan is backed by a formal community process and approval. Major stage of planning are reviewed, documented, authorized and approved by the local government Board of Trustees and FEMA. This process and approval includes authorization and funding of the plan development, selection and approval of a consultant to prepare the plan, approval of the draft and final plan by FEMA and the Village/Town Board of Trustees, and documentation of public meetings.

A Mount Kisco resolution was offered and officially authorized the acceptance of a proposal for preparation of a Pre-Disaster Hazard Mitigation Plan on 2012 and establishment of a committee to complete the project. The Hazard Mitigation Committee, consisting of Village staff, interested parties and the planning consultant (Figure 1-4) 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 FEMA, the Village/Town Board 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 and issues have been resolved and for approval of the Plan.

At the Mount Kisco Village/Town Board of Trustees Meeting 6/18/2012 the Board approved the awarding of the contract for the preparation of the All Hazard Mitigation Plan to the Environmental Technology Group, Inc. (ETG).

Section 2 – Public Involvement and Outreach

The community in Mount Kisco Village was invited to participate in the process of developing this Multi-Hazard Mitigation Plan through invitations in newspaper and website notices and postings around the Village. They were asked to provide comments at meetings, in letters and emails (See Appendix). A draft of this Plan was made available to the public at the Village Hall, Village Library and on the Village website. A list of all public and committee meetings and other key activities of this plan were given in Table 1-3 in Section 1. (See Appendix for additional details.) Public meetings are held in conjunction with the Village Board of Trustees meetings.

2.A Public Meetings

A public meeting was held in the Village Hall meeting 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 October 3, 2012 announcing the first meeting which was held on October 22, 2012 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 comments and questions were presented by the Village Board to the consultant. A second meeting (is to be) held April 15, 2013 to present the Draft Plan for their review and comment. The purpose of the second meeting is to summarize the Draft Plan, obtain public input and comment, and present the next steps in the planning and approval process.

104 Main Street, Mount Kisco, NY 10549
ph: 914-241-0500
fx: 914-241-9018
webmaster@ mountkisco.org

Village/Town of Mount Kisco

Pre-Disaster Hazard Mitigation Plan Public Meeting 10/22/2012@ 7:30 pm

Village/Town of Mount Kisco

Notice of Public Meeting
To Solicit Public Input
For the preparation of a
Pre-Disaster Hazard Mitigation Plan (PDHMP)
For the Village of Mount Kisco, NY
Date:10/22/2012
Time: 7:30 PM
Place: Village Hall Board Room

All interested residents are invited to attend a Public Meeting hosted by the Village of Mount Kisco 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 Mount Kisco.

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 $75,000. Additional administrative oversight and technical assistance is being provided by the NYS Division of Homeland Security & Emergency Services, Office of Emergency Management (NYSOEM), 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 Mount Kisco community. A second Public Meeting will be held later next 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) 864-0001.

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. Printed notices were posted in (7) seven public places in the Village. A notice and meeting summary was also put on the Village Web Page. See the website at (www.mountkisco.org/pages/index).

In order to facilitate coordination and communication between the Hazard Mitigation Planning Committee and Mount Kisco 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:

- The Village has created a page on its website devoted to the Multi-Hazard Mitigation Plan to inform residents about the project and allow for direct input.
- A press release, notifying the community about a public meeting on October 22, 2012 was published in the Journal News on 10/04/2012 in Mount Kisco and surrounding communities.
- A summary of the first public meeting was posted to the Mount Kisco website (www.mountkisco.org/pages/index) following the October meeting.
- On 4/15/2013, the Draft Plan was posted to the Mount Kisco website. (www.mountkisco.org/pages/index)
- A press release notifying the community about the second public meeting on April 15, 2013 was sent to Journal News on March 28, 2013.
- A formal opportunity for public comment will be provided for the Draft Plan that will be submitted to NYSOEM and FEMA. A 30 day review period for the Plan will be provided for public comment.

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.

Although there wasn't a plan to review at the first public meeting, the consultant explained that the Village is seeking input from residents about potential hazards the villagers face and 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. The meeting was covered by the local press. The primary hazard of concern is frequent flooding in various areas of the Village. (See Section 4.D in this Plan.) The public was invited to review and comment on the Draft Plan. Many concerns and comments are expected by the end of public review period.

Once the document is complete, it is transmitted to NYSOEM for review and comment by FEMA. Though the planning procedure officially requires a specific 30-day comment period, feedback was continually sought and welcomed from the public. Through public outreach the Village will get ideas from people who have been impacted by these hazards. Anyone wishing to submit comments to the Village could call (914) 864-0001, submit a letter or email to either the assistant manager or the Village Manager.

Section 3 - Coordination 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 and Participating Partners

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.

<u>Federal Agencies</u>

- 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 and Participating Interests.

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	Village/Town of Mount Kisco	Consolidated Edison
U.S. Army Corps of Engineers (USACE)	NYS Dept. of Transportation (NYSDOT)	Westchester County Dept. Emergency Management	Town of New Castle	Verizon and other Communication Companies
U.S. Environmental Protection Agency (USEPA)	NYS Department of Environmental Conservation (NYSDEC)	Westchester County Dept. of Planning	Town of Bedford	
National Oceanographic and Atmospheric Administration (NOAA)	Hudson River Valley Greenway	Westchester County Dept. Public Works	Town of North Castle	Metro-North Rail Road
U.S. Geological Survey (USGS)	State Elected Officials	County Elected Officials		
Federal Elected Representatives	NY State Department of State (NYSDOS)	Mount Kisco School District		
National Flood Insurance Program (NFIP), FEMA, Region 2, New York		Mount Kisco Chamber of Commerce		

- 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 Mount Kisco's Branch Brook, Kisco River, Byram Lake 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 Mount Kisco will be requested formally to seek Federal Funds for flooding problems in the Village.

<u>New York State Agencies</u>

- 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 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.
- 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 Mount Kisco 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.

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:

- Town of New Castle
- Town of Bedford

- Town of North Castle

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.
- Metro-North Rail Road – Provides commuter rail service to Mount Kisco residents. They would review and coordinate any plan activities or hazards that could affect rail service.
- Northern Westchester County Hospital

3.B Representative Agency Contacts

Interested parties were invited to review and comment on the Plan, which was posted on the Village Website: www.mountkisco.org/pages/index

Contacts were made with organization representatives to discuss hazards and mitigation measures relevant to the Village of Mount Kisco. 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 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
- Mount Kisco Village Web Site, http://www.village.Mount Kisco.ny.us/Pages/index
- Feasibility Report - Flood Control Mount Kisco & Kisco Rivers – October 1977
- Emergency Action Plan Mount Kisco Reservoir Dam – August 2010
- U.S. Census Bureau, 2010. Profile of General Demographic Characteristics, Mount Kisco, New York. http://factfinder.census.gov/
- Flood Insurance Study, Village of Mount Kisco, 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 NYSOEM 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 Mount Kisco website.

These invitations included:

- Town of Mount Kisco
- Mount Kisco School District
- Mount Kisco Chamber of Commerce
- Westchester County Planning Department

To date no specific comments were received from other parties that required significant changes or additions to this Plan.

Section 4 Assessing the Hazard

4.A Introduction and Background

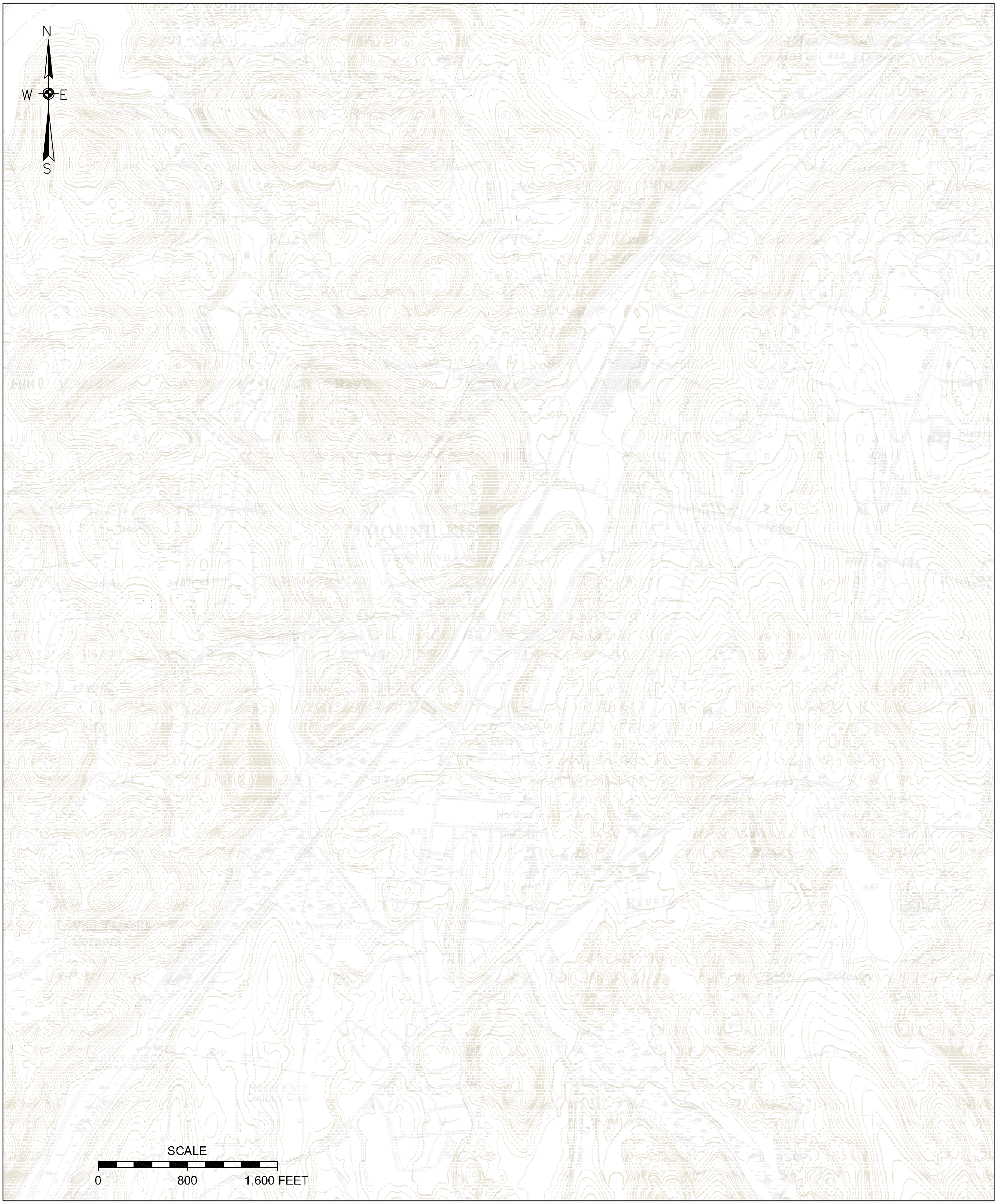
The Village of Mount Kisco is a community located in Northern Westchester County with a population of about 10,877 people recorded in the 2010 U.S. Census. The Village of Mount Kisco was originally incorporated in 1875, divided between the surrounding towns of New Castle and Bedford. It then became a coterminous and independent Village in 1978.

Mount Kisco 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, 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.)



Environmental Technology Group, Inc.

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

Project Name	Figure Title	Figure 4-1
Incorporated Village/Town of Mount Kisco Multi-Hazard Mitigation Plan	Topographic Map Incorporated Village/Town of Mount Kisco	DWN BY: AJZ CHK BY: JB SCALE: AS SHOWN DATE: 02/12/13

A list of potential hazards was prepared and reviewed with the Hazard Mitigation Committee. 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,

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 (NYSOEM) recommends that the HAZNY analysis program be used as a tool to review and assess the hazards. The American Red Cross together with NYSOEM 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 definitions of abbreviations and acronyms see Section 12 Acronyms and Glossary. For additional sources and detailed citations see Section 11, References Cited. These sources include:

Hazard Mitigation Planning Committee
Public meeting with residents
Village of Mount Kisco Officials
Local newspaper articles
Village of Mount Kisco website www.mountkisco.org
Documents, plans and Engineering reports supplied by the Village
New York State Standard Multi Hazard Mitigation Plan 2011 www.dhes.ny.gov
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 Building 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), Local Mitigation Plan Review Guide (FEMA, 2011), 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 Mount Kisco and surrounding area. Historic FEMA disaster declarations for New York State are listed below in Table 4-1. Tables 4-2 and 4-4 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 4-3. Knowledge and experience of local officials and the Hazard Mitigation Planning Committee aided the analyses and assessments made by the consultant. The consultant guided the Committee through the hazard assessment process during the period August through December, 2012.

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

Year	Date	Disaster Types	Active	Disaster Number
2012	10/30	Hurricane Sandy	Yes	4085
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	Yes	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 4-1. 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 4-2. Initial Screening of Potential Hazards.

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

* A frequent or regular event. May occur more than once in 7 years to several times a year.
** Nor'Easter storm

Table 4-3. 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 NYSOEM 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 4-4. 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
Severe Rain and 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		
Earthquake		X
Epidemic	X	
Extreme Temperature	X	X
Technological Hazards		
Air Contamination	X	
Explosion	X	X
Fire	X	X
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 43 listed hazards, 34 were considered as possible for the region and only 15 were considered to be prevalent hazards to the community. A significant health and safety risk was associated with 20 possible hazards and 17 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:

<u>Avalanches:</u> 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 Mount Kisco 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 resolve 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 4-5 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 Mount Kisco. 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 Mount Kisco. 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 NYSOEM 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 Mount Kisco 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 Mount Kisco 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 4-4.) Several hazards such as civil unrest, epidemics, and drought 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 4-5.

Table 4-5. Summary of Hazards Scores Based on HAZNY Analysis.

	HAZNY Score Mount Kisco
High Hazard	**321-400**
Flood	324
Moderately High Hazard	**241-320**
Coastal Storm*	301
Winter Storm (Severe)	290
Utility Failure	268
Tornado	267
Windstorm	266
Hurricane	265
Water Failure	263
Severe Storm & Thunderstorm**	262
Extreme Temperatures	251
Ice Storm	250
Fire (Structure)	244
Moderately Low Hazard	**161-240**
Epidemic	239
Dam Failure	238
Explosion	233
Trans Accident	230
Hazmat (In Transit)	223
Earthquake	222
Landslide/Rockslide	221
Terrorism	217
Drought	214
Hazmat (Fixed Site)	214
Water Supply Contamination	210
Oil Spill	202
Radiological (Transit)	200
Fuel Oil Spill	198
Hailstorm	196
Sewage Spills	189
Air Contamination	187
Air Accident	185
Radiological (Fixed Site)	172
Low Hazard	**44-160**
Civil Unrest	130
Rail Accident	128

***** 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 high, moderately high, moderately low, and low hazards in Table 4-5. The detailed results of scoring for each hazard are given in the Appendix.

The most significant hazard in Table 4-5 is flooding with a High hazard ranking. (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, both of which were rated as a moderately high hazard. This may reflect the fact that few high category hurricanes hit Mount Kisco. By the time a hurricane makes landfall it is often relegated to a tropical storm. By the time Hurricane Sandy made landfall in New Jersey, it had lost its hurricane status and was a "post-tropical cyclone with hurricane force winds". (NWS National Hurricane Center. www.nch.noaa.gov). Floods were considered the most severe hazard which is caused by several types of storms such as coastal storms and severe storms/thunder storms which were rated as number two and nine in the HAZNY analysis. Coastal storms scored 301 and were rated the 2nd highest hazard (Table 4-5). 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 238 was rate as a moderately low hazard in the Table 4-5.

Winter storms ranked 3rd had a score 290. 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 Mount Kisco from the standpoint of likelihood of occurrence and prevalence. Using the HAZNY Ground Rules we scored the major risk factors for the group of Mount Kisco 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 Mount Kisco. 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 Mount Kisco Planning Committee and the consultants will use as an important tool of the planning process.

Detailed hazard profiles are presented below for the high hazard of flooding, and for ten moderately high hazards listed in Table 4-5 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)
- Tropical Storms (Section 4.D.3.1)
- Coastal Storms (Section 4.D.3.2)
- Severe Winter Storms (Section 4.D.4.1)
- Utility Failures (Section 4.D.6.1)
- Tornadoes (Section4.D.3.4)
- Wind Storms (Section 4.D.3.5)
- Severe Storm and Thunderstorms (Section 4.D.3.3)
- Extreme Temperatures (Section 4.D.5.4)
- Ice Storms (Section 4.D.4.2)
- Fire (Section 4.D.6.7)

Other hazards considered less severe or low magnitude are described in less detail but may be reevaluated in later updates to this Plan. These hazard profiles include summarized 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 Mount Kisco at several locations shown on Figures 4-2, and 5-2. Floods may cover large areas of several streets, brooks, streams, rivers, parks, and parking fields. Floods of several feet deep have occurred following rain events. A major flood occurred on June 23, 2011. (See Figure 4-3). The most recent major flood was caused by Tropical Storm Irene on August 28, 2011 (See Figure 4-4) 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, families, and businesses have been impacted with flooded basements, stores, and impassible streets and highways. Details of the flood hazards in Mount Kisco are given below.

Sources of information on floods are included in Section 11, References Cited: Conversations with residents, Local media articles; The Examiner News, Chappaqua-Mount Kisco Patch, Mount Kisco Daily Voice, The Journal News, NY Times; Documents and Engineering reports supplied by the Village, NOAA websites, FEMA website, Westchester County Flood Insurance Study.

Profile Details: Flooding is a serious problem for the Village of Mount Kisco and ranked 1st with a HAZNY score of 324. The community is crisscrossed by a number of streams, brooks, rivers, lakes, and ponds, 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 Branch Brook and the Kisco River are the 2 major rivers and streams, totaling 60,096 linear feet within Mount Kisco. There are also 6.3 acres of lakes and ponds. Properties located along the Kisco River, Branch Brook, lakes and ponds lie within the 100-year floodplain. Critical flooding occurs in these areas (See Figure 4-2). 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, $1,292,012.49 was paid out in insurance claims for flood damage in the Village of Mount between January 1, 1978 and

November 30, 2012. However, these flood insurance claims are likely underreported and actual flood damages are probably higher. This amount only covers 46 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 Mount Kisco 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.

According to the FIRM, the most critical areas for flooding in Mount Kisco are located along the Kisco River, Branch Brook, and lakes and ponds. The topography in these flood risk areas is relatively flat, with flat stream gradient, and flat gradient to storm sewers, which leads to poor drainage and high chance for flooding (Figure 4-1).

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 in the downtown area. Flat grades to storm sewers help prevent the storm drains from effectively handling accumulating water.

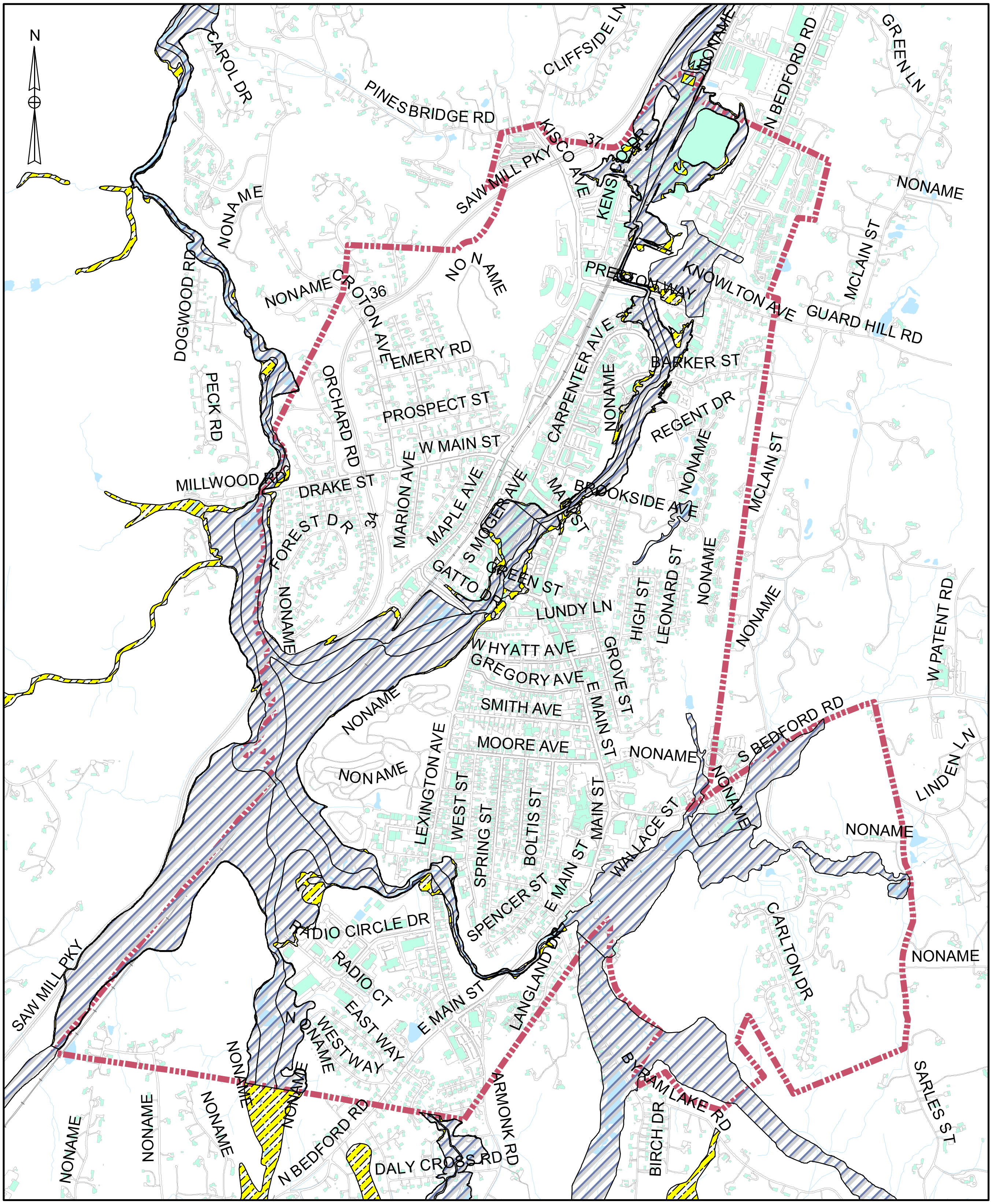


Figure 4-2
100 and 500-Year Floodplain

Incorporated Village/Town of Mount Kisco
Multi-Hazard Mitigation Plan

Legend

FEMA Flood Mapping

- 100 Year Flood Line
- 500 Year Flood Line

ETG Environmental Technology Group, Inc.

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

0 1,000 2,000 3,000 4,000 Feet

DWN BY: YS
CHK BY: JB
SCALE: AS SHOWN
DATE: 02/11/13

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 and 5-2) occur in the following locations:

- Lexington Avenue
- Gatto Drive
- South Moger Avenue
- Jeff Fiegl Square
- Green Street
- Kensico Drive
- Kisco Avenue
- Portion of Lieto Drive
- North Bedford Road (between Brookside and Barker)
- Carpenter Avenue (Lower)
- Portion of Hubbels Drive
- Portion of Preston Way
- Portion of Main Street (Vicinity of Route 117/133)
- Leonard Park
- Brook Street

Flooding has been a major issue in Mount Kisco. In 1980, the United States Army Corps of Engineers (USACE) prepared an in-depth study of flooding in Mount Kisco, and developed a HEC 2 model of the Branch Brook.

In 1983, FEMA prepared hydraulic and hydrologic analyses of the Kisco River and its tributaries. The results were published as the Flood Insurance Study (FIS) in 1986.

In 1999, following Hurricane Floyd, FEMA completed a damage assessment of the Branch Brook, entitled "Preliminary Engineering Report for the Village of Mount Kisco, Westchester County, NY".

In 2003, the USACE's "Interim Assessment Report, Section 205 Flood Control Cap" explored flood damage reduction measures for areas along Branch Brook. It's objective was to determine if these flood control measures merited federal participation. Westchester County is currently working on a countywide flood mitigation plan.

Figure 4-3. Village of Mount Kisco
Severe Street Flooding From Heavy Downpour – June 23, 2011

Flooding in Mount Kisco Village Centre Lot
Photo by Tom Auchterlonie via Chappaqua-Mount Kisco Patch

Overflowing Stream in Downtown Mount Kisco
Photo by Tom Auchterlonie via Chappaqua-Mount Kisco Patch

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

Flooding in Shoppers Park
Photo by Tom Auchterlonie, via Chappaqua-Mount Kisco Patch

Flooding in Leonard Park
Photo by Tom Auchterlonie, via Chappaqua-Mount Kisco Patch

4.D.1.4 <u>The Base Flood</u>

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 Mount Kisco runs along the Kisco River, Branch Brook, and lakes and ponds in the Village.

Properties along these waterways 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 primarily border the banks of the Kisco River and Branch Brook, and other lakes, streams, and ponds in Mount Kisco.

4.D.1.5 <u>The 500-Year Flood</u>

A 500-Year flood is a flood that has a 0.2-percent chance of being equaled or exceeded in any one year. Extensive portions of Mount Kisco lie directly within the 100-year floodplain and 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. However, these storms have been happening more frequently. 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. Hurricanes are among the most threatening and highest ranked natural disasters in the northeast. 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 can strike the Village of Mount Kisco.

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; National Center for Atmospheric Research; Accuweather website; Local papers: Journal News, NY Times, Mount Kisco Daily Voice, Chappaqua-Mount Kisco Patch, The Examiner news.

Profile Details: The flood-producing hurricane has a moderately high risk with a HAZNY score of 265. Although most hurricanes have been downgraded to tropical storms by the time they have reached Westchester County, the hazard was given a moderately high HAZNY score due to the damage they can cause. 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 Irene in 2011, Hanna in 2008, Ernesto in 2006, and Floyd in 1999, which were downgraded to tropical storms by the time they reached Westchester County. Sandy, also known as Superstorm Sandy, was not classified as a hurricane when it hit landfall on the coast of New Jersey on October 29, 2012. It was considered to be a post-tropical cyclone with hurricane force winds. This was said to occur due to the alignment of a tropical storm with an extra tropical storm.

These tropical storms will be discussed in detail in Section 4.D3.1. Figure 4-5 shows the paths of the hurricanes listed in Table 4-6 that have been tracked within 50 miles of the Village of Mount Kisco from 1861 to 2011. This map was generated from the NOAA (2012) web site http://maps.csc.noaa.gov/hurricanes/

Hurricanes are among the most threatening and highest ranked natural disasters in the northeast. 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)
- Erosion
- Public health and safety (automobile accidents, food shortages, sewage impacts)
- Economic loss (business loss, loss of employment, downtime, loss of inventory)

From 1971 until 2008 hurricanes were rated according to the Saffir-Simpson Hurricane Scale based on the intensity of the sustained wind speed, pressure, storm surge, and flooding measurements. In 2009, the U.S. National Hurricane Center switched over to the Saffir-Simpson Wind Scale, which is a categorical classification of hurricanes based on their sustained wind speed. The scale underwent minor modifications in 2012.

The scale ranges of the Saffir-Simpson Hurricane Wind Scale are from 1 to 5 as follows:

CATEGORY	
Category 1	Sustained winds 74-95 mph
Category 2	Sustained winds 96-110 mph
Category 3	Sustained winds 111-129 mph
Category 4	Sustained winds 130-156 mph
Category 5	Sustained winds greater than 156 mph

Because the Village of Mount Kisco is in the northeastern U.S., Category 5 hurricanes are considered unlikely. Although possible, no category 4 hurricanes have directly hit Westchester

County.   Mount Kisco 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.

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.

Historical Hurricane Tracks

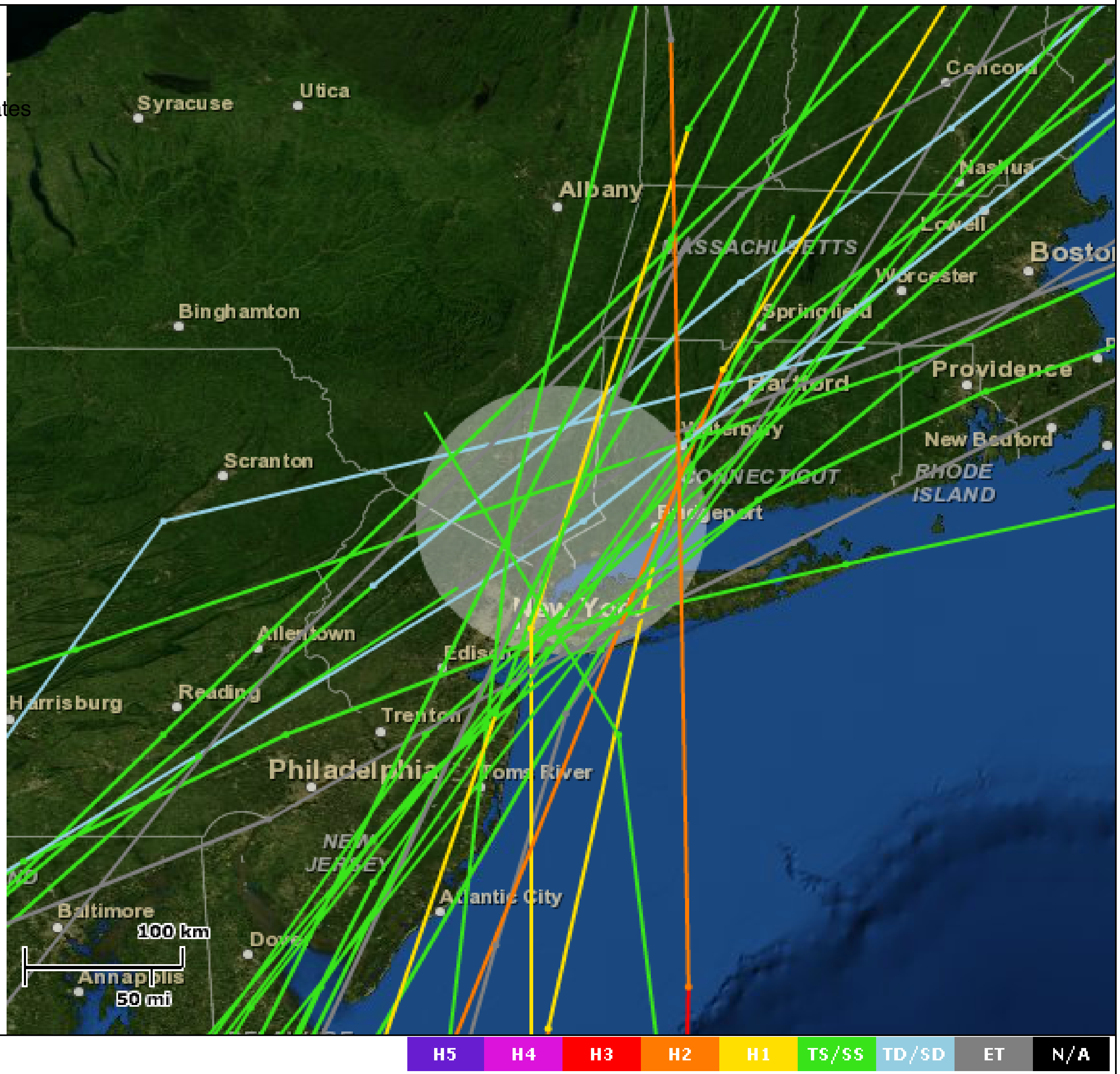
National Oceanic and Atmospheric Administration

Summary of Search:

Location: Mount Kisco, New York, United States
Buffer: 92600 Meters (50 Nautical Miles)
Search was not refined

Summary of Storms

Category	Count
Category 5 (H5)	1
Category 4 (H4)	3
Category 3 (H3)	6
Category 2 (H2)	2
Category 1 (H1)	8
Trop./Sub. Storm (TS/SS)	7
Trop./Sub. Depression (TD/SD)	0
Extratropical (ET)	1
Unknown (N/A)	0



http://www.csc.noaa.gov/hurricanes

Figure 4-5 Major Regional Hurricane Tracks

Table 4-6. Historical Hurricanes Storm tracks from 1861 - 2008 within 50 Miles of Mount Kisco, 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
NOT NAMED 1945	H4	Sep. 12, 1945 to Sep. 20, 1945
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
BERYL 1994	TS	Aug. 14, 1994 to Aug. 19, 1994
BERTHA 1996	H3	Jul. 5, 1996 to Jul. 17, 1996
FLOYD 1999	H5	Sep. 7, 1999 to Sep. 19, 1999
HANNA 2008	H1	Aug. 28, 2008 to Sep. 8, 2008
IRENE 2011	H2	Aug. 21, 2011 to Aug. 30, 2011

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

Note: *Hurricane Irene formed on August 20, 2011 and dissipated on August 30, 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. Hurricane Sandy formed on October 22, 2012 and dissipated on October 31, 2012. Its highest rank was a Category 2 Hurricane (H2). Sandy was downgraded to a post tropical cyclone with hurricane force winds before it reached Westchester County.*

4.D.2.1 Notable Northeastern Hurricanes

All of the hurricanes listed below in Table 4-7 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 4-7. 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

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

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

Note: *Not included above: Hurricane Irene (2011) has an estimated total damage of $15,800,000,000. Damage costs for Hurricane Sandy (2012) have not been totaled yet, but are estimated to be over 71,000,000,000.*

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 Mount Kisco 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 Mount Kisco has felt the effects of many tropical storms. Because of their less severe wind speeds, wind damage is less that 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, 4-3, 4-4 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: Meetings with residents; Local papers and websites, including: Journal News, NY Times, Mount Kisco Daily Voice, Chappaqua-Mount Kisco Patch, The Examiner news; Village Documents and Engineering reports; NOAA websites; FEMA website; Westchester County (All Jurisdictions) Flood Insurance Study, September 28, 2007; NYS Office of the Governor Press releases; FEMA Press releases; Con Edison 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. In Mount Kisco, several roads closed due to flooding, downed trees, and utility lines; including North Bedford Road and Green Street; and Lexington Avenue near Lieto Drive to South Moger Avenue.(DR-1296).

Tropical Storm Ernesto brought strong winds and heavy rain to Westchester County on September 2, 2006. 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.

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. The Village of Mount Kisco suffered major flooding, particularly in the core downtown area. The areas of Shoppers Park and South Moger Avenue were both almost completely flooded. Commercial businesses and retail stores were flooded. The municipal lot, Court, firehouse, and police department also flooded. Wallace Pond and a brook overflowed in Leonard Park, severely flooding the entire park, including the tennis courts, ball fields, and the Memorial Pool. Homes and retail establishments located in the vicinity of Lexington Avenue and Radio Circle suffered flooding from the low-lying areas along the Kisco River. Brook Street, North Bedford Road, and Lower Carpenter Avenue (around the Senior Center) also suffered major flooding.

Trees and power lines were also downed during Tropical Storm Irene. Wind gusts of 75–80 MPH knocked out power. Con Edison reported that the storm knocked out power to more than 3,300 customers in the Mount Kisco. An estimate of 500 people utilized the emergency shelter located in the Boys and Girls Club, which had to run on emergency generator power. (DR-4020).

Hurricane Sandy hit Westchester County on October 29, 2012. Sandy was not a typical hurricane. By the time it made landfall in the Northeast, it had become a post-tropical cyclone with hurricane force winds. Referred to as “Superstorm Sandy”, this phenomenon occurred due to the alignment of a tropical storm with an extra tropical storm.

Sandy did not produce too much rain, but the high force winds downed trees and power lines throughout Westchester County. Con Edison reported more than 206,000 customers lost power in Westchester County; 180 roads were closed in the County. In Mount Kisco, Con Edison reported more than 2,500 customers lost power. Several roads were closed due to fallen trees. The Red Cross operated the Boys and Girls Club as an emergency shelter. Once closed, they opened and operated Chappaqua Crossing as emergency shelter.

Along with widespread power outages, Sandy created logistical problems, which made it difficult to obtain and transfer fuel from the refineries and terminals to those who needed it, thus creating a gasoline shortage.

A Federal Emergency Declaration was declared for Sandy on October 28, 2012 (EM-3351) for New York State, including Westchester County. On October 30, 2012, a Major Disaster Declaration was declared (DR-4085) for parts of New York, including Westchester County.

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 Mount Kisco has felt the effects of many coastal storms. Because of their less severe wind speeds, wind damage is typically 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 Figures 4-2, 4-4, 4-5 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 coastal nor'easter storms are given in Section 11, References Cited and include: Public meetings with residents; Local papers and websites including: Journal News, NY Times, Mount Kisco Daily Voice, Chappaqua-Mount Kisco Patch, The Examiner news; Documents and Engineering reports supplied by the Village; NOAA websites; FEMA website; Westchester County (All Jurisdictions) Flood Insurance Study, September 28, 2007; NYS Office of the Governor Press releases; FEMA Press releases; Consolidated Edison 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 Mount Kisco 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 Mount Kisco 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, businesses, 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 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 6 inches of rain fell on Northern 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". (DR-1692).

The Nor'easter of March 13, 2010 brought rain and high wind gusts of up to 62 mph. Trees and power lines were downed, closed local roads, and basements flooded. A large tree was reportedly downed due to high winds across Highway 22 in Mount Kisco, closing all northbound lanes. (DR-1899).

4.D.3.3 <u>Severe Storms and Thunderstorms</u>

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 severe storms and thunderstorms are given in see Section 11, References Cited and include: Public meeting with residents; Local papers and websites including: Journal News, NY Times, Mount Kisco Daily Voice, Chappaqua-Mount Kisco Patch, The Examiner news; Documents and Engineering reports supplied by the Village; NOAA websites; FEMA website; Spatial Hazard Events and Losses Database for the United States (SHELDUS) 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 severe storms and 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, 1960 and December 31, 2011, 198 major thunderstorms were listed in the Spatial Hazard Events and Losses database (SHELDUS) 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 are described below.

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. 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 that occurred just days later on July 21, 2006, dropping over 3 inches of rain in Northern Westchester. The next day, another storm knocked out power to an additional 6,000 households. On October 29, 2006, another severe storm hit Westchester County. It's heavy rain and wind dropped more than three inches over the Mount Kisco area.

On May 16, 2007, a severe thunderstorm occurred and its heavy rains and winds took down power lines and tree limbs. The Mount Kisco area was among the hardest hit in Westchester County.

On July 1, 2008, thunderstorms and torrential rains dumped approximately 1.17 inches of rain on the Mount Kisco area in the short span of 45 minutes. Another fierce thunderstorm on July 5, 2008 dropped approximately 4.3 inches of rain in Mount Kisco. A severe thunderstorm on August 2, 2008 downed trees across the Metro North railroad tracks in Mount Kisco.

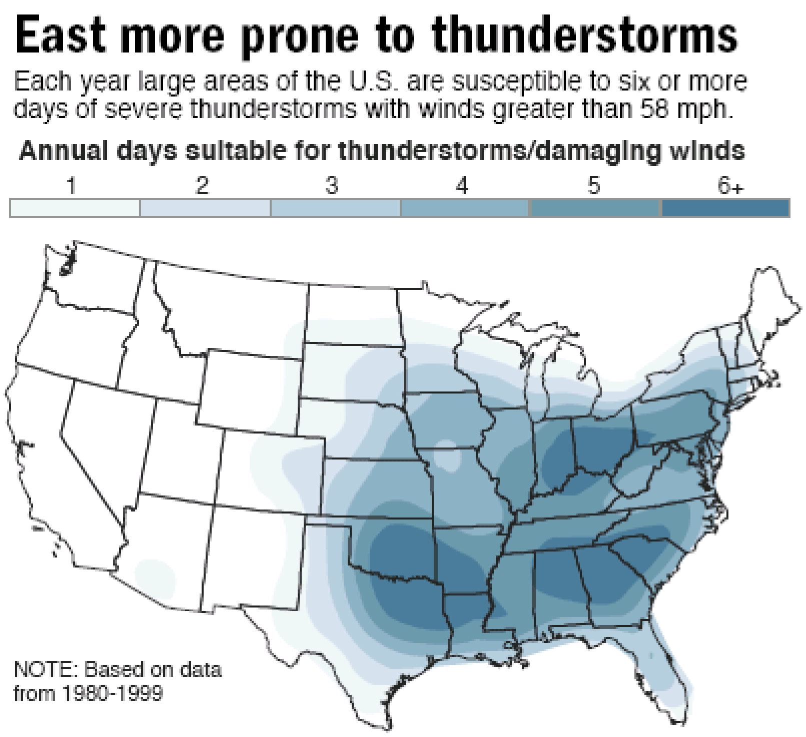
On January 25, 2010, a severe storm brought driving rain and winds, knocking down power lines at Lieto Drive and Maple Avenue. 303 Mount Kisco Customers lost power.

On August 21, 2011, a fast moving storm caused much damage in Northern Westchester. A tree fell on the Metro North railroad tracks right outside of Mount Kisco.

On September 18, 2012, a severe storm occurred in Westchester County. Heavy rainfall and high winds downed trees and damaged Metro North wires, causing extreme delays.

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 4.6 below identifies the states most prone to these severe storms, including New York State.

Figure 4-6. States Most Prone to Thunderstorms.



Source: msnbc.com, NWS

4.D.3.4 <u>Tornados</u>

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 Mount Kisco. 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 possible. Hilly terrain such as that surrounding Mount Kisco 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 Section 11, References Cited and include: Tornado History Project website; Bergen SkyWarn website; Accuweather.com; Journal News; Chappaqua-Mount Kisco Patch; 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 Mount Kisco. The database for storm events lists eight tornado events for Westchester County between 1950 and 2012 (NCDD/NOAA, 2012) with one death reported. None of the eight reported events have been in or near Mount Kisco. 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).

There have been no occurrences of tornadoes in Westchester County since 2006, despite several tornado warnings. The last warning was as recent as September 2012.

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.D.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 <u>Wind Storms</u>

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.

Many notable wind events have crossed Mount Kisco. On May 16, 2007, winds gusted up to 70 MPH toppled trees and took down power lines. On August 2, 2008, high winds downed trees cross the Metro North railroad tracks in Mount Kisco. A large tree was downed on Highway 22 due to high winds on March 13, 2010. 60-70 MPH wind gusts downed trees and power lines on August 21, 2011. High winds downed trees and caused extensive damage across Northern Westchester on September 18, 2012.

Wind events are common in the Village of Mount Kisco 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; Local papers and websites including: Journal News, NY Times, Mount Kisco Daily Voice, Chappaqua-Mount Kisco Patch, The Examiner 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.

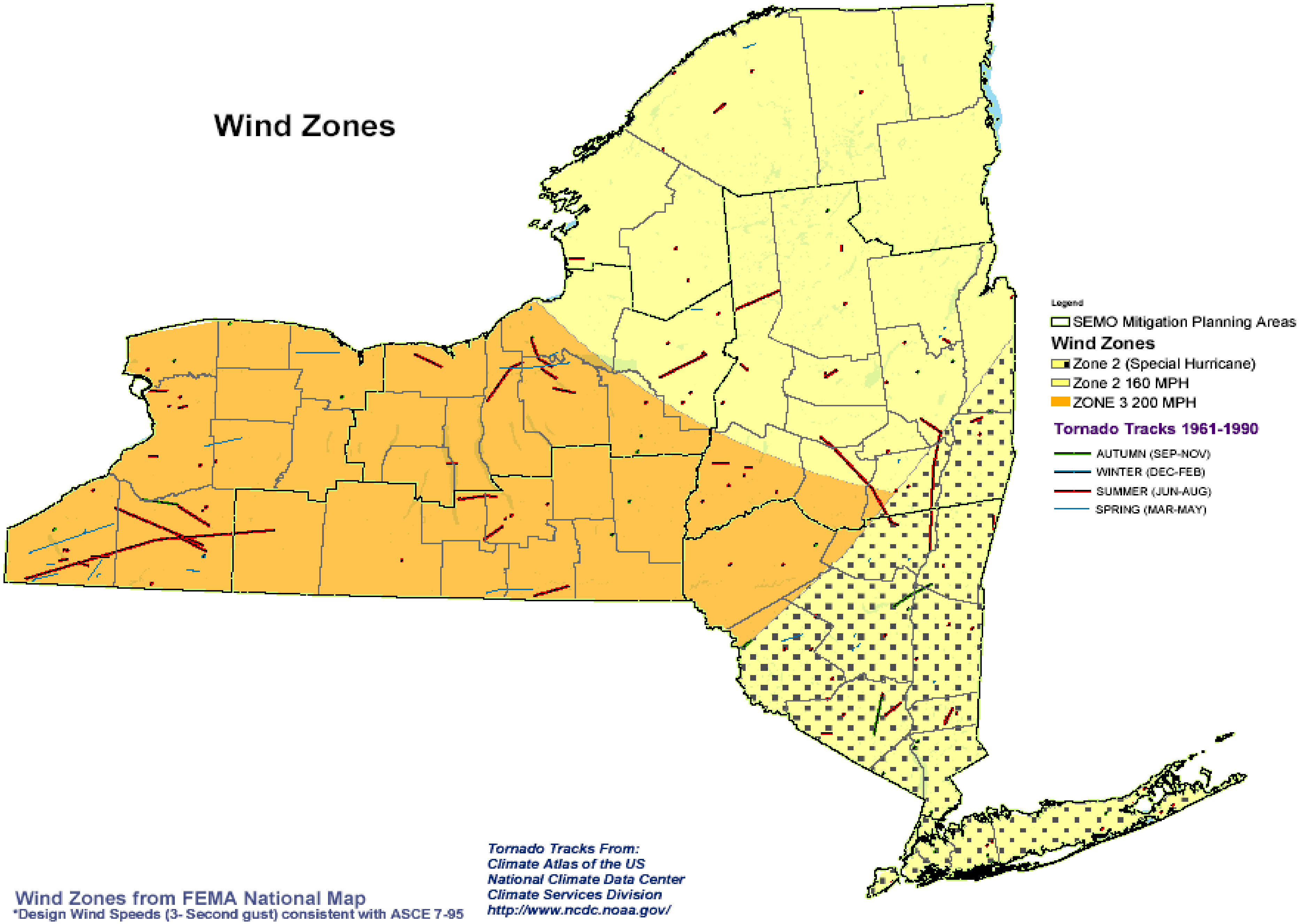


Figure 4-7

Wind Zones of New York State

4.D.4 Winter Storm Hazards

Winter weather for the Village of Mount Kisco 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 loss of life, but some have caused localized flooding.

The damage to the Village of Mount Kisco 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 <u>Snow Storms</u>

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 the 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 Mount Kisco 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, including: Journal News, NY Times, Mount Kisco Daily Voice, Chappaqua-Mount Kisco Patch, The Examiner News; NOAA websites; FEMA website; NYSCE 2006, Climate Summary, NWS Forecast Office, Significant Weather Events Archive; Spatial Hazard Events and Losses Database for the United States (SHELDUS).

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. $2.5 billion were reported in damages. These dollar amounts were adjusted to 2012 dollars by using the Consumer Price Index (CPI). (NCDC /NOAA, Billion Dollar Weather/Climate Disasters, 2012). www.ncdc.noaa.gov/oa/reports/billions (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 $8.7 billion adjusted 2012 dollars. 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. (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/Climate Disasters (NCDC/NOAA, 2012), the total impact from this event on the northeast was 187 fatalities and about $4.4 billion in total damages and adjusted 2012 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. NOAA reported accumulation of 16 to 25 inches of snowfall in Westchester County; 21.5 inches fell at Westchester Airport, and 19.5 inches fell in Mount Kisco. 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 20 inches of snow fell on the Village of Mount Kisco during the February 25-26, 2010 snowstorm. The storm also brought high wind gusts to the Village.

The Blizzard of December 26-27, 2010 dropped approximately 20 inches of snowfall on Mount Kisco. Extremely high winds knocked out power to the 23 Mount Kisco customers. (DR-1957).

During the heavy snow storm of January 26-27, 2011, 14 inches of snow fell on Mount Kisco.

4.D.4.2 Ice Storms

Hazard Summary: An ice storm is a type of winter storm that is characterized by freezing rain. The National Weather Service defines it as a storm that results in the accumulation of at least one quarter inch of ice on exposed surfaces. Ice storms frequently accompany snowstorms, blizzards, and nor'easters, and can manifest itself as hail or freezing rain. Significant accumulations of ice can knock down trees and power lines, and result in loss of power. Extreme slipping hazards are created for motorists and pedestrians.

Sources of information on ice storms are given in see Section 11, References Cited and include: Accuweather.com; Local newspapers papers and websites, including: Journal News, NY Times, Mount Kisco Daily Voice, Chappaqua-Mount Kisco Patch, The Examiner News; NOAA websites; FEMA website; NYSCE 2006, Climate Summary, NWS Forecast Office, Significant Weather Events Archive; Spatial Hazard Events and Losses Database for the United States (SHELDUS); 2011 New York State Standard Multi-Hazard Mitigation Plan; NY State Division of Homeland Security and Emergency Services, NY State Office of Emergency Management.

Profile Details: Ice storms can 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 can cause dangerous situations from fallen electrical lines and trees falling on roofs. Ice storms can be particularly severe and hazardous due to the potential slipping hazard.

There have been many ice storms in Westchester County, but there have been no presidential disasters declared for an ice storm alone, that did not accompany a blizzard, severe snowstorm, or nor'easter since 1953. According to the 2011 NY State Hazard Mitigation Plan, a vulnerability assessment was performed which indicated the New York counties most vulnerable to ice storms. Westchester County's final rating was a low score of 5 out of a possible 25.

Notable ice storm incidents have occurred in Northern Westchester County. On January 18, 2011, a winter storm brought ¼ to ½ inch of ice accumulation on top of the accompanying snow in Northern Westchester County. On February 1, 2011, an ice storm was reported that dropped up to 6/10 of an inch of ice in Northern Westchester County.

4.D.5 Other Natural Hazards

Although other natural hazards occur in the Village of Mount Kisco, only a few are of concern while most others may not be severe or prevalent events. The following two hazards were eliminated from further consideration: 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.

Byram Lake is the primary water source for more than 10,000 residents in Mount Kisco, and smaller outlying parcels in the townships of Bedford and New Castle.

The Byram Lake Dam is located in the Town of North Castle, approximately 2 miles north of Armonk, New York. The length of the dam is approximately 185 feet, with 175 feet of embankment and 10 feet of spillway. The dam is 27 feet high, and the reservoir has a normal pool capacity of 2, 909 acre-feet. (Emergency Action Plan for Byram Lake Dam, NYSDEC DAM ID#: 232-0346, Village of Mount Kisco, NY).

The Village of Mount Kisco is responsible for maintaining and making any repairs to the Dam, to ensure the integrity of the structure and surrounding area. The Dam is inspected weekly for detection and evaluation of existing conditions.

The Byram Lake Dam is an “Intermediate” sized dam, classified as “Class C” or “High Hazard” because the Hamlet of Armonk lies approximately 2 miles downstream of the Dam. The NYSDEC definition of a Class "C" or "High Hazard" dam is as follows: A dam failure may result in widespread or serious damage to home(s); damage to main highways, industrial or commercial buildings, railroads, and/or important utilities, including water supply, sewage treatment, fuel, power, cable or telephone infrastructure; or substantial environmental damage; such that the loss of human life or widespread substantial economic loss is likely.

Failure of the Byram Lake Dam would cause significant damage and flooding to the community. The Hamlet of Armonk lies approximately 2 miles downstream of the Dam. Other portions of the Township of North Castle and the Township of Greenwich, CT lie in the inundation zone.

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.

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 Mount Kisco would not be severe since it lies upstream of the dam. Approximately nine million people, including 85% of Westchester County would lose their water supply. Future event of this type is considered unlikely but with a potential for large impacts.

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

Since The Village of Mount Kisco is responsible for the safety and security of the Byram Lake Dam, further damage analysis and health and safety assessments will be discussed in Section 5.

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; Emergency Action Plan for Byram Lake Dam, NYSDEC DAM ID#: 232-0346, Village of Mount Kisco, NY.

Profile Details: Located in the Town of North Castle, the Byram Lake Dam lies approximately 2 miles north of Armonk, New York. The length of the dam is approximately 185 feet, with 175 feet of embankment and 10 feet of spillway. The dam is 27 feet high, and the reservoir has a normal pool capacity of 2, 909 acre-feet. (Emergency Action Plan for Byram Lake Dam, NYSDEC DAM ID#: 232-0346, Village of Mount Kisco, NY).

Byram Lake provides the potable water to more than 10,000 residents in Mount Kisco, and smaller outlying parcels in the townships of Bedford and New Castle.

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.

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 4-8 shows the 9 worst dam failures in U.S. history.

Table 4-8. 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 Franciscquito 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,** www.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 for the Kensico Dam 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 Mount Kisco is 3.6%. (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 Mount Kisco. 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; NYS Geological Survey (NYSGS); NYC Area Consortium for Earthquake Loss Mitigation (NYCEM); NYS Disaster Preparedness Commission (NYSDPC).

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 Mount Kisco 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 date. 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 Mount Kisco (Latitude: 41.2042N, Longitude: -73.7275W), the %g value is 3.6% (See Figure 4-8). According to the current USGS Seismic Hazard Map for the region Mount kisco 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 greater 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.

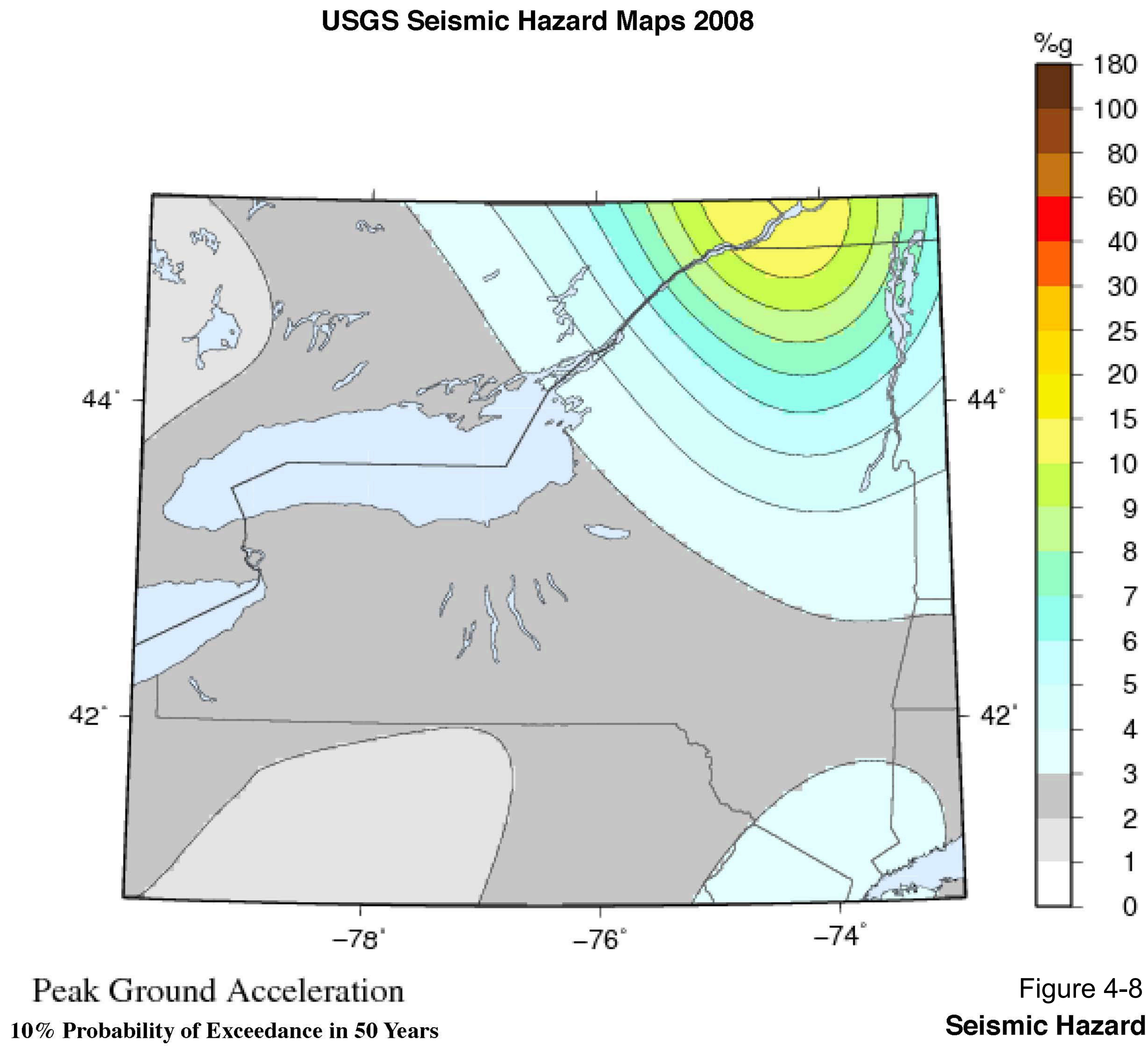


Figure 4-8
Seismic Hazard Zones in New York State

Table 4-9. Largest Earthquakes Near New York City.

DATE yr/mo/day	**TIME hh:mm: sec**	**LAT. (°N)**	**LONG. (°W)**	**LOCATION**	**MAGNITUDE Richter (ML)**	**Max. Intensity (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	Ardsley, 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 Tarry-town, 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
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 Mount Kisco. 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; Center for Disease Control Website; Local Papers; NY Times; Journal News; "The Resurgence of West Nile Virus", Annals of Internal Medicine, December 4, 2012; "West Nile Virus May Get Worse as Climate Gets Hotter", Los Angeles Times, September 10, 2012.

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 sanitary and storm sewers that could cause floods, backups, and standing water in homes and streets. This would place the residents at risk of contracting disease. 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. Deer as vectors are not common in the Village.

Epidemics, although a concern for the entire planning area, are not considered to be a prevalent or severe hazard. 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 Mount Kisco. 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 90ºF. 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 and websites: Journal News, NY Times; Climate change documents; National Climate Data Center website; Accuweather website; Westchester County Health

Department; NYSERDA website; "Responding to Climate Change in NY State", Technical Report 11-18, NYSERDA, November 2011.

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 Northern Westchester reached between 95 and 105 degrees, with heat indices in excess of 105 degrees. The heat index reached 109 degrees at Westchester County Airport on July 22, 2011. 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 90ºF. 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.

Temperatures are predicted to increase in New York State by 1.5 to 3 degrees Fahrenheit by 2020, 3.5 to 5.5 degrees Fahrenheit by 2050, and 4.5 – 8.5 degrees Fahrenheit by 2080 (NYSERDA 2011). The link between extreme temperatures and global warming will be discussed further in the Climate Change section of this Hazard Mitigation Plan.

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 <u>Drought</u>

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; National Drought Mitigation Center 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). 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.

The 2012 North American Drought brought drought conditions over much of the United States. In fact, as of September 25, 2012, the drought covered 65% of the contiguous United States. 1,692 Counties in 36 states had been declared primary natural disaster areas.

The connection between drought and global warming will be discussed in the Climate Change section of this Hazard Mitigation Plan. 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 Mount Kisco 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 through 2011 in the County. According to the USGS, the Village of Mount Kisco 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 <u>The Effect of Climate Change on Natural Hazards</u>

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 heat waves, and an increase in droughts and wildfires.

The average temperature in the Northeast has increased by more than 1.5 degrees Fahrenheit since 1970. Temperatures are predicted to increase in New York State by 1.5 to 3 degrees Fahrenheit by 2020, 3.5 to 5.5 degrees Fahrenheit by 2050, and 4.5 – 8.5 degrees Fahrenheit by 2080 (NYSERDA 2011). Winter precipitation is projected to increase by 20-30% in the Northeast by the end of the century; Sea level rise is projected to rise from between 7 inches to 2 feet by the end of the century, causing an increase in coastal flooding and damaging storm surges. (NECIA).

Rising temperatures along with little predicted change in summer rainfall is projected to increase the frequency of short-term droughts. Higher temperatures combined with increasing levels of carbon dioxide in the air can accelerate seasonal pollen production in plants, and thus extend the allergy season and increase asthma risks. It can also worsen air-quality. Increased temperatures coupled with more frequent droughts can increase the production of vector-borne diseases, such as West Nile Virus and Lyme disease. Other projected casualties of climate change include impacts to forestry, agriculture, fisheries, and dairies.

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; "Confronting Climate Change in the US Northeast – New York", NECIA. www.climatechoices.org; NYSERDA website; "Responding to Climate Change in NY State", Technical Report 11-18, NYSERDA, November 2011. www.westchester.gov; "Climate Change and Sustainability", Westchester County Website www.climatechange.westchestergov.com; "Climate Science Watch", www.climatesciencewatch.org; United States Global Change Research Program website www.globalchange.gov

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; Local papers and websites: NY Times, Journal News, Chappaqua-Mount Kisco Patch, Mount Kisco Daily Voice, The Examiner. "Report on Preparation and System Restoration Performance – Hurricane Irene", Consolidated Edison, November 14, 2011.

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. The Village is also served by New York State Electric & Gas (NYSEG). It is estimated that there are approximately 5,075 Con Edison electrical customers, and 137 NYSEG customers in the Village of Mount Kisco. 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.

The Nor'easter of March 2010 knocked out power to approximately 173,000 households in Westchester County and New York City.

Tropical Storm Irene, which occurred on August 23, 2011, reportedly knocked out power to approximately 203,821 households in Westchester County and New York City. Con Edison reported approximately 3,300 households without power in Mount Kisco.

The Blizzard of October 2011 knocked out power to approximately 71,000 customers in Westchester County. This storm also knocked out power to approximately 75% of Mount Kisco customers.

In late October 2012, Superstorm Sandy knocked out power to approximately 206,000 customers in Westchester County, affecting more than 2,500 customers in Mount Kisco.

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

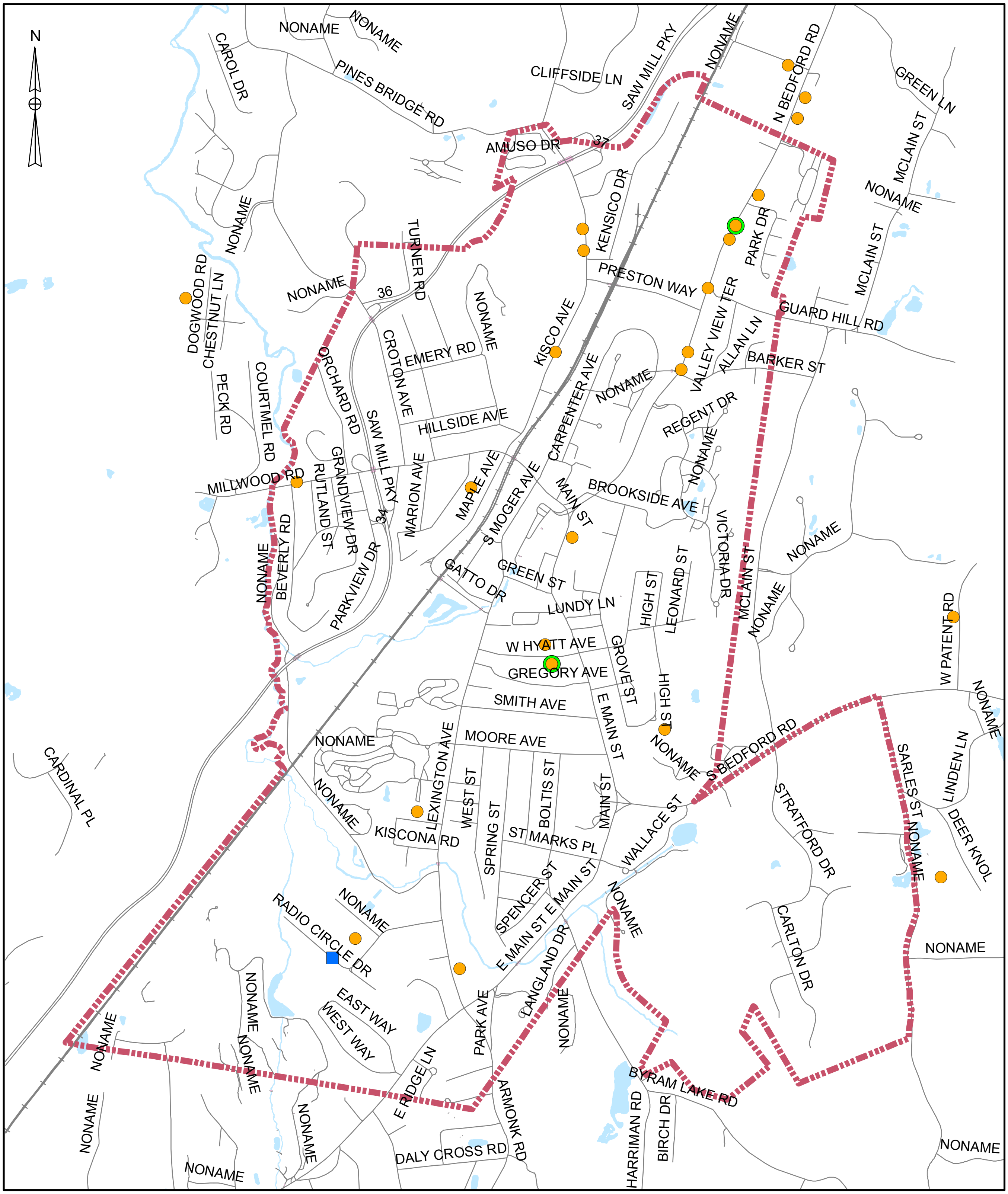
After Superstorm Sandy, New York State Governor Andrew Cuomo announced that regulators would scrutinize Con Edison's preparations for Sandy, as well as its subsequent attempts to restore power in New York City and Westchester County after the storm. No further health and safety assessments and damage analysis will be performed related to utility failures, and no mitigation measures will be proposed or evaluated.

4.D.6.2 <u>Hazardous Materials Fixed Site Releases</u>

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 commercial and industrial enterprises that require the storage of chemicals and generate hazardous wastes in the Village of Mount Kisco (See Figure 4-9). 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. There are a few larger enterprises located in the Village of Mount Kisco that would pose a greater threat to the Village, should there be a hazardous materials release incident. These sites include The Halstead-Quinn Propane tanks, the sewage pump station at Michelle Estates, and Zierick Manufacturing.

Relatively few significant releases that would affect the pubic 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 the Mount Kisco Fire Department; Westchester County GIS website; EPA Enviromapper website.



Legend

- Facility Registry System
- Hazardous Waste Generators
- Hazardous Waste Transporters
- Hazardous Waste Treat, Store, Dispose

Figure 4-9
Hazardous Materials Locations

ETG Environmental Technology Group, Inc.
300 WHEELER ROAD, SUITE 307, HAUPPAUGE, NEW YORK 11788

Incorporated Village/Town of Mount Kisco
Multi-Hazard Mitigation Plan

0 1,000 2,000 3,000 4,000 Feet

Basemap Information by Westchester County GIS

DWN BY: YS
CHK BY: JB
SCALE: AS SHOWN
DATE: 02/04/13

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 Mount Kisco. Metro-North commuter tracks run through Mount Kisco. 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. No significant releases that would affect the public and require evacuation have been reported in the Village of Mount Kisco. 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 Mount Kisco Fire Department; Conversations with Village Officials; Metro-North Website; Conrail website.

The Village of Mount Kisco 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 Explosions

Hazard Summary: According to the National Fire Protection Agency, an explosion is defined as "an effect produced by the sudden, violent expansion of gases, which can be accompanied by a shockwave or disruption, or both, of enclosing materials or structures". Chemical changes, such as rapid oxidation, deflagration, detonation, decomposition of molecules, or runaway polymerization could cause an explosion. Physical changes, such as pressure tank ruptures can also cause an explosion.

Sources of information are given in Section 11, References Cited include: Conversations with village officials, Mount Kisco Fire Department Incident Reports, National Fire Protection

Agency (NFPA) website; EPA Enviromapper website; Local newspapers: The Journal News, The Mount Kisco Daily Voice, Chappaqua-Mount Kisco Patch, The Examiner.

Profile Details: An explosion can vary in size and magnitude, from a small incident to a catastrophic failure, causing injury and loss of life, and major property damage. Explosions can occur at a number of sites in the Village of Mount Kisco, especially in locations where hazardous materials are stored. Trucks carrying hazardous materials are also most likely at risk for explosion at one of the established transportation routes that traverse the village. Metro North Commuter tracks run through Mount Kisco, and are also used by CRX to transport hazardous materials through the village. Particularly vulnerable sites that would cause extreme damage should an explosion occur include the Halstead-Quinn Propane storage facility on Hubbels Drive, or one of the multiple propane facilities, such as Suburban Propane, on Kensico Drive.

Relatively few explosions that would affect the public have been reported in the last 6 years. The risk is considered to be moderately low. No further health or 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 of chemicals from industry or transportation into the air. Air contamination events in the Village, due to local sources, are small and isolated and generally 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 moderately 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: Conversations with Village Officials; EPA Enviromapper website; Westchester County GIS website; Accuweather website.

Profile Details: The commercial and manufacturing establishments in the Village of Mount Kisco would generally 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 Mount Kisco. 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, have been small and isolated and generally 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 <u>Transportation Accidents</u>

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.

Sources of information are given in Section 11, References Cited and include: Conversations with Village Officials; local newspapers and websites: NY Times, Journal News, Chappaqua-Mount Kisco Patch, The Examiner; MKFD Incident Type Report Summary, January 1, 2007 – November 28, 2012.

Profile details: Transportation accidents can occur on any roadway in Mount Kisco. Transportation accidents occur frequently with the potential of serious injury or death, but likely not in large numbers and generally with limited public or private property loss.

The Saw Mill Parkway is the only Arterial Roadway located directly in Mount Kisco. It is a North-South State roadway that runs along the western edge of the Village. Major roads in Mount Kisco include NYS Route 172/South Bedford Road; NYS Route 117/East Main Street/North Bedford Road; NYS Route 133/West Main Street; NYS 128/Armonk Road; Lexington Avenue (county road). Collector roads in the village include Preston Way, Barker Street, Green Street, Moore Avenue, and Radio Circle.

During the period January 1, 2007 through November 28, 2012, the MKFD reported responding to 59 motor vehicle accidents with injuries, 10 motor vehicle accidents with no injuries, and 9 motor vehicle/pedestrian accidents.

4.D.6.7 <u>Fires</u>

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 of Mount Kisco. 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 high. Although most fires that have occurred are structural fires, there have been incidences of wildfire hazard or brush fires. 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 Mount Kisco Fire Department, January 1, 2007 – November 28, 2012.

The Mount Kisco Fire Department provides fire protection to residents of Mount Kisco, New Castle, and Bedford. The MKFD consists of four member companies: Mutual Engine & Hose Company Number 1 (serves the North portion of Mount Kisco), Independent Fire Company (Serves the South portion of Mount Kisco), Union Hook & Ladder Company Number 1, and Rescue Fire Police (both serving Central Mount Kisco).

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 <u>Civil Unrest</u>

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 Mount Kisco 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 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.

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 Mount Kisco. 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.

There are possible targets for terrorism located in or around the Village. The rail station in the Village of Mount Kisco is a possible target. Railroad facilities have been targets in recent years in European cities. Another target is the Byram Lake Dam, located in the township of North Castle, which serves as the primary water source to Mount Kisco and parts of Bedford and New Castle. The Town of North Castle lies in the inundation zone. The effects of failure of the Dam are discussed in section 4.D.5.1 of this report.

Another possible target is the Northern Westchester Hospital. The hospital is currently in the process of updating their Emergency Operations Plan and is said to be working with Mount Kisco Village officials to ensure Village input.

Another possible target is the Indian Point nuclear power plant. Current regulations require evacuation planning for areas located within a ten-mile radius of nuclear facilities. Mount Kisco lies outside of this planning zone. Legislators are currently urging the Nuclear Regulatory Commission (NRC) to expand the NRC evacuation plan requirements to include areas within fifty miles of a nuclear facility.

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: Conversations with Village officials; NY Times; Journal News; United States Nuclear Regulating Commission (USNRC) website www.nrc.gov.

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 have been documented in Westchester County since 1958, and they are scattered geographically. None of the 8 occurred in Mount Kisco. Although tornadoes have a moderately high hazard rating, they are also associated with other severe storm hazards, so they were not evaluated separately from other wind hazards in this plan.

Epidemic: Should an epidemic occur, it would most likely 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 in Mount Kisco. Interruption of services and businesses is limited and primarily due to electrical utility failures. Although this hazard has a moderately high hazard rating, these risks are generally related to regional problems. 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 Mount Kisco was reported from drought. Interruption of services and businesses is regional and primarily due to electrical utility failures and water shortage. Due to its 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.

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 have not resulted in significant property damage or resulted 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.

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 have been 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 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.

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 - Assessing the Impacts

5.A Introduction

The possible hazards affecting the Village of Mount Kisco 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 Mount Kisco's Multi-Hazard Committee. The primary purpose of the current section is to identify and assess Mount Kisco'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", and FEMA's Hazard Mitigation Handbook, July 2012. 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 Mount Kisco (See Section 4.B above). The Hazards New York (HAZNY) method was used as a tool to help 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 5-1 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 5-1. Summary of Hazards Scores Based on HAZNY Analysis.

	HAZNY Score Mount Kisco
High Hazard	**321-400**
Flood	324
Moderately High Hazard	**241-320**
Coastal Storm*	301
Winter Storm (Severe)	290
Utility Failure	268
Tornado	267
Windstorm	266
Hurricane	265
Water Failure	263
Severe Storm & Thunderstorm**	262
Extreme Temperatures	251
Ice Storm	250
Fire (Structure)	244
Moderately Low Hazard	**161-240**
Epidemic	239
Dam Failure	238
Explosion	233
Trans Accident	230
Hazmat (In Transit)	223
Earthquake	222
Landslide/Rockslide	221
Terrorism	217
Drought	214
Hazmat (Fixed Site)	214
Water Supply Contamination	210
Oil Spill	202
Radiological (Transit)	200
Fuel Oil Spill	198
Hailstorm	196
Sewage Spills	189
Air Contamination	187
Air Accident	185
Radiological (Fixed Site)	172
Low Hazard	**44-160**
Civil Unrest	130
Rail Accident	128

***** 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 Mount Kisco. 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 Mount Kisco is a largely built-out residential suburban community. (See Section 1.A.) Most commercial activity is located in the commercial business district, along East Main Street, South Moger Avenue, and West Main Street; in the northern section along North Bedford Road and Preston Way; near the Northern Westchester Hospital, and along Lexington Avenue. Most offices are situated along Route 172/South Bedford Road, Route 117/East Main Street, Radio Circle, Route 117/North Bedford Road, Smith Avenue, and in the Village Center. The industrial areas are concentrated around Radio Circle, in the southern section, and along Kisco Avenue, in the northern section of the Village.

Some studies have been prepared for the Village of Mount Kisco. The first Comprehensive Development Plan for Mount Kisco was published in 1958. It was reviewed, with limited updates added, in 1966, 1969, 1971, and 1987. A new Comprehensive Development Plan was prepared for the Village of Mount Kisco, and adopted on September 10, 2000.

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 5-2 provides an estimate of residential, commercial, education, recreation, government, religious, manufacturing and other buildings in the Village based on the Village of Mount Kisco tax assessments. The number of structures by property use code is listed in Table 5-2. For the most current year 2012, the predominant buildings in the Village are 1,455 single residential properties out of total 2,564 buildings. There are 292 multi-residential structures.

Commercial buildings are located in use class codes 400-486. Recent tax assessment records show a total of 740 commercial buildings. Commercial apartment buildings are also included in this class. The major concentration of commercial activity is located in the commercial business district (East Main Street, South Moger Avenue, and West Main Street), in the Northern section along North Bedford Road and Preston Way, near the Northern Westchester Hospital, and along Lexington Avenue. Most Offices are located along Route 172/South Bedford Road, Route 117/East Main Street, Radio Circle, Route 117/North Bedford Road, Smith Avenue, and in the Village center.

Recreation and Entertainment structures include entertainment and sports facilities, the movie theatre, health club, as well as Leonard Park and the Mount Kisco Country Club. Community Services include education, government, health services and religious properties.

Industrial uses are mostly clustered around Radio Circle, in the southern section, and along Kisco Avenue, in the northern section of Mount Kisco.

Table 5-2. Residential, Commercial, Industrial and other Buildings in the Village of Mount Kisco.

Property Class Code	Building Type by Property Class	Number of Buildings*
210	Single Residential	1,455
220-283	Multi-residential	292
400-486	Commercial	740
500-590	Recreation & Entertainment	10
600-615	Community Services & Education	4
620	Religious	9
640-695	Health, Government & Protection	41
710	Industrial	13
	Total	2,564

*** Data provided by the Mount Kisco Village Manager's Office.**

5.B.2 Critical Facilities

The principal critical facilities identified in the Village of Mount Kisco are given in Table 5-3a. The location of these facilities is shown in Figure 5-1. They include the Village Hall, fire and emergency response facilities, school, Byram Lake facilities, The Boys and Girls Club to be used as emergency shelter, Metro-North Railroad, the Northern Westchester Hospital, among other buildings.

Table 5-3a. Critical Facilities in The Village of Mount Kisco.

Facility Name	**Facility Function**	**Address**	**Facility Vulnerability to Hazards**
Mount Kisco Police Department	Emergency Response	40 Green Street	Interruption of police emergency services & communication. Interruption of emergency & rescue services.
Union Hook & Ladder Company #1/ Mount Kisco Rescue Fire Police	Emergency Response, Storage of Emergency Response Vehicles & Equipment.	29 Green Street	Interruption of fire emergency services. Interruption of emergency & rescue services.
Mutual Engine & Hose Company #1	Emergency Response, Storage of Emergency Response Vehicles & Equipment.	99 East Main Street	Interruption of fire emergency services. Interruption of emergency & rescue services.
Independent Fire Company	Emergency Response, Storage of Emergency Response Vehicles & Equipment.	322 Lexington Avenue	Interruption of fire emergency services. Interruption of emergency & rescue services.
MKVAC	Emergency Response, Storage of Emergency Response Vehicles & Equipment	310 Lexington Avenue	Interruption of emergency & rescue services.
Northern Westchester Hospital	Diagnostic & Treatment Health Care Services	400 Main Street	Interruption of emergency medical attention and facilities.
Mount Kisco Village Hall	Village Administrative Services	104 Main Street	Loss of Village records. Interruption of services & communication.
Boys and Girls Club of Northern Westchester	Youth Development Center	351 Main Street	Emergency Shelter
Fox Senior Center	Senior Citizen Programs	198 Carpenter Avenue	Interruption of services to vulnerable populations
Mount Kisco DPW	Emergency Response, Storage of Village Vehicles & Equipment	43 Columbus Avenue	Interruption of emergency services
Metro North Railroad Station	Metro North Commuter RR, Amtrak, CRX, Metro-North	Station Plaza	Loss of major transportation thoroughfare.
Byram Lake Facilities (Outside Municipal Boundaries): -Pump House -Filtration Plant -3,500,000 gallon water tank	Water Supply	Byram Lake	Loss of Potable water supply to entire Village
Cold Spring Sewer & Lift Station – Mt Kisco Chase	Water Supply & Sewage Treatment	Cold Spring Court & Carlton Lane	Loss of Water Supply

Facility Name	**Facility Function**	**Address**	**Facility Vulnerability to Hazards**
Chase Water Tank	Water Supply	Mount Kisco Chase	Loss of Water Supply
Radio Circle Sewer Lift Station	Water Supply & Sewage Treatment	Radio Circle	Loss of Water Supply
Hillside Avenue Water Pump Station	Water Supply	Hillside Avenue	Loss of Water Supply
Mountain Avenue Water Tank	Water Supply	Mountain Avenue	Loss of Water Supply
Woodcrest Water Pump Station	Water Supply	Woodcrest Lane	Loss of Water Supply
Saw Mill Sewer Pump Station	Water Supply & Sewage Treatment	Saw Mill River Parkway	Loss of Water Supply
Guard Hill Fire Booster Pump Station	Water Supply	Guard Hill	Loss of Water Supply
Foxwood Fire Booster Pump Station	Water Supply	Foxwood Circle	Loss of Water Supply
Leonard Park Wells	Water Supply	Leonard Park	Loss of Water Supply

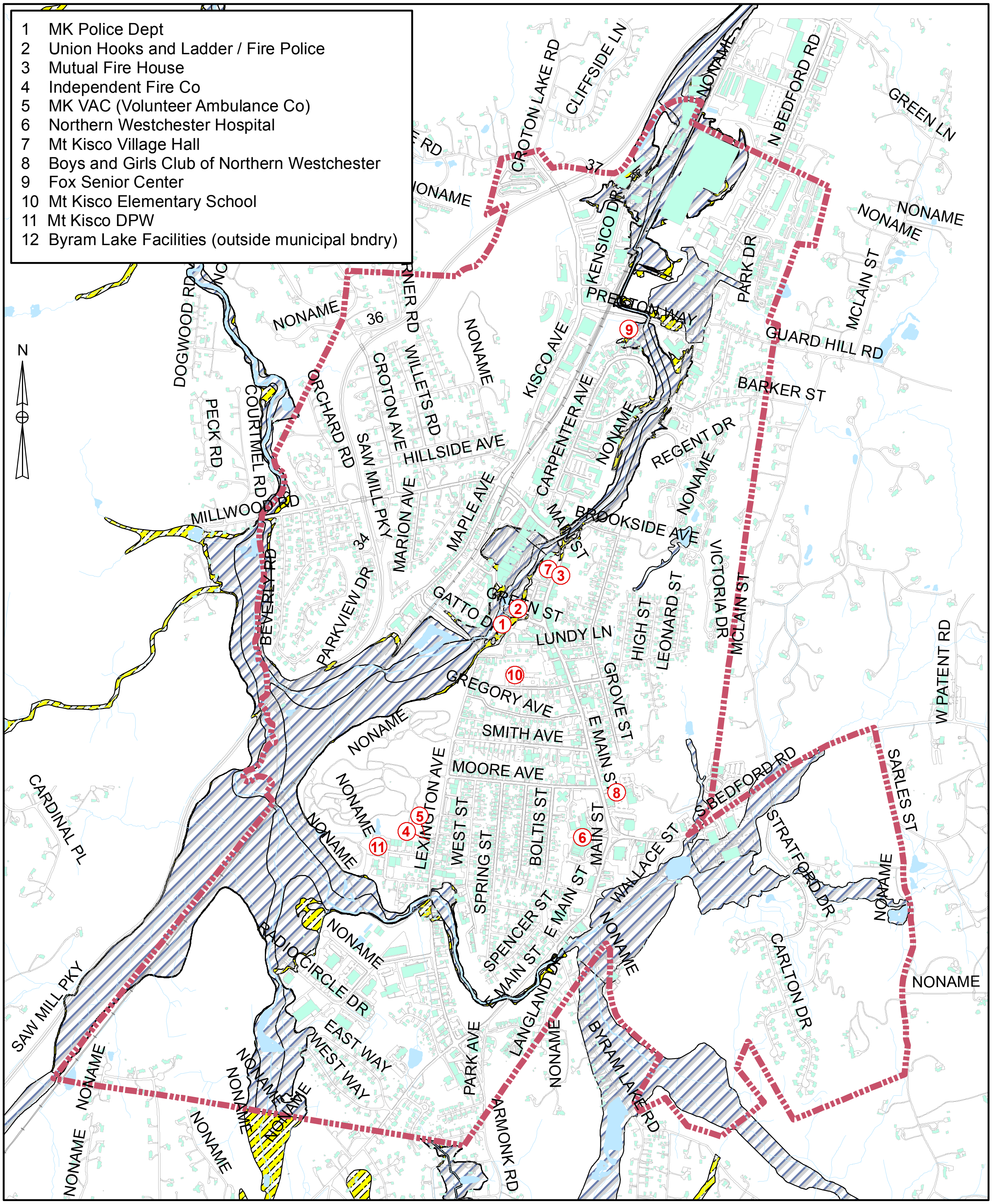


Figure 5-1
Location Of Critical Facilities

Incorporated Village/Town of Mount Kisco
Multi-Hazard Mitigation Plan

ETG Environmental Technology Group, Inc.
300 WHEELER ROAD, SUITE 307, HAUPPAUGE, NEW YORK 11788

Legend

Municipal Boundaries

FEMA Flood Mapping

100 Year Flood Line

500 Year Flood Line

0 1,000 2,000 3,000 4,000 Feet

Basemap Information by Westchester County GIS

DWN BY: YS
CHK BY: JB
SCALE: AS SHOWN
DATE: 01/18/13

5.B.3 Key Assets

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

Table 5-3b. Key Assets in the Village of Mount Kisco

Type of Asset	Key Asset	Location	Priority Need
Economic/Key Employers	Northern Westchester Hospital	400 East Main Street	Major Employer
	Mount Kisco Medical Group	90 South Bedford Road	Major Employer
	Bedford Central School District – Mount Kisco Elementary School	47 West Hyatt Avenue	Major Employer
	Curtis Instruments	200 Kisco Avenue	Major Employer
	Multiplier Industries	135 Radio Circle Drive	Major Employer
	Zierick Manufacturing	131 Radio Circle Drive	Major Employer
	RLC Electronics	83 Radio Circle Drive	Major Employer
	Zumbach Electronics	140 Kisco Avenue	Major Employer
	Frito Lay	116 Radio Circle Drive	Major Employer
	Village of Mount Kisco	104 Main Street	Major Employer
	Visiting Nurse Association	100 South Bedford Road	Major Employer
	Commercial Business Districts	East Main Street, South Moger Avenue, and West Main Street; in the Northern section along North Bedford Road and Preston Way; near the Northern Westchester Hospital; and along Lexington Avenue.	Commercial & Retail Centers
	Industrial Areas	Around Radio Circle, and along Kisco Avenue	Industrial & Manufacturing Centers
Cultural, Historical and Natural Areas	Village Hall	104 Main Street	Historical Building
	Bet Torah Synagogue	60 Smith Avenue	House of Worship
	Bethel Baptist Church	37 Maple Avenue	House of Worship
	Fountain of Eternal Life Church	720 East Main Street	House of Worship
	Lutheran Church of the Resurrection	15 South Bedford Road	House of Worship
	Mount Kisco Hebrew Congregation	15 Stewart Place	House of Worship
	Presbyterian Church Of Mount Kisco	605 Millwood Road	House of Worship
	Religious Society of Friends (Quakers)	Meeting House Road	House of Worship

	St Francis of Assisi Roman Catholic Church	2 Green Street	House of Worship
	Unitarian Universalist Fellowship of Northern Westchester	236 South Bedford Road	House of Worship
	Westchester Family Church	27 Radio Circle	House of Worship
	St Marks Episcopal Church	85 Main Street	House of Worship Historical Building
	United Methodist Church of Mount Kisco	300 East Main Street	House of Worship Historical Building
	Mount Kisco Village Hall & Post Office	104 Main Street	Historical Building
	Mount Kisco Public Library	100 Main Street	Cultural Center
	Saw Mill River Club	77 Kensico Drive	Recreation
	Mount Kisco Country Club	10 Taylor Road	Recreation
	Leonard Park	Leonard Park	Recreation
	Fox Senior Center	198 Carpenter Avenue	Community Services
	Mount Kisco Child Care Center	95 Radio Circle Drive	Community Services
	Ability Beyond Disability	120 Kisco Avenue	Community Services
Education (Noncritical facility)	Mount Kisco Elementary School	47 West Hyatt Avenue	BCSK K-5
	Yeshiva Farm Settlement School	Pines Bridge Road	Private Secular K-12
	Karafin School	40 Radio Circle Drive	Private Special Education 9-12

5.B.4 Infrastructure

Infrastructure needs for the Village of Mount Kisco 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 Mount Kisco Station provides public rail transportation services. The Westchester County Bee Line Bus system provides intercommunity bus transportation.

Table 5-4. Village of Mount Kisco Key Infrastructures.

Service Provider	Facility Type	Key Locations of Concern	Importance/ Function
NY State	Highway/Roads/ Streets	Saw Mill River Parkway	Evacuation Route
NY State	Highway/Roads/ Streets	Route 172 / South Bedford Road	Evacuation Route
NY State	Roads/Streets	Route 117 / East Main Street / North Bedford Road	Evacuation Route
NY State	Roads/Streets	Route 133 / West Main Street	Evacuation Route
NY State	Roads/Streets	Route 128 / Armonk Road	Evacuation Route
County	Roads/Streets	Lexington Avenue	Evacuation Route
Westchester County	Bus Service	Intercounty & local bus routes	Public Transportation
Metro-North Railroad	Rail Service	1 Kirby Plaza	Commuter & Public Transport
Verizon	Telecommunication Service	Village wide	Telecommunications Infrastructure
Con Edison Company of NY	Power Service	Village wide	Electric Power
Byram Lake Facilities (Outside Municipal Boundaries): -Pump House -Filtration Plant -3,500,000 gallon water tank	Water Supply	Byram Lake	Loss of Potable water supply to entire Village
Cold Spring Sewer & Lift Station – Mount Kisco Chase	Water Supply & Sewage Treatment	Cold Spring Court & Carlton Lane	Loss of Water Supply
Chase Water Tank	Water Supply	Mount Kisco Chase	Loss of Water Supply
Radio Circle Sewer Lift Station	Water Supply & Sewage Treatment	Radio Circle	Loss of Water Supply
Hillside Avenue Water Pump Station	Water Supply	Hillside Avenue	Loss of Water Supply
Mountain Avenue Water Tank	Water Supply	Mountain Avenue	Loss of Water Supply
Woodcrest Water Pump Station	Water Supply	Woodcrest Lane	Loss of Water Supply
Saw Mill Sewer Pump Station	Water Supply & Sewage Treatment	Saw Mill River Parkway	Loss of Water Supply
Guard Hill Fire Booster Pump Station	Water Supply	Guard Hill	Loss of Water Supply
Foxwood Fire Booster Pump Station	Water Supply	Foxwood Circle	Loss of Water Supply
Leonard Park Wells	Water Supply	Leonard Park	Loss of Water Supply

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

Critical facilities and vulnerabilities in the Village of Mount Kisco are given in Table 5-3a 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

		High Hazard	Moderately High Hazard									Moderately Low Hazard											Low Hazard
Critical Facility	**Vulnerability**	**Flood**	**Coastal Storm ***	**Winter Storm ****	**Utility Failure**	**Tornado**	**Windstorm**	**Hurricane**	**Severe Storm *****	**Extreme Temperatures**	**Ice Storm**	**Fire**	**Epidemic**	**Dam Failure**	**Explosion**	**Trans Accident**	**Hazmat (In Transit)**	**Earthquake**	**Landslide/Rockslide**	**Terrorism**	**Drought**	**Hazmat (Fixed Site)**	**Civil Unrest**
Mount Kisco Police Department	Interruption of police emergency services & communication. Interruption of emergency & rescue services.	V	V	V	V	V	V	V	V	V	V	H	C	V	H	U	H	V	U	C	V	H	U
Union Hook & Ladder Company #1/ Mount Kisco Rescue Fire Police	Interruption of fire emergency services. Interruption of emergency & rescue services.	V	V	V	V	V	V	V	V	V	V	H	C	V	H	U	H	V	U	C	V	H	U
Mutual Engine & Hose Company #1	Interruption of fire emergency services. Interruption of emergency & rescue services.	V	V	V	V	V	V	V	V	V	V	H	C	V	H	U	H	V	U	C	V	H	U
Independent Fire Company	Interruption of fire emergency services. Interruption of emergency & rescue services.	V	V	V	V	V	V	V	V	V	V	H	C	V	H	U	H	V	U	C	V	H	U
MKVAC	Interruption of emergency & rescue services.	V	V	V	V	V	V	V	V	V	V	H	C	V	H	U	H	V	U	C	V	H	U
Northern Westchester Hospital	Interruption of emergency medical attention and facilities.	V	V	V	V	V	V	V	V	V	V	H	C	V	H	U	U	V	U	C	V	H	U
Mount Kisco Village Hall	Loss of Village records. Interruption of services & communication.	V	V	V	V	V	V	V	V	V	V	H	C	V	H	U	U	V	U	C	V	U	U
Boys and Girls Club of Northern Westchester	Emergency Shelter	V	V	V	V	V	V	V	V	V	V	H	C	V	H	U	U	V	U	C	V	U	U
Fox Senior Center	Interruption of services to vulnerable populations	V	V	V	V	V	V	V	V	V	V	H	C	V	H	U	U	V	U	C	V	U	U

		High Hazard	Moderately High Hazard									Moderately Low Hazard											Low Hazard
Critical Facility	**Vulnerability**	**Flood**	**Coastal Storm ***	**Winter Storm ****	**Utility Failure**	**Tornado**	**Windstorm**	**Hurricane**	**Severe Storm *****	**Extreme Temperatures**	**Ice Storm**	**Fire**	**Epidemic**	**Dam Failure**	**Explosion**	**Trans Accident**	**Hazmat (In Transit)**	**Earthquake**	**Landslide/Rockslide**	**Terrorism**	**Drought**	**Hazmat (Fixed Site)**	**Civil Unrest**
Mount Kisco DPW	Interruption of emergency services	V	V	V	V	V	V	V	V	V	V	H	C	V	H	U	H	V	U	C	V	H	U
Metro North Railroad Station	Loss of major transportation thoroughfare.	V	V	V	V	V	V	V	V	V	V	H	C	V	H	U	H	V	U	C	V	H	U
Byram Lake Facilities (Outside Municipal Boundaries): -Pump House -Filtration Plant -3,500,000 gallon water tank	Loss of Potable water supply to entire Village	V	V	V	V	V	V	V	V	V	V	H	C	V	H	U	U	V	U	C	V	H	U
Cold Spring Sewer & Lift Station – Mount Kisco Chase	Loss of Water Supply & Sewage Treatment Facilities	V	V	V	V	V	V	V	V	V	V	H	C	V	H	U	U	V	U	C	V	H	U
Chase Water Tank	Loss of Water Supply	V	V	V	V	V	V	V	V	V	V	H	C	V	H	U	U	V	U	C	V	H	U
Radio Circle Sewer Lift Station	Loss of Water Supply & Sewage Treatment Facilities	V	V	V	V	V	V	V	V	V	V	H	C	V	H	U	U	V	U	C	V	H	U
Hillside Avenue Water Pump Station	Loss of Water Supply	V	V	V	V	V	V	V	V	V	V	H	C	V	H	U	U	V	U	C	V	H	U
Mountain Avenue Water Tank	Loss of Water Supply	V	V	V	V	V	V	V	V	V	V	H	C	V	H	U	U	V	U	C	V	H	U
Woodcrest Water Pump Station	Loss of Water Supply	V	V	V	V	V	V	V	V	V	V	H	C	V	H	U	U	V	U	C	V	H	U
Saw Mill Sewer Pump Station	Loss of Water Supply & Sewage Treatment Facilities	V	V	V	V	V	V	V	V	V	V	H	C	V	H	U	U	V	U	C	V	H	U
Guard Hill Fire Booster Pump Station	Loss of Water Supply	V	V	V	V	V	V	V	V	V	V	H	C	V	H	U	U	V	U	C	V	H	U

		High Hazard	Moderately High Hazard									Moderately Low Hazard											Low Hazard
Critical Facility	**Vulnerability**	**Flood**	**Coastal Storm ***	**Winter Storm ****	**Utility Failure**	**Tornado**	**Windstorm**	**Hurricane**	**Severe Storm *****	**Extreme Temperatures**	**Ice Storm**	**Fire**	**Epidemic**	**Dam Failure**	**Explosion**	**Trans Accident**	**Hazmat (In Transit)**	**Earthquake**	**Landslide/Rockslide**	**Terrorism**	**Drought**	**Hazmat (Fixed Site)**	**Civil Unrest**
Foxwood Fire Booster Pump Station	Loss of Water Supply	V	V	V	V	V	V	V	V	V	V	H	C	V	H	U	U	V	U	C	V	H	U
Leonard Park Wells	Loss of Water Supply	V	V	V	V	V	V	V	V	V	V	H	C	V	H	U	U	V	U	C	V	H	U

* Including tropical storms and nor'easters.
** Including snowstorms and hail storms
*** 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

		High Hazard	Moderately High Hazard									Moderately Low Hazard											Low Hazard
Key Infrastructure	**Vulnerability**	**Flood**	**Coastal Storm ***	**Winter Storm ****	**Utility Failure**	**Tornado**	**Windstorm**	**Hurricane**	**Severe Storm *****	**Extreme Temperatures**	**Ice Storm**	**Fire**	**Epidemic**	**Dam Failure**	**Explosion**	**Trans Accident**	**Hazmat (In Transit)**	**Earthquake**	**Landslide/Rockslide**	**Terrorism**	**Drought**	**Hazmat (Fixed Site)**	**Civil Unrest**
Westchester County Bus Service (Bee Line), Commuter & Public Transport	Loss of major transportation service	V	V	V	V	V	V	V	V	V	V	U	C	V	H	U	H	V	U	C	V	H	U
Metro-North Railroad, Commuter & Public Transport	Loss of major transportation thoroughfare	V	V	V	V	V	V	V	V	V	V	U	C	V	H	U	H	V	U	C	V	H	U
Saw Mill River Parkway, Route 172 / South Bedford Road, Route 117 / East Main Street / North Bedford Road, Route 133 / West Main Street, Route 128 / Armonk Road	Loss of NYS evacuation routes	V	V	V	V	V	V	V	V	V	V	U	C	V	H	U	H	V	U	C	V	H	U
Lexington Avenue	Loss of County evacuation routes	V	V	V	V	V	V	V	V	V	V	U	C	V	H	U	H	V	U	C	V	H	U
Verizon, Telecommunications Infrastructure	Interruption of telecommunications system	V	V	V	V	V	V	V	V	V	V	U	C	V	H	U	U	V	U	C	V	H	U
Consolidated Edison, Electric Power Service	Interruption of electric power service	V	V	V	V	V	V	V	V	V	V	U	C	V	H	U	U	V	U	C	V	H	U
Byram Lake Facilities (Outside Municipal Boundaries): -Pump House -Filtration Plant -3,500,000 gallon water tank	Loss of Potable water supply to entire Village	V	V	V	V	V	V	V	V	V	V	U	C	V	H	U	U	V	U	C	V	H	U
Cold Spring Sewer & Lift Station – Mount Kisco Chase	Loss of Water Supply & Sewage Treatment Facilities	V	V	V	V	V	V	V	V	V	V	U	C	V	H	U	U	V	U	C	V	H	U
Chase Water Tank	Loss of Water Supply	V	V	V	V	V	V	V	V	V	V	U	C	V	H	U	U	V	U	C	V	H	U
Radio Circle Sewer Lift Station	Loss of Water Supply & Sewage Treatment Facilities	V	V	V	V	V	V	V	V	V	V	U	C	V	H	U	U	V	U	C	V	H	U

		High Hazard	**Moderately High Hazard**									**Moderately Low Hazard**											**Low Hazard**
Key Infrastructure	**Vulnerability**	**Flood**	**Coastal Storm ***	**Winter Storm ****	**Utility Failure**	**Tornado**	**Windstorm**	**Hurricane**	**Severe Storm *****	**Extreme Temperatures**	**Ice Storm**	**Fire**	**Epidemic**	**Dam Failure**	**Explosion**	**Trans Accident**	**Hazmat (In Transit)**	**Earthquake**	**Landslide/Rockslide**	**Terrorism**	**Drought**	**Hazmat (Fixed Site)**	**Civil Unrest**
Hillside Avenue Water Pump Station	Loss of Water Supply	V	V	V	V	V	V	V	V	V	V	U	C	V	H	U	U	V	U	C	V	H	U
Mountain Avenue Water Tank	Loss of Water Supply	V	V	V	V	V	V	V	V	V	V	U	C	V	H	U	U	V	U	C	V	H	U
Woodcrest Water Pump Station	Loss of Water Supply	V	V	V	V	V	V	V	V	V	V	U	C	V	H	U	U	V	U	C	V	H	U
Saw Mill Sewer Pump Station	Loss of Water Supply & Sewage Treatment Facilities	V	V	V	V	V	V	V	V	V	V	U	C	V	H	U	U	V	U	C	V	H	U
Guard Hill Fire Booster Pump Station	Loss of Water Supply	V	V	V	V	V	V	V	V	V	V	U	C	V	H	U	U	V	U	C	V	H	U
Foxwood Fire Booster Pump Station	Loss of Water Supply	V	V	V	V	V	V	V	V	V	V	U	C	V	H	U	U	V	U	C	V	H	U
Leonard Park Wells	Loss of Water Supply	V	V	V	V	V	V	V	V	V	V	U	C	V	H	U	U	V	U	C	V	H	U

* Including tropical storms and nor'easters.
** Including snowstorms and hail storms
*** 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 5-3b 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, water, sewage treatment, 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 the Boys and Girls Club listed in Table 5-3a would result in loss of shelter space during an emergency evacuation. The loss of the Northern Westchester Hospital would result in the loss of critical medical care facilities. 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.

The loss of any of the Byram Lake Dam facilities and pump stations would result in the loss of the potable water supply to the entire Village, any critical pressurized water needed in emergencies, and sewage treatment facilities.

5.B.6 Vulnerable Populations

According to the 2010 Federal Census, the population of the Village of Mount Kisco was 10,877 with a median age of 38. According to the U.S. Census Bureau, the area of the Village is approximately 3.1 square miles. The Kisco River and the Branch Brook are the two major rivers and streams in Mount Kisco, totaling 60,096 linear feet in the Village. There are also 6.3 acres of lakes and ponds. 6.3% of the residents were under the age of 5 and 13.4% over the age of 65. The percentage of minority populations consists of 35.1% Hispanic or Latino, 5.2% African American, 4.8% Asian, and 4.2% two or more races. The Village of Mount Kisco is considered to be an upper-middle income community. The median household income was reported to be $66,111 and the per capita income was $36,002.

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:

- Lexington Avenue
- Gatto Drive
- South Moger Avenue
- Jeff Fiegl Square
- Green Street
- Kensico Drive
- Kisco Avenue
- Portion of Lieto Drive (From Lexington Ave toward Maple Avenue)
- North Bedford Road (between Brookside and Barker)
- Carpenter Avenue (Lower)
- Portion of Hubbels Drive (Close to Kisco Avenue)
- Portion of Preston Way (Close to Kisco Avenue)
- Portion of Main Street (Vicinity of Route 117/133)
- Leonard Park (Most of the entire park)
- Brook Street

List of Frequently Flooded Streets:
Lexington Avenue
Gatto Drive
South Moger Avenue
Jeff Fiegl Square
Green Street
Kensico Drive
Kisco Avenue
Portion of Leito Drive
North Bedford Road (between Brookside and Barker)
Carpenter Avenue (Lower)
Portion of Hubbels Drive
Portion of Preston Way
Portion of Main Street (Vicinity of Route 117/133)
Leonard Park
Brook Street

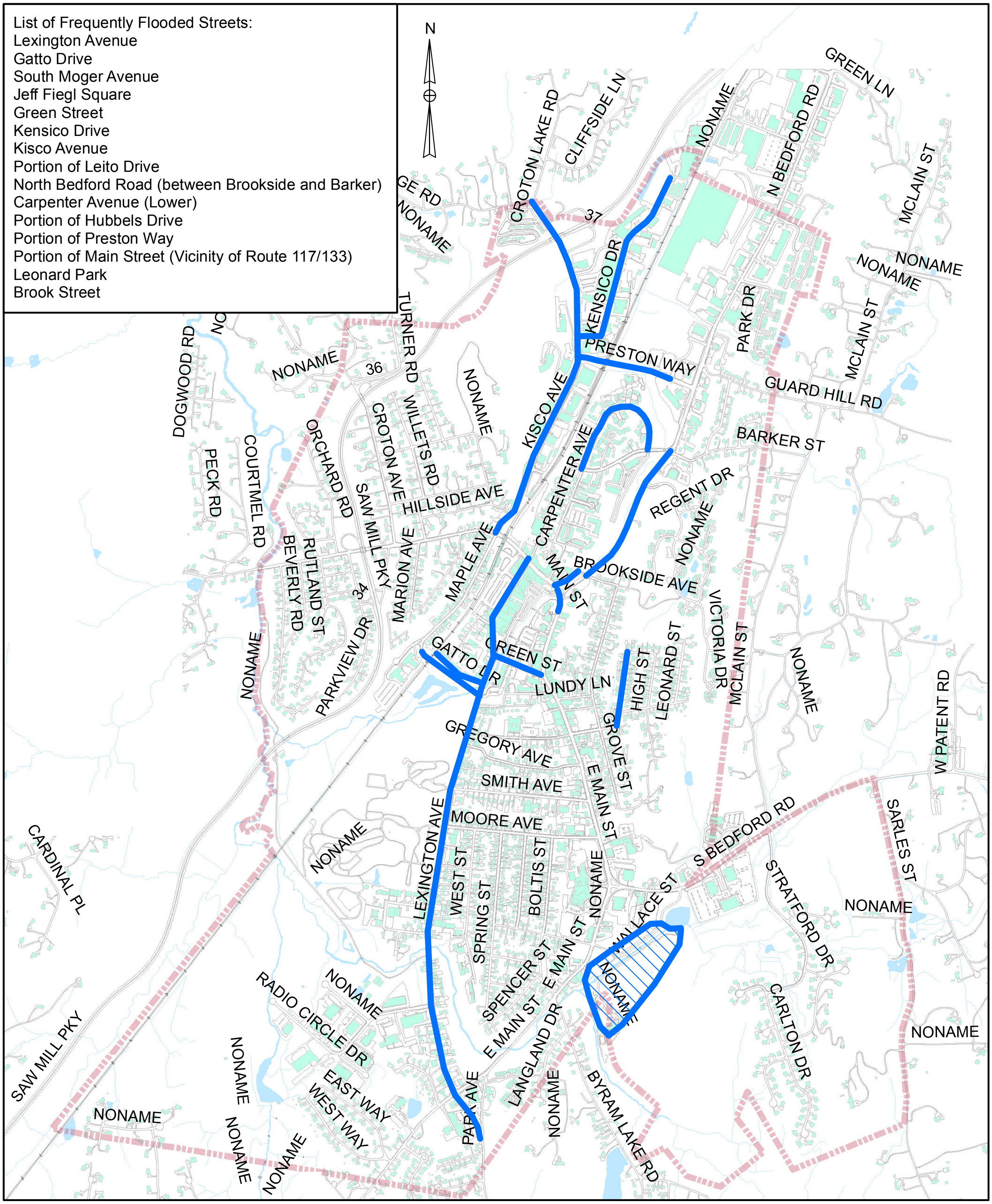


Figure 5-2
Frequently Flooded Streets

Legend
Municipal Boundaries
Frequently Flooded Streets

Environmental Technology Group, Inc.
300 WHEELER ROAD, SUITE 307, HAUPPAUGE, NEW YORK 11788

Incorporated Village/Town of Mount Kisco
Multi-Hazard Mitigation Plan

0 1,000 2,000 3,000 4,000 Feet

Basemap Information by Westchester County GIS

DWN BY: YS
CHK BY: JB
SCALE: AS SHOWN
DATE: 02/12/13

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 Mount Kisco in the future.

The impact of hazards to the life, safety and health of people in the Village of Mount Kisco 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 Mount Kisco 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 high with a HAZNY score of 324 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 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. However, as sea levels rise, the probability of future flood events for both 100-year and 500-year floods increases. (Please see section 4.D.5.7 regarding the effects of climate change on natural hazards). Based on past events, the probability for local flooding in the Village of Mount Kisco for any given year is very high. Maps 2 and 3 show the extent of flooding on the Village. (See Figure 5-3.) Due to the extent and potential depth of flooding there is a high likelihood of significant damage. Severity of damage to areas along the Branch Brook and Kisco River could be significant. Impact on safety of people could be significant if advance warning is insufficient and evacuation routes are blocked.

The Village of Mount Kisco is participating in Westchester County's Flood Mitigation Program to prepare a Reconnaissance Plan. Please see Appendix for the Village's data report.

Figure 5-3. Photos of Local Flooding in the Village of Mount Kisco. Photos taken at Leonard Park on August 28, 2011 after Hurricane Irene. Photos provided by Village of Mount Kisco Manager's Office.

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 along the Branch Brook and Kisco River, and other lakes and streams.

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 Mount Kisco.
- 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, lakes, and streams subject to storm surges.

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

- 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 Kisco River and Branch Brook.
- Damage to buried fuel tanks, building foundations and swimming pools.
- Isolation of critical facilities and Village infrastructure; The Village of Mount Kisco'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 Mount Kisco. 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 7 and were rated moderately high with a HAZNY score of 265. Although hurricanes can produce extensive and devastating damage, the hazard was not given a high HAZNY score due to the rarity of occurrence, as most hurricanes have been downgraded to highly damaging tropical storm or tropical depression status by the time they have reached Westchester County. Most damage from hurricanes is from high winds, and heavy rains. The extent of the flooding depends on the hurricane category. 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.

According to the United States Landfalling Hurricane Probability Project, prepared by the Tropical Meteorology Project at Colorado State University, the probabilities of a hurricane making landfall in Westchester County have increased between 2006 and 2012. 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).

There are no quantitative forecasts published as of yet for the probability of hurricane landfall along the United States coastline for the 2013 hurricane season. However, there are climatological probabilities that have been published. One study showed the climatological probability of one or more tropical storms (of different categories) making landfall in different regions of the United States in the 2013 hurricane season. The results below are for Florida, plus the East Coast (Regions 5-11). Westchester County is located in Region 10.

Region	Tropical Storm	Cat 1-2 Hurricane	Cat 3-4-5 Hurricane	All Hurricanes	Named Storm
5-11	50%	44%	31%	61%	81%

Another study showed the climatological probability of one or more named storms, hurricanes, and major hurricanes making landfall in 2013, based upon statistics since the late 19th century. The resulting climatological probabilities for one or more named storms, hurricanes, and major hurricanes making landfall in Westchester County (located in region 10) for 2013 is as follows:

Region	Named Storm Probability	Hurricane Probability	Major Hurricane Probability
10	15%	9%	4%

Source of both studies: "Discussion of Atlantic Basin Seasonal Hurricane Activity for 2013 (As of December 7, 2012). Philip J. Klotzbach and William M. Gray. Colorado State University, Department of Atmospheric Science. http://hurricane.atmos.colostate.edu

Should a hurricane strike the Village of Mount Kisco, 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 Mount Kisco:

- Water may go overtop land barriers and be driven through storm sewers.
- Substantial wind damage to homes and businesses are 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 Mount Kisco Community consists of a population of 10,877 people (2010 US Census). Vulnerable populations include those residents and businesses along and below the Kisco River, Branch Brook, and other lakes and streams in the Village.

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 watercourses are at high risk of drowning.
- 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 Mount Kisco. 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 301 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 262 in the HAZNY and ranked number 9 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 (along the areas of the Kisco River, Branch Brook, and other lakes, streams, and ponds in the Village). Floods could also affect the Village's Key Infrastructures, such as Evacuation

Routes. 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 5th with a HAZNY score of 267 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 the Village of Mount Kisco. Wind storms were ranked 6th with a HAZNY score of 266 and are also included in this storm category. 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.
- 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, wind 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 3rd and 11th, were moderately high hazards and had final scores of 290 and 250, 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 is Section 5.D.3.

5.C.5 Utility Failure Problems

The hazard level associated with utility failure was ranked 4th and was classified as Moderately high with a HAZNY Score of 268. Utility failures are both local in the Village of Mount Kisco 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).

Several storms since 2006 have knocked out power to Westchester County. Super storm Sandy knocked out power to more than 2,500 customers in Mount Kisco, and approximately 206,000 customers in Westchester County. After Super storm Sandy, New York State Governor Andrew Cuomo announced that regulators will scrutinize Con Edison's preparations for Sandy, as well as its subsequent attempts to restore power in New York City and Westchester County after the storm. 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.

5.C.6. Dam Failure

Dam Failure was ranked 14th in the moderately low range with a HAZNY score of 238. 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. Impacts to the Village of Mount Kisco would not be severe since it lies upstream of the dam and gets its potable water supply from another source.

The Byram Lake Dam is located in the Town of North Castle. (See Figure 1-2.) The length of the dam is approximately 185 feet, with 175 feet of embankment and 10 feet of spillway. The dam is 27 feet high, and the reservoir has a normal pool capacity of 2,909 acre-feet. The Dam is an "Intermediate" sized Dam, classified as "Class C" or "High Hazard", because there is a densely populated area situated in close proximity, downstream of the Dam.

Failure of the Byram Lake Dam would cause significant damage and flooding to the community. The Hamlet of Armonk lies approximately two miles downstream of the Dam. Other portions of the Township of North Castle and the Township of Greenwich, Connecticut also lie in the inundation zone. In addition, the Village of Mount Kisco, and portions of Bedford and New Castle, would lose their primary potable water supply.

There is an Emergency Action Plan in place for the Byram Lake Dam (Emergency Action Plan for Byram Lake Dam, NYSDEC DAM ID#232-0346, Village/Town of Mount Kisco). The Village of Mount Kisco is responsible for the safety and security of the Byram Lake Dam, and for maintaining and making any repairs to the Dam to ensure the integrity of the structure and surrounding area. The Byram Lake Dam is inspected weekly for detection and evaluation of existing conditions.

5.C.7 Fire

Fire hazard was ranked 12th in the moderately high range with a HAZNY Score of 244. According to incident reports from the Village of Mount Kisco Fire Department, the following fires have occurred in the Village from January 1, 2007 until November 28, 2012:

Type of Situation	
Building or Confined Structure Fires:	144
Mobile/Vehicle Fires:	27
Other Fires:	81
Total Fires:	252

There are approximately 850 commercial and industrial facilities (including commercial apartment buildings) and 1747 residential buildings in the Village of Mount Kisco (See Table 5-5). Vulnerable fire prone locations include gas stations, restaurants and schools. Densely developed residential areas are likely to be fire risks, including single family and multi-residential buildings, and have the likelihood to affect more than one building. There are approximately 1,455 single-family homes and 288 multi-residential buildings in the Village of

Mount Kisco. 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

Other particularly vulnerable sites that would cause extreme damage should a fire occur include the Halstead-Quinn propane storage facility on Hubbels Drive, or one of the multiple propane facilities, such as Suburban Propane, on Kensico Drive. There are many safety precautions in place. However, there is a large area that would be impacted if there were a fire or explosion at these premises.

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 10th in the moderately high range with a HAZNY Score of 251. 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 Mount Kisco 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 17th and was rated a moderately low score of 223. Released from fixed locations, hazardous materials were rated moderately low with a HAZNY Score of 214 and a rank of 22.

Trucks carrying hazardous materials are likely most at risk at one of the established transportation routes that traverse the Village of Mount Kisco. Metro-North commuter tracks run through the Village. These same tracks 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 the Village of Mount Kisco, 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. There are sites in the industrial and manufacturing sections of Mount Kisco whose areas are likely to have the highest risk of a hazardous materials incident. There are a few larger enterprises located in Mount Kisco that would pose a greater threat to the Village, should there be a hazardous materials release incident. These sites include the Halstead-Quinn propane storage facility on Hubbels Drive, or one of the multiple propane facilities, such as Suburban Propane, on Kensico Drive, and the sewage pump stations located in the Village. There are stringent safety precautions in place at these facilities.

Releases may occur from activities such as dry cleaning, auto repair and repainting, 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 Mount Kisco is an important community concern. However, the quantities involved would not generally 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 233 and a rank of 15. Fueling activities at gasoline stations 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, particularly at the major facilities, such as the Halstead-Quinn propane storage facility on Hubbels Drive, or one of the multiple propane facilities on Kensico Drive. There are stringent safety precautions in place at these facilities. However, there is a large area that would be impacted if an explosion were to occur.

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 Mount Kisco 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 24th in the moderately low range with a HAZNY score of 202. Fuel oil spills were ranked 26 in the moderately low range with a HAZNY Score of 198.   Fuel oil spills during transport within or through the Village of Mount Kisco 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. No significant releases that have affected the pubic and required evacuation have been occurred in the Village. The primary concern would be fire and explosion incidents. There are no major fuel oil 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, and heating oil businesses, there are no significant commercial or industrial oil storage or transfer facilities in the Village of Mount Kisco.   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 occurred in the Village. According to the Mount Kisco Fire Department Incident Type Reports, there were 41 incidents of “oil or other combustible liquid spill” during the period January 1, 2007 to November 28, 2012. 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 moderately low range ranking 29th with a HAZNY Score of 187. The Village of Mount Kisco 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, industrial, and 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 Mount Kisco.
- Local diesel emissions in the Village of Mount Kisco 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 Mount Kisco 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 18th in the moderately low hazard range and has a HAZNY Score of 222. Chances of an earthquake occurring in the Village of Mount Kisco are low. None of the 2,564 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 Mount Kisco is 3.6%g. 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 Mount Kisco.

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 12.14 miles from Mount Kisco, 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 217 and a rank of 20. As discussed in Section 4.D.7, this human caused hazard would be low risk in the Village of Mount Kisco since there are no real major terrorist targets of interest identified in the Village. 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 Mount Kisco 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 Byram Lake Dam located in North Castle, which serves as the primary water source for Mount Kisco. Another target is the Indian

Point nuclear power plant. Current regulations require evacuation planning for areas located within a 10 mile radius of nuclear facilities. Mount Kisco lies 12.14 miles from Indian Point, and is outside of the evacuation planning zone. Another target is the Northern Westchester Hospital. The hospital is in the process of updating their Emergency Operations Plan, and will be working with the Village of Mount Kisco to get Village input. 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 Epidemic

Epidemics are a moderately low risk in the Village of Mount Kisco. Epidemic hazard was ranked 13^{th} in the moderately low range with a HAZNY score of 239. 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.

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.C.16 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 Mount Kisco 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
- Rail Accident
- Radiological releases

Civil unrest has a low HAZNY ranking of 130 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.

Rail accidents are a very low risk in the Village of Mount Kisco. Rail accident hazard was ranked in the low range with a HAZNY score of 128. Rail accidents in Mount Kisco can be a real concern, but are rare occurrences. The Harlem Line of the Metro North Commuter Railroad runs through Mount Kisco. According to the 2010 Census, 18% of Mount Kisco residents use public transportation to commute to and from work. The tracks are also used by CRX to transport hazardous materials through the Village. Should an accident occur, this would be a concern to the Village. Rail accidents have not been an issue in the Village of Mount Kisco. In 2011, a man was struck by a Metro North commuter train while leaning over the platform on the northbound side of the train station. Besides this incident, there have been no rail accidents occurring in the Village of Mount Kisco. 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 Mount Kisco is essentially a residential community and about 68 percent of the total buildings are single-family and multi-family residences (Table 5-6). Commercial properties, including apartment buildings, represent about 29% of the buildings in the Village.

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

Property Class Code	Building Type by Property Class	Total Number of Buildings *	% of Total Buildings
200-210	Single Residential	1456	57.3%
220-283	Multi-Residential	291	11.4%

400-486	Commercial	740	29.1%
500-590	Recreation & Entertainment	10	0.4%
600-615, 682	Community Services & Education	6	0.2%
620	Religious	9	0.4%
640-670	Health, Government & Protection	18	0.7%
710	Industrial	13	0.5%
	Total	2543	100.0%

*** Data provided by Village Mount Kisco Manager's Office.**

The valuation of the buildings at risk is based on the Town of Mount Kisco's tax assessments. The Town tax assessment information is given in Table 5-7A. The Residential Assessment Ratio (RAR) to determine the value of residential properties for the Town of Mount Kisco is 15.09 for 2012. The Equalization Rate for the Town of Mount Kisco is 19.45. The total valuation of all occupied properties in the Town of Mount Kisco is approximately $340.4 million ($1,954 billion, 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 41% of the value is residential and multi-residential property. About 40% of the exposed value is from commercial properties. About 11% of the exposed value is from Health, Government, and Protection Services. These three property types represent a total of 92% percent of the number of the Town of Mount Kisco 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. Town of Mount Kisco Property Tax Assessments and Property Values. *

Property Occupancy Code	Building Type by Property Class	Total Number Buildings	Total Assessed Value $	Average Property Value $
200-210	Single Residential	1456	114,222,255	78,449
220-283	Multi-Residential	291	23,574,830	81,013
400-486	Commercial	740	135,125,925	182,603
500-590	Recreation & Entertainment	10	13,255,200	1,325,520
600-615, 682	Community Services & Education	6	2,940,800	490,133
620	Religious	9	6,050,900	672,322
640-670	Health, Government & Protection	18	36,505,350	2,028,075
710	Industrial	13	8,749,000	673,000
	Total	2543	340,424,260	

*** Data provided by Village of Mount Kisco Manager's Office.**

Residential values were adjusted using the Residential Assessment Rate (RAR) of 15.09. Other building types were adjusted using the Equalization Rate of 19.45. 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	1456	756,940,060	519,876	38.7%
Multi Residential	291	156,228,164	536,867	8.0%
Commercial	740	694,734,833	938,831	35.5%
Recreation & Entertainment	10	68,150,129	6,815,013	3.5%
Community Services & Education	6	15,119,794	2,519,966	0.8%
Religious	9	31,110,026	3,456,670	1.6%
Health, Government & Protection	18	187,688,175	10,427,121	9.6%
Industrial	13	44,982,005	3,460,154	2.3%
	2543	1,954,953,185		100%

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

Property Class Code	Occupancy Class	Total Value Properties *	Replacement Value
210	Single Residential	114,222,255	84,777,405
220-283	Multi-Residential	23,574,830	16,635,530
400-486	Commercial	135,125,925	80,551,115
500-590	Recreation & Entertainment	13,255,200	8,690,000
600-615,682	Community Services & Education	2,940,800	2,225,800
620	Religious	6,050,900	4,907,100
640-670	Health, Government & Protection	36,505,350	36,505,350
710	Industrial	8,749,000	5,084,300
	Total	340,424,260	239,376,600

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

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

Property Class Code	Occupancy Class	Total Value Properties *	Replacement Value
200-210	Single Residential	756,940,060	561,811,829
220-283	Multi-Residential	156,228,164	110,242,081
400-486	Commercial	694,734,833	414,144,550
500-590	Recreation & Entertainment	68,150,129	44,678,663
611-615,682	Community Services & Education	15,119,794	11,443,702
620	Religious	31,110,026	25,229,306
640-682	Health, Government & Protection	187,688,175	187,688,175
710	Industrial	44,982,005	26,140,360
	Total	1,954,953,185	1,381,378,666

*** Values adjusted by RAR and Equalization Rate.**

5.D.1.1 Participation in the National Flood Insurance Program

The National Flood Insurance Program (NFIP) is a Federal program created by Congress in 1968 to mitigate future flood losses nationwide through sound, community-enforced building and zoning ordinances and to provide access to affordable, federally backed flood insurance protection for property owners. The NFIP is designed to provide an insurance alternative to disaster assistance to meet the escalating costs of repairing damage to buildings and their contents caused by floods. The NFIP is administered by the Federal Emergency Management Agency (FEMA), a component of the U.S. Department of Homeland Security (DHS).

Participation in the NFIP is based on a voluntary agreement between local communities and the Federal Government that states that if a community will adopt and enforce a floodplain management ordinance to reduce future flood risks to new construction in Special Flood Hazard Areas (SFHAs), the Federal Government will make flood insurance available within the community as a financial protection against flood losses.

Under the NFIP program, construction in floodplains is acceptable provided that floors are elevated to minimize the risk of damage. In exchange, the NFIP makes Federally-backed flood insurance available to homeowners, renters, and business owners in these communities. In addition to providing flood insurance and reducing flood damages through floodplain management regulations, the NFIP identifies and maps the Nation's floodplains. Mapping flood hazards creates broad-based awareness of the flood hazards and provides the data needed for floodplain management programs.

The Village of Mount Kisco has participated in FEMA's National Flood Insurance Program since 1977, is registered as Community Identification Number (CIN) #360918, and intends to continue its participation. Mount Kisco actively implements and enforces its Flood Damage Prevention Ordinance, Stormwater Management and Erosion and Sediment Control Ordinance, and Uniform Building Codes. The Village follows recommendations from it's 2000 Comprehensive Plan, and the January 2003 US Army Corps of Engineers Branch Brook Flood Control Study. Mount Kisco is also participating in Westchester County's County-Wide Flood Mitigation Plan.

Please refer to Section 7 for NFIP compliant mitigation action items.

5.D.1.1.a Flood Insurance Claims

There was limited information available on insurance claims data for the Village of Mount Kisco. According to the NFIP, as of 10/31/2012, there are currently 47 flood insurance policies for the Village. The total insurance coverage is $15,147,000 and since 1978 there were 46 claims made for $1,292,016. However, these flood insurance claims are likely underreported and actual flood damages are probably higher. (http://bsa.nfipstat.fema.gov).

Mount Kisco has a total of three repetitive loss properties. One property located in the flood zone had repetitive loss payments of $7,303.60 for two separate loss occurrences. Two properties situated in the B,C,X zones had repetitive loss payments of $23,854.70 over four separate loss occurrences. The combined repetitive loss payments totaled $23,854.70; $17,933.20 was paid for building coverage, and $5,921.50 was paid for contents coverage.

FEMA defines a repetitive loss property as any insurable building for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period since 1978.

5.D.1.2 100-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 Mount Kisco, 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.3.1.

Flooding in the Mount Kisco has been associated with high stream states. The most severe riverine floods have been associated with the heavy rains from storms or landfalling hurricanes originating in the Caribbean Sea. Wind-driven storms 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 Mount Kisco 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 A	Corresponds to the 1-percent annual chance floodplains that are determined by detailed methods. No Base flood elevations determined.
Zone AE	Corresponds to the 1-percent annual chance floodplains that are determined by detailed methods. Base flood elevations determined.
Zone V	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); No 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 Maps 36119C0134F, 36119C0151F, 36119C0152F, 36119C0153F, 36119C0154F, 36119C0161F, 36119C0162F, Village of Mount Kisco, 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 the Branch Brook and the Kisco River on the FIRM Maps. 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 Mount Kisco.

Base flood elevations are shown below for several cross sections of the 100- year flood spanning throughout the Village of Mount Kisco along the Branch Brook and the Kisco River:

Flooding Source Cross Section: Branch Brook	**Base Flood Water Surface Elevation**
A	281.3
B	281.5
C	281.9
D	282.9
E	284.4
F	284.5
G	285.2
H	286.1
I	287.2
J	291.9
K	291.9

Flooding Source Cross Section: Kisco River	**Base Flood Water Surface Elevation**
L	281.5
M	281.5
N	286
O	293
P	297.2
Q	324.5
R	334.4
S	343.2

Flooding Source Cross Section: Kisco River Tributary 1	**Base Flood Water Surface Elevation**
A	281.5
B	281.8
C	283.8

Source: Flood Insurances Study (FIS), Westchester County, NY (All jurisdictions). Effective September 28, 2007. FIS Study # 36119CV001A

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 291.0 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 1.4% and 3.3% of the properties in the Village of Mount Kisco 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 $29 million (Table 5-10). The 500-Year flood resulted in a risk of about $112 million (Table 5-10). This compares to a total adjusted property value of about $1,955 million.

There is a large potential loss values for these two classes of floods. Loss values for combined single and multi-residential homes are about $6.2 million and $11 million respectively. Combined commercial and industrial capital risks are also substantial at about $22.5 million and $53 million for 100 and 500-Year events. Community services (including Religious, Education, Health, Government, and Protection) face a risk with about $46.8 million 100 and 500-year flood year events.

Table 5-9. Number of Buildings in the Village of Mount Kisco Subject to Flood Hazards*

Category	Single Residential	Multi-Residential	Commercial	Industrial	Recreation & Entertainment	Religious	Community Services **	% Properties At risk
100-Year flood	12	0	24	0	0	0	0	1.4
500-Year flood***	14	7	50	2	4	2	5	3.3
Total Village Properties	1456	291	740	13	10	9	24	

* Information supplied by the Village of Mount Kisco Manager's office.
** Includes government buildings & community centers
***Total properties in the100-Year and 500-Year floodplain

Table 5-10. Value of Buildings and Properties in the Village of Mount Kisco 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	Single Residential	12	519.9	6,238.8
	Multi Residential	0		
	Commercial	24	938.8	22,531.2
	Industrial	0		
	Recreation & Entertainment	0		
	Religious	0		
	Community Services***	0		
	Totals	**36**		**28,770**
500-Year****	Single Residential	14	519.9	7,278.6
	Multi Residential	7	536.9	3,758.3
	Commercial	50	938.8	46,940.0
	Industrial	2	3,460.1	6,920.2
	Recreation & Entertainment	4	6,815.0	27,260.0
	Religious	2	3,456.7	6,913.4
	Community Services***	5	2,520.0	12,600.0
	Totals	**84**		**111,670.5**

* Estimates based on information supplied by the Village of Mount Kisco Manager's office, manual counts from Westchester County Base Maps and Land Use Designation Map (See Maps 2, 3 & 5).
** Based on assessed rates given in Table 5-7. Includes the market value of the property and structure.
*** Includes government, protection, and community center buildings.
****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 Westchester County FIS, 2007.

The total structural damage to buildings for a 100-Year flood event was about $6.6 million and nearly $36.9 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 $15.5 million and nearly $91 million, respectively.

Table 5-12 provides an estimate of downtime losses for commercial/industrial properties. Commercial downtime from flood damages was approximately $271,410 in the 100-year flood zone and $633,300 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 Mount Kisco

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									
Single Residential	3	6,238.8	0.23	1,434.9	3,119.4	0.345	1,076.2		2,511.1
Commercial	3	22,531.2	0.23	5,182.2	22,531.2	0.345	7,773.3	.27	12,955.7
Total				**6,617.1**			**8,849.5**		**15,466.8**
500-Year Flood									
Single Residential	5	7,278.6	0.33	2,401.9	3,639.3	0.495	1,801.5		4,203.4
Multi Residential	5	3,758.3	0.33	1,240.2	1,879.2	0.495	930.2		2,170.4
Commercial/Industrial*****	5	81,120.2	0.33	26,769.7	84,580.3	0.495	41,867.2	.63	68,637.5
Religious		6,913.4	0.33	2,281.4	6,913.4	0.495	3,422.1		5,703.6
Community Services	5	12,600.0	0.33	4,158.0	12,600.0	0.495	6,237.0		10,395.0
Total				**36,851.3**			**54,258.0**		**91,109.9**

* Base Flood Elevations less the Low Floor Depths. Based on figures from Westchester County (All Jurisdictions) 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.
***** Includes Recreation & Entertainment buildings.

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

Event	Flood Depth (Feet)	Number of Structures Inundated	Average Estimated Area* (Sq. Feet)	Annual Sales** ($/Sq. Ft.)	Total Daily Sales Loss ($)	Function Downtime *** (Days)	Total Downtime Costs ($)
100-Year Flood							
Commercial/Industrial	3	24	110,075	30.0	9,047	30	271,410
500-Year Flood ******							
Commercial/Industrial	5	56	256,842	30.0	21,110	30	633,300

5.D.2. HAZUS Flood Model and Damage Analysis

A Level 1 HAZUS-MH model analysis was performed to analyze the risk and vulnerability of a flood hazard in the Village of Mount Kisco, using HAZUS-MH, Version 2.1 software. It calculated a basic estimate of flood losses based on national databases and using the default data in the model, such as general building stock, demographics, critical facilities. The default demographic data in HAZUS-MH 2.1, based on the 2000 U.S. Census, was used for analysis. The valuation of general building stock and the loss estimates determined in the Village of Mount Kisco were based on the default general building stock database provided in HAZUS-MH 2.1 The general building stock valuations provided in HAZUS-MH 2.1 are estimated Replacement Cost Values from RS Means, 2006, which has a level of accuracy acceptable for planning purposes.

To ensure a greater level of accuracy for these estimates, figures for the general building stock and replacement costs in this plan have been substituted with information supplied by the Village of Mount Kisco Manager's office (See text and Table 5-19). Population from the 2010 Census has also been substituted for 2000 Census data. In addition, figures for the buildings located in the flood plain and their replacement costs have been substituted with information supplied by the Village Manager's office, manual counts from the Westchester County Base Maps, and Land Use Designation Maps (See Tables 5-9 and 5-10).

Adjusting the population by 2010 Census data, HAZUS-MH 2.1 estimates 1011 people will be displaced and 855 people will seek temporary shelter in a 100-year flood event, representing 9.2% and 7.8% of the Village population, respectively. For the 500-year event, HAZUS-MH 2.1 estimates 1301 people will be displaced and 1116 will seek temporary shelter representing 11.9% and 10.2% of the Village population, respectively.

Table 5-13. Estimated Persons Displaced from Flood and Seeking Short-term Public Shelter.

	Displaced People	People Seeking Temporary Shelter
100-Year	1011	855
500-Year	1301	1116

There are 36 buildings located in the 100-Year flood zone, representing 1.4% of the total buildings in Mount Kisco. 84 buildings, or 3.3% of the total buildings lie in the 500-year (including those in the 100-year zone) flood zone. (See Table 5-14). 33 residential buildings, or 1.9% of total residential buildings, lie within the 100- and 500- year flood zones. 80 commercial/industrial buildings, or 10.5% of all commercial buildings, are located in the 100- and 500- year flood zones. Please refer to Table 5-15 for a breakdown of buildings in the flood zones by occupancy type.

Table 5-14. Number of Buildings in 100- and 500-Year Flood Zones*

	Total Village Buildings	Buildings	% Total
100-Year	2543	36	1.4
500-Year	2542	84	3.3

* Based on building counts provided by the Mount Kisco Village Manager's Office.

Table 5-15. Buildings in Flood Zones by Occupancy Type*

	100-Year	% Total/ Occupancy	500-Year	% Total/ Occupancy
Total Residential	12	0.7%	21	1.2%
Commercial/Industrial	24	3.1%	56	7.3%
Religion	0	0.0%	2	22.2%
Community Services**	0	0.0%	5	20.8%

* Based on figures provided by the Mount Kisco Village Manager's Office.
** Includes government, protection, education, and community center buildings.

The replacement values for the properties located in the floodplain, and the entire Village were calculated based upon information supplied by the Mount Kisco Village Manager's office. Table 5-16 summarizes the general building stock exposure by occupancy type.

Table 5-16. Estimated General Building Stock Exposure to Flood. ($1,000)*.

	Village Replacement Value	100-Year Flood Zone	500-Year Flood Zone	Value Adjustment Factor***
Residential	672,054	6,238.8	11,036.9	.97
Commercial/Industrial	484,964	22,531.2	81,120.2	1.02
Community Services**	224,361		19,513.4	5.21
Total	**1,381,379**	**28,770**	**111,670.5**	

*Estimates based on information supplied by the Village of Mount Kisco Manager's office, and assessed rates given in Table 5-8B.
** Includes government, protection, health, religion, and community center buildings.
*** Value adjusted factor based on average value of community services.

HAZUS-MH MR2 divides building losses into two categories. Direct building losses represent the estimated costs to repair or replace the damage caused to the buildings and its contents. Business interruption losses consist of the losses associated with the inability to operate a business due to the damage sustained during a flood. Temporary living expenses for those people who are displaced from their homes due to flood are also included in business interruption losses. HAZUS-MH 2.1 estimated the total economic loss for the flood. Table 5.17 summarizes these losses (including business interruption and building losses) as a result of the

100- and 500- year flood events. Building replacement values supplied by the Mount Kisco Village Manager's office were substituted for the figures in the model. The estimated business interruption loss for the 100-year flood event is approximately $.86 million, and it is $1.07 million for the 500-year flood event. The estimated total loss for the 100-year flood event is approximately $55 million, or about 4% of the Village of Mount Kisco's building stock replacement value. The estimated total loss for the 100-year flood event is approximately $82 million, or about 5.9% of the Village's building stock replacement value. In the 100-year flood event, total building-related commercial losses represented 48% of the total losses. In the 500-year event, commercial losses represented 49% of the losses.

Table 5-17. Building-related Economic Loss Estimates from Flood ($1,000).

100-Year	**Category**	**Area**	**Residential**	**Commercial**	**Other**	**Total**
	Building Loss	Building	8.11	5.98	1.93	16.01
		Content	4.60	19.87	13.03	37.49
		Inventory	0.00	0.62	0.10	0.73
		Subtotal	**12.71**	**26.47**	**15.06**	**54.23**
	Business Interruption	Income	0.01	0.07	0.00	0.08
		Relocation	0.00	0.02	0.00	0.02
		Rental Income	0.00	0.01	0.00	0.01
		Wage	0.01	0.11	0.63	0.75
		Subtotal	0.02	0.21	0.63	0.86
		Total	**12.73**	**26.68**	**15.68**	**55.09**
500-Year	Building Loss	Building	13.71	9.09	2.71	25.50
		Content	7.72	29.80	17.56	55.08
		Inventory	0.00	0.99	0.16	1.15
		Subtotal	**21.43**	**39.88**	**20.42**	**81.73**
	Business Interruption	Income	0.01	0.11	0.00	0.12
		Relocation	0.01	0.03	0.00	0.04
		Rental Income	0.00	0.01	0.73	0.74
		Wage	0.02	0.15	0.00	0.17
		Subtotal	**0.04**	**0.31**	**0.73**	**1.07**
		Total	**21.47**	**40.19**	**21.15**	**82.81**

HAZUS-MH 2.1 estimates the damage that could incur to critical facilities resulting from the 100- and 500- year flood events. It is estimated that the school is vulnerable and may experience structural damage as a result of the 100- and 500- year flood events. The fire station is estimated to have a moderate loss of functionality, but suffer no structural damages. The Northern Westchester Hospital is not estimated to lose any functionality as a result from the 100- or 500-year flood event.

According to FEMA"s HAZUS-MH 2.1 Flood Model Technical Manual (http://www.fema.gov/library/viewRecord.do?id=5120), the "damage states" are derived from the percent damage to the building. 1-10% damage is considered slight, 11-50% damage is considered moderate, and 51-100% is considered substantial damage. HAZUS estimated the building counts that would incur these damages. Building count information was substituted by information received from the Mount Kisco Village Manager's office. It is estimated that about 34 buildings would be at least moderately damaged, and 1 building destroyed in a 100-year flood event, compared to 45 buildings moderately damaged and 5 buildings destroyed in a 500-year flood event. Table 18 summarizes the expected building damage by general occupancy.

Table 18. Expected Building Damage from Flood by General Occupancy.

		1-10%	11-20%	21-30%	31-40%	41-50%	Substantial	Total
100-Year	Commercial/Industrial	0	6	0	0	0	0	6
	Residential	0	2	5	10	11	1	29
	Total	**0**	**8**	**5**	**10**	**11**	**1**	**35**
500-Year	Commercial/Industrial	0	6	0	0	0	0	6
	Residential	0	2	6	13	18	5	44
	Total	**0**	**8**	**6**	**13**	**18**	**5**	**50**

5.D.3 Valuation Assessment of Wind Storms

The Village of Mount Kisco 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 Mount Kisco 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 Mount Kisco.

5.D.3.1 HAZUS Hurricane Model and Damage Assessment

Hurricane impacts from wind were assessed using FEMA's HAZUS ®*MH 2.1* model. HAZUS is a regional multi-hazard loss estimation computer model that was developed by FEMA and the National Institute of Building Sciences. The model was used in conjunction with Esri's ArcGIS software, version 10.0. 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 worst-case storm parameters as an example of a hurricane that could strike Mount Kisco 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 5-19 through 5-24 and in the Attachments included in Appendix 3 of this Hazard Mitigation Plan may differ from the data provided by the Village of Mount Kisco 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 5-19. Since the Village provided counts are current and based on the Mount Kisco Tax Assessors Office, the HAZUS model estimates of damages were adjusted using the Village of Mount Kisco 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 5-19 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	763	491	1.6	484,964	477,571	1.02
Government, Protection, Health	18	9	2.0	187,688	5,895	5.21
Education/ Community Services	6	13	0.5	11,444	11,693	
Religious	9	20	0.5	25,229	25,488	
Residential	1,747	2,392	0.7	672,054	689,795	.97
Total	2,543	2,925		1,381,379	1,210,442	

* 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 4-6 and Figure 4-5 except it would track through Mount Kisco (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.

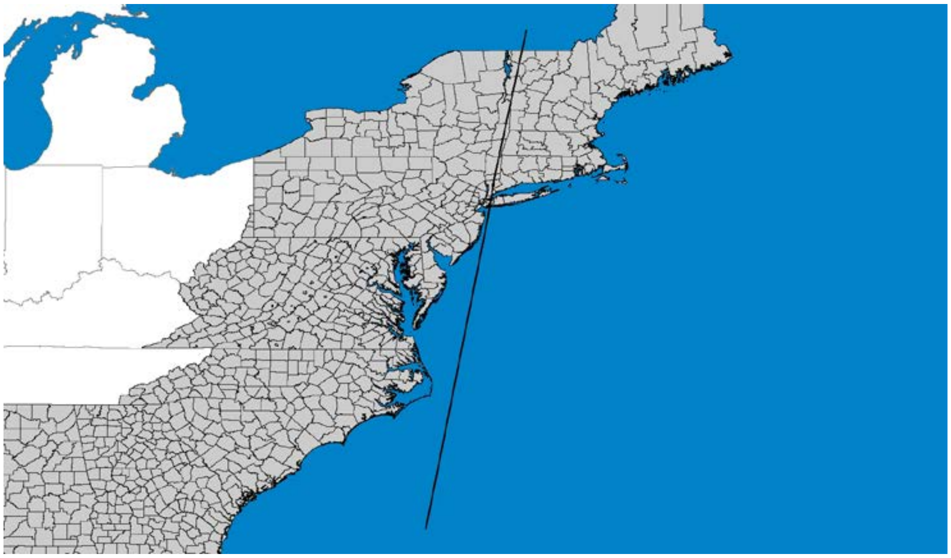


Figure 5-4. HAZUS Historical Model projected track for a hypothetical hurricane through Mount Kisco NY with 120 mph winds.

The model results in Table 5-20 show what could have happened if this model hurricane track struck Mount Kisco with full force sustained winds of 120 mph with peak 3-second gusts of 143 mph. The model's assumptions and detailed output from the HAZUS historical model is given as an Attachment in Appendix 3. A hurricane of this size could destroy over 139 homes and severely damage 235 more. About 12% or 211 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 Mount Kisco. 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 5-21 and 5-22.

Table 5-20. Potential Damage to Mount Kisco 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	763	104	13.61	160	20.98	267	34.93	228	29.86	5	0.63
Education/Community Services	6	1	14.05	1	20.01	2	34.68	2	31.17	0	0.09
Government	18	3	14.18	3	18.61	6	34.56	6	32.59	0	0.06
Religious	9										
Residential	1,747	1	13.01	2	26.35	3	34.98	2	25.43	0	0.25
		211	12.08	561	32.1	601	34.42	235	13.44	139	7.96
Total	2,543	108		728		879		473		144	

* Village-provided building counts were substituted for estimated model counts. See Text and Table 5-19.
** % Damaged buildings were estimated using the HAZUS Historical Model.

Table 5-21 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 Mount Kisco of exceeding the computed total direct loss shown for the 100-Year event. These periods and winds are specific to the Village of Mount Kisco. 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 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 5-21 and 5-22. Also the 10 and 20-year events 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 Appendix 3.

The data used in the model were from the Village of Mount Kisco 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 5-20 and 5-21, 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 $689,795,000 and the Village's property estimate based on assessed value for residential and multi-residential (Table 5-8 and 5-19) was $672,054,000. This resulted in an adjustment factor of .97, which was applied to the HAZUS model result for residential loss to obtain the result of $2,370,000 in Table 5-22. The adjustment factor for combined commercial/industrial use was 1.02 and for other community services (education, government, and religious services the factor was 5.21. Thus capital damage losses in Table 5-22 can be compared to current property values in Mount Kisco.

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 Mount Kisco is approximately 3.1 square miles. There are about four thousand households in the village, which had a total population of 9,983 people in 4 census tracts (Based on the 2000 Census Bureau data used by the HAZUS Model). 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 5-21. Probabilistic Building Damage Risks from Hurricanes that Could Strike the Village of Mount Kisco.

			Degree of Wind Damage									
			None		Minor		Moderate		Severe		Destruction	
Return Period (Yrs.)*	**Property Class****	**Total Building Count*****	**Damage Count**	**(%) Impact**	**Damage Count**	**(%) Impact**	**Damage Count**	**(%) Impact**	**Damage Count**	**(%) Impact**	**Damage Count**	**(%) Impact**
50	Commercial/Industrial	763	760	99.6	3	0.39	0	0	0	0	0	0
	Education/Community	6	6	99.59	0	0.41	0	0	0	0	0	0
	Government	18	18	99.57	0	0.43	0	0	0	0	0	0
	Religious	9	9	99.68	0	0.31	0	0.01	0	0	0	0
	Residential	1,747	1741	99.66	5	0.31	1	0.03	0	0	0	0
	Total	2,543		2534		9		1		0		0
100	Commercial/Industrial	763	755	98.94	8	1	1	0.07	0	0	0	0
	Education/Community	6	6	98.99	0	1	0	0.01	0	0	0	0
	Government	18	18	98.96	0	1.03	0	0.01	0	0	0	0
	Religious	9	9	99.12	0	0.86	0	0.02	0	0	0	0
	Residential	1,747	1719	98.37	24	1.4	0	0.02	0	0	0	0
		2,543	2506		32		1		0		0	
200	Commercial/Industrial	763	738	96.72	22	2.93	2	0.32	0	0.03	0	0
	Education/Community	6	6	97.12	0	2.79	0	0.08	0	0	0	0
	Government	18	17	97.1	1	2.82	0	0.08	0	0	0	0
	Religious	9	9	97.02	0	2.88	0	0.09	0	0.01	0	0
	Residential	1,747	1644	94.1	85	4.88	17	1	0	0.02	0	0
		2,543	2414		109		20		0		0	
500	Commercial/Industrial	763	673	88.26	74	9.68	14	1.79	2	0.27	0	0
	Education/Community	6	5	89.4	1	9.4	0	1.14	0	0.05	0	0
	Government	18	16	89.68	2	9.14	0	1.14	0	0.04	0	0
	Religious	9	8	88.4	1	10.47	0	1.08	0	0.05	0	0
	Residential	1,747	1433	82.03	248	14.2	64	3.64	2	0.11	0	0.02
	Total	2,543	2136		325		78		4		0	

See Notes on next page.

Table 5-21 Notes:

* Return period, peak wind and % impacts are from HAZUS probabilistic model for hurricane damage for the Village of Mount Kisco.

** Residential includes single and multifamily.

*** Building counts provided by Village of Mount Kisco Manager's Office were substituted for model estimates. (See text.)

Table 5-21 summarizes the expected building damage by hurricane event and general property class in the Village. Based on HAZUS percentage estimates, about 109 buildings will suffer from minor damage to destruction from a 200-year event. This is about 4.2% of the total number of buildings in the village. There are an estimated 78 buildings that will be moderately damaged in a 500-year event. In contrast, a 50-year event showed 2,534 or 99% of the buildings would have no significant wind damage compared to 2136 or 84% 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 about 77% of the buildings in the Village are constructed of wood. The strong winds of a 500-year return storm would impact about 18% of these wooden structures but 0% of the wooden structures would be destroyed. The model estimated that 36 households would be displaced from their homes as a result of a 500-year hurricane and about 9 people in the Village population will likely need temporary public shelters. (See Attachments in Appendix 3.)

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 5-22. HAZUS Hurricane Probabilistic Model – Property Damage Capital Losses (X $1,000)*

Return Year	Losses	Residential **	Commercial /Industrial	Community Services	Total Capital Losses
50	Building	571	48	22	642
	Contents	269	0	0	269
	Inventory	0	0	0	0
		840	48	22	910
100	Building	2,370	152	68	2,590
	Contents	891	0	0	891
	Inventory	0	0	0	0
	Subtotal	3,261	152	68	3,482
200	Building	5,998	537	263	6,798
	Contents	1,980	66	22	2,068
	Inventory	0	2	1	3
	Subtotal	7,978	605	286	8,868
500	Building	14,220	1,900	991	17,112
	Contents	4,445	423	178	5,046
	Inventory	0	18	7	25
	Subtotal	18,665	2,341	1,177	22,183

*****HAZUS Model results adjusted for Village of Mount Kisco replacement values (See text and Table 5-19).

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

Table 5-23. HAZUS Hurricane Probabilistic Model - Business Interruption Losses (X $1,000)*

Return Year	Losses	Residential	Commercial /Industrial	Community Services	Total Interruption Losses
50	Income	0.00	0.00	0.00	0.00
	Relocation	4.80	0.22	0.04	5.07
	Rental	7.27	0.00	0.00	7.27
	Wage	0.00	0.00	0.00	0.00
	Subtotal	12.08	0.22	0.04	12.34
100	Income	0.00	0.00	0.00	0.00
	Relocation	26.66	3.18	0.16	30.00
	Rental	35.50	0.00	0.00	35.50
	Wage	0.00	0.00	0.00	0.00
	Subtotal	62.15	3.18	0.16	65.50
200	Income	0.00	55.02	15.96	70.98
	Relocation	145.05	49.17	9.66	203.88
	Rental	167.64	25.71	0.96	194.32
	Wage	0.00	19.90	37.54	57.44
	Subtotal	312.70	149.81	64.12	526.63
500	Income	0.00	507.81	53.52	561.33
	Relocation	418.33	516.61	60.76	995.70
	Rental	445.89	286.29	6.16	738.33
	Wage	0.00	656.56	224.86	881.42
	Subtotal	864.21	1,967.26	345.30	3,176.78

* Corrected for Building counts provided by the Village of Mount Kisco. (See text)
** Total Residential, Commercial includes industrial and Community services include education, government, and religious facilities.

Table 5-24. HAZUS Hurricane Probabilistic Model – Summary of Economic Losses (X $1,000)

Return Year	Total Interruption Losses	Total Capital Losses	Total Village Losses
50	12	910	922
100	66	3,482	3,548
200	527	8,868	9,395
500	3,177	22,183	25,360

Tables 5-22, 5-23, and 5-24 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 nearly $25.4 million dollars, which represents about 2% of the $3.4 billion in total property value for the total Village. The total capital property damage costs were about $22 million dollars with $3.2 million of the estimated losses due to the interruption of business in the Village. The largest capitol loss, $18.7 million, was to residential buildings, which accounted for 84% of the total capital losses. The HAZUS model showed just less than $1 million in damages for a 50-year event.

HAZUS estimates the amount of debris generated by a hurricane. Four general types of debris are evaluated by the model: brick/wood, reinforced concrete/steel, eligible tree debris, and other tree debris. This distinction is made because of the different types of material handling equipment required to handle the debris. A total of 2,308 tons of debris will be generated from wind damage during a 200-year event. Brick and wood comprises 52% of the total debris, other tree debris comprises 24% of the total debris, reinforced concrete and steel comprise of 0% and the remaining debris consists of eligible tree debris. The building debris alone (brick, other tree debris, concrete and steel) generated by the hurricane will require 36 truckloads (@25 tons/truck) to remove the debris. The number of Eligible Tree Debris truckloads will depend on how the 852 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

There are several critical facilities of concern (see Section 5.B.2). Loss-of-use time for these facilities is expected to be less than one day. There is one hospital in the Village. A 500-year event would likely have a 50% probability of impacting this facility. The HAZUS model estimates that 100% of all beds will be in service after one week.

Although HAZUS can provide comprehensive loss estimates, uncertainties are inherent in any model methodology. The next hurricane that may strike Mount Kisco could be quite different from any model hurricane included in this hurricane analysis. The results of this model analysis for Mount Kisco 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 Mount Kisco. 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.

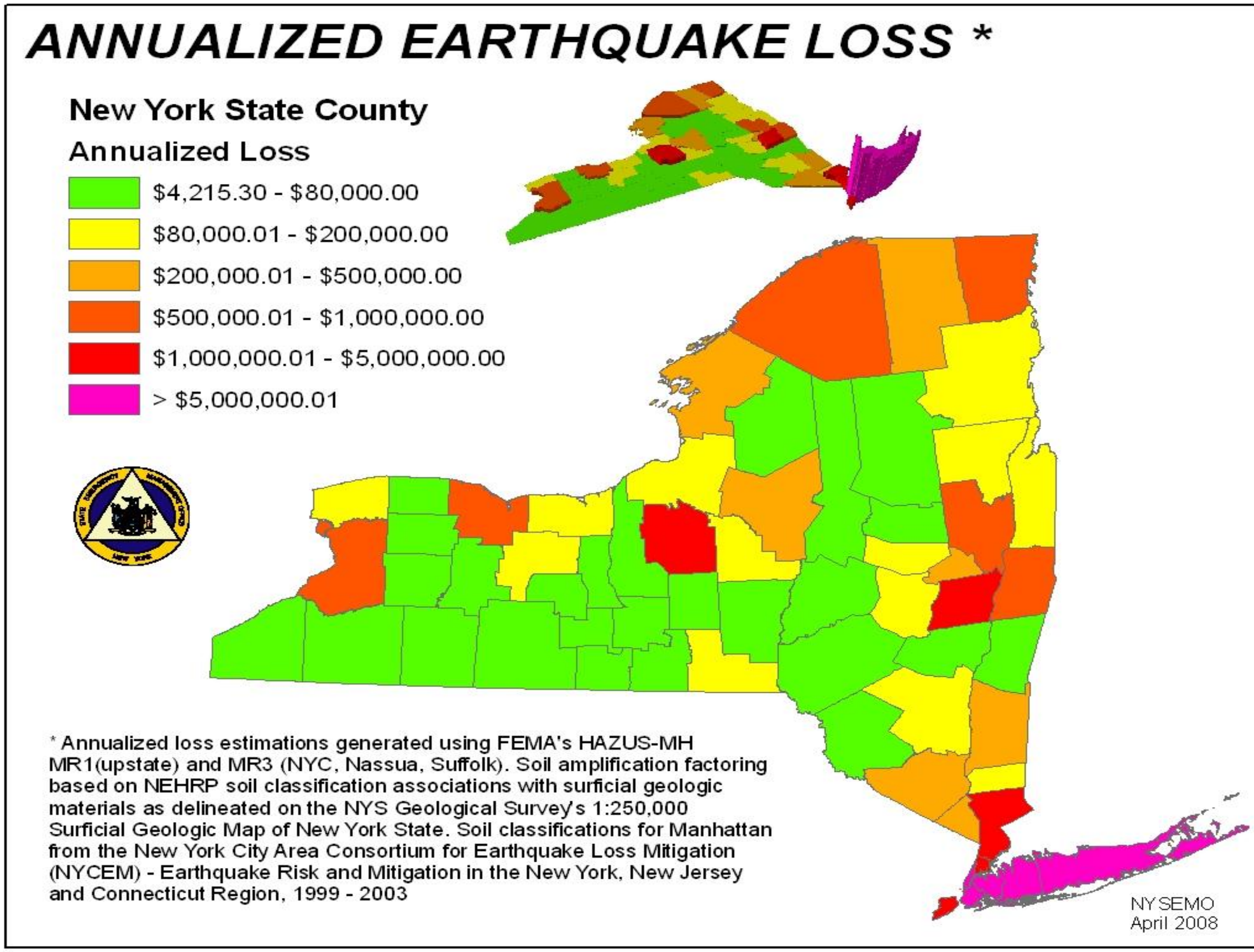
5.D.4 Valuation Assessment of Earthquakes

An earthquake is a rare event in Mount Kisco 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 2008, FEMA reported a study using the HAZUS Estimated Software called "HAZUS-MH Estimated Annualized Earthquake Losses for the United States". The study showed that New York State ranked 4th in annualized earthquake losses, and 26th in annualized earthquake loss ratio (annualized loss as a fraction of replacement value of building stock). Annualized Earthquake Loss was determined to be $95,185,000, while Annualized Earthquake Loss Ratio was $67 per million.

In addition, FEMA ran a vulnerability assessment study using HAZUS-MH software which indicated counties most vulnerable to earthquake hazards. 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 $61,638,517, 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.



COUNTY	ANNUALIZED LOSS
Albany	$1,375,282
Allegany	$22,374
Bronx	$2,529,298
Broome	$130,155
Cattaraugus	$39,386
Cayuga	$24,353
Chautauqua	$59,858
Chemung	$48,508
Chenango	$33,935
Clinton	$606,224
Columbia	$62,441
Cortland	$30,374
Delaware	$38,022
Dutchess	$296,089
Erie	$872,128
Essex	$122,238
Franklin	$339,417
Fulton	$40,507
Genesee	$50,763
Greene	$53,265
Hamilton	$14,315
Herkimer	$72,720
Jefferson	$382,453
Kings	$10,422,919
Lewis	$24,863
Livingston	$39,228
Madison	$159,977
Monroe	$573,267
Montgomery	$134,068
Nassau	$8,420,076
New York	$12,203,219
Niagara	$170,973
Oneida	$327,226
Onondaga	$1,243,681
Ontario	$158,019
Orange	$427,984
Orleans	$28,866
Oswego	$134,870
Otsego	$17,429
Putnam	$118,373
Queens	$6,755,028
Rensselaer	$818,101
Richmond	$1,406,849
Rockland	$401,306
Saratoga	$667,085
Schenectady	$414,914
Schoharie	$80,146
Schuyler	$7,452
Seneca	$39,566
St Lawrence	$869,129
Steuben	$46,836
Suffolk	$5,911,137
Sullivan	$72,961
Tioga	$19,836
Tompkins	$56,275
Ulster	$178,400
Warren	$199,447
Washington	$193,600
Wayne	$123,061
Westchester	$1,498,958
Wyoming	$26,076
Yates	$4,215
STATE TOTAL	$61,638,517

Figure 5-5. Annualized Earthquake Loss

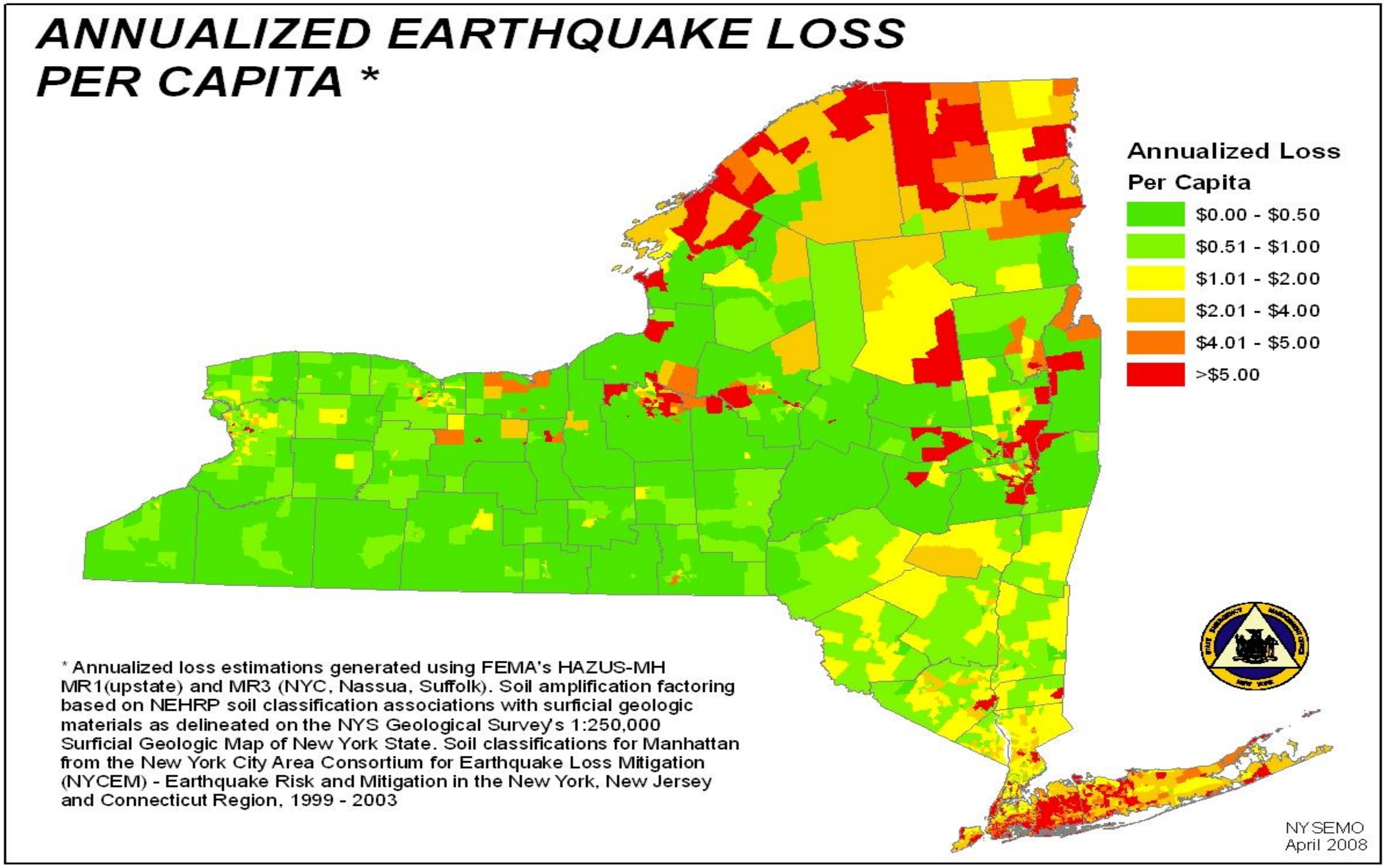


Figure 5-6. Per Capita Annualized Earthquake Loss.

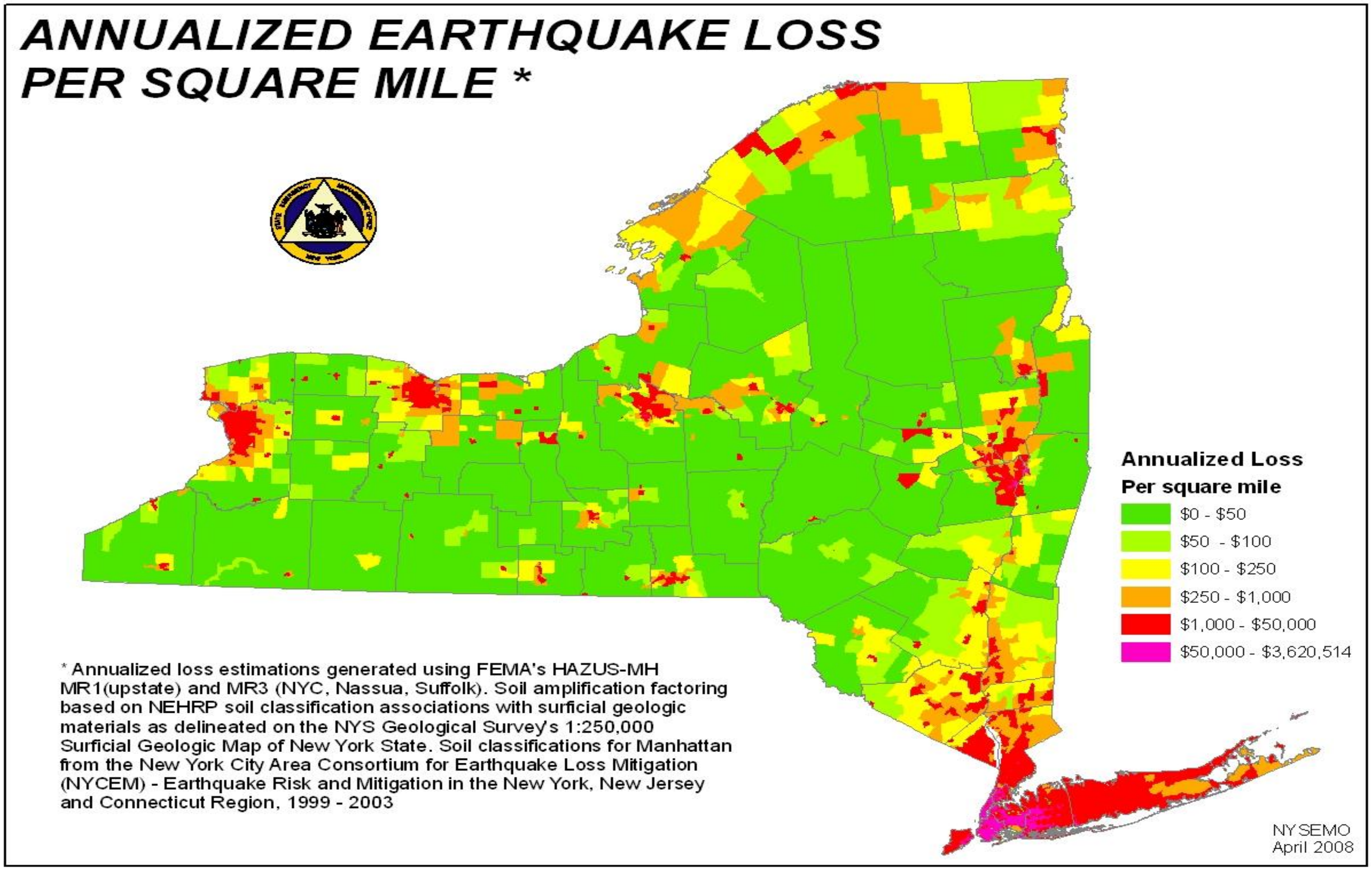


Figure 5-7. Annualized Earthquake Loss

5.D.4.1 Earthquake HAZUS Model and Damage Analysis

A probabilistic assessment was conducted for the 100-, 500- and 2,500-year mean return periods (MRP) through a Level 1 analysis in HAZUS-MH Version 2.1 to analyze the earthquake hazard for the Village of Mount Kisco. The HAZUS-MH 2.1 analysis evaluates the statistical likelihood that a specific event will occur and what consequences will occur. A 100-year MRP event is an earthquake with a 1% chance that the mapped ground motion levels (PGA) will be exceeded in any given year. For a 500-year MRP, there is a 0.2% chance the mapped PGA will be exceeded in any given year. For a 2,500-year MRP, there is a 0.04% chance the mapped PGA will be exceeded in any given year.

HAZUS estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four severity levels that describe the extent of the probable injuries:

Severity Level:

1. Injuries will require medical attention but hospitalization is not needed.
2. Injuries will require hospitalization but are not considered life-threatening.
3. Injuries will require hospitalization and can become life threatening if not promptly treated.
4. Victims are killed by the earthquake.

The casualty estimates are provided for three times of day: 2:00 AM, 2:00 PM, and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate assumes that the residential occupancy load is at maximum, the 2:00 PM estimate assumes that the educational, commercial, and industrial sector loads are at maximum, and 5:00 PM represents peak commuting time. See Table 5-25 which summarizes the injuries and casualties for the 100-, 500-, and 2500- year events.

Table 5-25. Earthquake Casualty by Time of Day.

	Time	Level 1	Level 2	Level 3	Level 4	Totals
100-Year	2:00 AM	0	0	0	0	0
	2:00 PM	0	0	0	0	0
	5:00 PM	0	0	0	0	0
	Subtotal	**0**	**0**	**0**	**0**	**0**
500-YEAR	2:00 AM	1	0	0	0	1
	2:00 PM	1	0	0	0	1
	5:00 PM	1	0	0	0	1
	Subtotal	**3**	**0**	**0**	**0**	**3**
2500-Year	2:00 AM	6	1	0	0	7
	2:00 PM	11	2	0	0	13
	5:00 PM	9	2	0	0	11
	Subtotal	**26**	**5**	**0**	**0**	**31**

HAZUS estimated the number of households that would be displaced from their homes, as well as the number of people in the household that would require the short-term use of a public shelter. There were no displaced households in the 100-year event. 42 households would be displaced, and 36 people would require the use of a public shelter in a 2500-year event. Table 5-26 summarizes displaced households and people that would seek shelter for the different mean return periods.

Table 5-26. Earthquake Shelter Requirements.

MRP	Displaced Households *	People Requiring Short Term public Shelter
100-Year	0	0
500-Year	2	1
2500-Year	42	36

* Household data adjusted based on building count figures provided by the Village of Mount Kisco Manager's office. (See text and Table 5-19).

Fires often occur after an earthquake. HAZUS used a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For 100-, 500-, and 2500-year events the model estimates that there will be 0 ignitions, and no people will be displaced from fire.

HAZUS estimated the amount of debris that would be generated by the earthquake. The model breaks the debris into two general categories: brick/wood and reinforced concrete/steel. This distinction is made because of the different types of material handling equipment required to handle the debris. The 100-year event was estimated to not generate any debris. The 500-year event would not generate a significant amount of debris. 71% of the debris would consist of brick/wood, and would require 40 truckloads (assuming 25 tons/truck) to remove the debris generated from the earthquake. The 2500-year event would generate .02 million tons of debris, with 52% of the total consisting of brick/wood. It would require 640 truckloads (assuming 25 tons/truck) to remove the debris generated by the earthquake.

Entire building stock is considered at risk and exposed to the earthquake hazard. The potential general building stock damage extent was evaluated. Evaluations were made based on the degree of structural damage. Damage parameters used were: None, Slight, Moderate, Extensive, and Complete. According to FEMA's HAZUS-MH 2.1 User Manual (www.fema.gov/library/viewrecord.do?id=5120), examples of Structural Damage State definitions are as follows:

Slight: Small plaster or gypsum board cracks at corners of door and window openings and wall-ceiling intersections; small cracks in masonry chimneys and masonry veneer.

Moderate: Large plaster or gypsum-board cracks at corners of door and window openings; small diagonal cracks across shear wall panels exhibited by small cracks in stucco and gypsum wall panels; large cracks in brick chimneys; toppling of tall masonry chimneys.

Extensive: Large diagonal cracks across shear wall panels or large cracks at plywood joints; permanent lateral movement of floors and roof; toppling of most brick chimneys; cracks in foundations; splitting of wood sill plates and/or slippage of structure over foundations; partial collapse of room-over-garage or other soft-story configurations; small foundations cracks.

Complete: Structure may have large permanent lateral displacement, may collapse, or be in imminent danger of collapse due to cripple wall failure or the failure of the lateral load resisting system; some structures may slip and fall off the foundations; large foundation cracks.

Table 5-27 summarizes this damage by building type for the 100-, 500-, and 2500- year events. Table 5-28 summarizes this damage by general occupancy type. Building counts provided by the Village were substituted for model estimates in both tables (See text and table 5-19).

Table 5-27. Expected Earthquake Building Damage by General Building Type (All Design Levels)

		None		Slight		Moderate		Extensive		Complete	
		Count*	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**
100-Year	Wood	1973	0.67	0	0.00	0	0.00	0	0.00	0	0.00
	Steel	259	0.09	0	0.00	0	0.00	0	0.00	0	0.00
	Concrete	77	0.03	0	0.00	0	0.00	0	0.00	0	0.00
	Precast	16	0.01	0	0.00	0	0.00	0	0.00	0	0.00
	RM	104	0.04	0	0.00	0	0.00	0	0.00	0	0.00
	URM	497	0.17	0	0.00	0	0.00	0	0.00	0	0.00
	MH	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	TOTAL	**2926**	**1.00**	**0**	**0.00**	**0**	**0.00**	**0**	**0.00**	**0**	**0.00**
500-Year	Wood	1906	0.68	59	0.54	7	0.26	0	0.00	0	0.00
	Steel	245	0.09	10	0.09	3	0.11	0	0.00	0	0.00
	Concrete	73	0.03	3	0.03	1	0.04	0	0.00	0	0.00
	Precast	15	0.01	1	0.01	0	0.00	0	0.00	0	0.00
	RM	99	0.04	3	0.03	2	0.07	0	0.00	0	0.00
	URM	448	0.16	33	0.30	14	0.52	2	0.50	0	0.00
	MH	0	0.00	0	0.00	0	0.00	2	0.50	0	0.00
	TOTAL	**2786**	**1.00**	**109**	**1.00**	**27**	**1.00**	**4**	**1.00**	**0**	**0.00**
2500 Year	Wood	1431	0.72	407	0.68	123	0.43	11	0.19	1	0.14
	Steel	151	0.08	49	0.08	46	0.16	12	0.20	1	0.14
	Concrete	44	0.02	15	0.03	14	0.05	3	0.05	0	0.00
	Precast	8	0.00	3	0.01	3	0.01	2	0.03	0	0.00
	RM	65	0.03	15	0.03	17	0.06	6	0.10	0	0.00
	URM	276	0.14	109	0.18	80	0.28	25	0.42	5	0.71
	MH	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	TOTAL	**1975**	**1.00**	**598**	**1.00**	**283**	**1.00**	**59**	**1.00**	**7**	**1.00**

* Counts adjusted and based on building count figures provided by the Village of Mount Kisco Manager's office. (See text and Table 5-19).

Table 5-28. Expected Earthquake Building Damage by General Occupancy Type

		None		Slight		Moderate		Extensive		Complete	
		Count*	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**	**Count**	**%**
100-Year	Commercial/Industrial	786	0.31	0	0.00	0	0.00	0	0.00	0	0.00
	Government**	18	0.01	0	0.00	0	0.00	0	0.00	0	0.00
	Education	7	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	Religion	10	0.00	0	0.00	0	0.00	0	0.00	0	0.00
	Residential	1674	0.67	0	0.00	0	0.00	0	0.00	0	0.00
	TOTAL	**2495**	**1.00**	**0**	**0.00**	**0**	**0.00**	**0**	**0.00**	**0**	**0.00**
500-Year	Commercial/Industrial	739	0.31	32	0.34	10	0.42	2	0.53	0	0.00
	Government**	18	0.01	0	0.00	0	0.00	0	0.00	0	0.00
	Education	6	0.00	1	0.01	0	0.00	0	0.00	0	0.00
	Religion	10	0.00	1	0.01	0	0.00	0	0.00	0	0.00
	Residential	1599	0.67	60	0.65	13	0.58	1	0.47	0	0.00
	TOTAL	**2372**	**1.00**	**93**	**1.00**	**23**	**1.00**	**3**	**1.00**	**0**	**0.00**
2500 Year	Commercial/Industrial	459	0.28	165	0.32	123	0.46	34	0.56	3	0.48
	Government**	10	0.01	4	0.01	2	0.01	0	0.00	0	0.00
	Education	4	0.00	2	0.00	1	0.00	0	0.00	0	0.00
	Religion	7	0.00	2	0.00	2	0.01	1	0.01	0	0.00
	Residential	1164	0.71	341	0.66	140	0.52	26	0.43	4	0.52
	TOTAL	**1644**	**1.00**	**513**	**1.00**	**268**	**1.00**	**60**	**1.00**	**7**	**1.00**

*   Counts adjusted and based on building count figures provided by the Village of Mount Kisco Manager's office.   (See text and Table 5-19).
** Government includes protection and health services.

Building losses are divided into two categories. Direct building losses represent the estimated costs to repair or replace the damage caused to the buildings and its contents. Business interruption losses consist of the losses associated with the inability to operate a business due to the damage sustained during an earthquake. Table 5-29 summarizes the estimated annualized earthquake general building stock losses for both Direct building losses (capital stock losses) and business interruption losses (Income losses). Total building stock related losses were zero for the 100-year event, almost 5.2 million for the 500-year event, and about 79 million for the 2500-year event. This figure represents approximately 5 percent of the Village of Mount Kisco's building stock replacement value.

All critical facilities in the village of Mount Kisco are considered exposed and vulnerable to the earthquake hazard. See section 5.B for a complete list of the critical facilities in Mount Kisco. HAZUS estimated the probability that the critical facilities would sustain damages as a result of the earthquake events from different mean return periods. For the 100-year event, HAZUS did not estimate a significant impact on the Village's critical facilities, estimating that no facilities would lose functionality. The Northern Westchester Hospital is estimated to have use of 99% of its beds on day one of the event. In the 500-year event, the hospital is estimated to have use of 85% of its beds on day one, 94% after 1 week, and 99% after 30 days. In the 2500-year event, the hospital is estimated to have use of 57% of its beds on day one, 77% after one week, and 93% after 30 days.

HAZUS divides lifeline inventory into two categories: transportation and utility lifeline systems. Should an earthquake occur, it is possible that ground failure could cause damage to transportation and utility lifeline systems. HAZUS considers seven transportation systems that include highways, railways, light rail, bus, ports, ferry, and airports; as well as six utility systems that include potable water, wastewater, natural gas, crude and refined oil, electric power, and communications. The total value of the lifeline inventory is over 381 million dollars. The inventory includes over 40 kilometers of highways, 9 bridges, and 107 kilometers of pipes.

Table 5-29. Estimated Annualized Earthquake Building Stock Losses. (X $1,000)*

MRP	Category	Area	Residential	Commercial/ Industrial	Other	Total
100-Year	Income Losses	Wage	0.00	0.00	0.00	0.00
		Capital-Related	0.00	0.00	0.00	0.00
		Rental	0.00	0.00	0.00	0.00
		Relocation	0.00	0.00	0.00	0.00
		Subtotal	0.00	0.00	0.00	0.00
	Capital Stock Losses	Structural	0.00	0.00	0.00	0.00
		Non-Structural	0.00	0.00	0.00	0.00
		Content	0.00	0.00	0.00	0.00
		Inventory	0.00	0.00	0.00	0.00
		Subtotal	0.00	0.00	0.00	0.00
500-Year	Income Losses	Wage	0.01	0.40	0.05	0.46
		Capital-Related	0.00	0.27	0.00	0.27
		Rental	0.10	0.15	0.00	0.25
		Relocation	0.12	0.22	0.10	0.45
		Subtotal	0.22	1.04	0.16	1.42
	Capital Stock Losses	Structural	0.27	0.29	0.16	0.71
		Non-Structural	0.93	0.84	0.42	2.18
		Content	0.20	0.44	0.21	0.85
		Inventory	0.00	0.02	0.00	0.02
		Subtotal	1.41	1.58	0.78	3.77
2500-Year	Income Losses	Wage	0.10	5.55	0.52	6.17
		Capital-Related	0.04	3.76	0.10	3.91
		Rental	1.08	1.88	0.21	3.16
		Relocation	1.39	3.23	1.77	6.39
		Subtotal	2.60	14.42	2.61	19.63
	Capital Stock Losses	Structural	2.97	4.07	2.08	9.12
		Non-Structural	14.70	13.10	6.30	34.10
		Content	5.00	7.91	3.70	16.60
		Inventory	0.00	0.24	0.05	0.30
		Subtotal	22.66	25.32	12.14	60.11

* Values adjusted and based on general building stock replacement value figures provided by the Village of Mount Kisco Manager's office. (See text and Table 5-19).

Regional transportation and distribution of materials may be interrupted due to an earthquake event. HAZUS calculated damage estimates to the different components of the Village of Mount Kisco's transportation systems. Its assessment analyzed such components as segments, bridges, tunnels, and facilities to the Village's highways, railways, and bus systems. It is estimated that a 2500-year event would cost .7 million dollars in damages to Mount Kisco's transportation system. Table 5-30 summarizes the economic losses to the Village's transportation system for a 100-, 500-, and 2500- year event.

Table 5-30. Transportation System Economic Losses from Earthquake. (X $1,000)

			100-Year		500-Year		2500-Year	
System	**Component**	**Inventory Value**	**Economic Loss**	**% Loss Ratio**	**Economic Loss**	**% Loss Ratio**	**Economic Loss**	**% Loss Ratio**
Highway	Segments	271.34	0.0	0.00	0.0	0.00	0.0	0.00
	Bridges	80.87	0.00	0.01	0.01	0.01	0.53	0.65
	Tunnels	0.00	0.0	0.00	0.0	0.00	0.0	0.00
	Subtotal	352.2	0.0		0.0		0.53	
Railways	Segments	27.61	0.0	0.00	0.0	0.00	0.0	0.00
	Bridges	0.00	0.0	0.00	0.0	0.00	0.0	0.00
	Tunnels	0.00	0.0	0.00	0.0	0.00	0.0	0.00
	Subtotal	27.60	0.0		0.0		0.0	
Bus	Facilities	1.29	0.0	0.02	0.03	2.50	0.19	214.69
	Subtotal	1.29	0.0		0.0		0.19	
	Total	**381.10**	**0.00**		**0.03**		**.70**	

Utility systems may be damaged due to an earthquake event. A 100-year event would not cause any damage, a 500-year event would not cause any significant damage. In a 2500-year event, the damage ratio (ratio of repair to replacement cost) for the Village's communication system is 7.63%. Table 5-31 summarizes the economic losses to the Village's Utility system for a 100-, 500-, and 2500- year event.

Table 5-31. Utility System Economic Losses from Earthquake. (X $1,000)

			100-Year		500-Year		2500-Year	
System	**Component**	**Inventory Value**	**$ Economic Loss**	**% Loss Ratio**	**$ Economic Loss**	**% Loss Ratio**	**$ Economic Loss**	**% Loss Ratio**
Potable Water	Pipelines	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Facilities	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Dist. Lines	1.10	0.00	0.00	0.00	0.06	0.01	0.48
	Subtotal	1.08	0.00		0.00		0.01	
Wastewater	Pipelines	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Facilities	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Dist. Lines	0.60	0.00	0.00	0.00	0.05	0.00	0.40
	Subtotal	0.65	0.00		0.00		0.00	
Natural Gas	Pipelines	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Facilities	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Dist. Lines	0.40	0.00	0.00	0.00	0.02	0.00	0.21
	Subtotal	0.43	0.00		0.00		0.00	
Oil Systems	Pipelines	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Facilities	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Subtotal	0.00	0.00		0.00		0.00	
Electric Power	Facilities	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Subtotal	0.00	0.00		0.00		0.00	
Communication	Facilities	0.10	0.00	0.00	0.00	0.34	0.01	7.63
	Subtotal	0.12	0.00		0.00		0.01	
	Total	**2.38**	**0.00**		**0.00**		**0.02**	

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, wind damage, and earthquakes. Also, these hazards were judged to be rare, improbable or not significant to the Village of Mount Kisco. 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 Mount Kisco. These include:

- Air Contamination
- Civil Unrest
- Rail Accidents
- Radiological Release
- 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, erosion and redistribution and shifting of rivers, lakes, and streams. There are a number of areas for natural habitats, wetlands and marsh plants and grasses in Mount Kisco. There are 233.5 acres classified as Open Space/Conservation Land, including dedicated preserves, open spaces, and areas with easements that restrict development. The largest area of wetlands is located between the Kisco River and Lieto Drive, with an extension running up to Green Street, just south of the Central Business District. Other wetland areas are located north of the Central Business District, from Legion Way to Barker Street, and on Preston Way; and behind the Target shopping center north of Preston Way. These wetlands are zoned by the Village as Open Space/Conservation Land, except for the wetland area behind the Target Center, which is classified as Undeveloped Land.

These are areas that are affected by natural storm events, and other hazards such as riverine erosion and flooding, and would impact the Village. The Village's topography consists of a stream valley traversing from the southwest to the northeast along with rocky outcrop hills in two sections. Elevations range from 620 feet above mean sea level on the know formed by a bedrock outcrop in the northwest corner of the Village, to approximately 280 feet above mean sea level in the stream valley to the southwest. There are a total of 135.9 acres of steep slopes in the Village of Mount Kisco.

5.G Land Use Development, Redevelopment and Population Trends

The current population in the Village of Mount Kisco is 10,877 according to the 2010 US Census. It is seen as a growing suburban community with an established land use pattern. The socioeconomically diverse population has increased by almost 9% over the last 10 years. Housing is varied, consisting of apartment buildings, coops, condominiums, typical suburban homes, historic colonials, and multi-million dollar estates. Mount Kisco is considered the "Commercial Hub of Northern Westchester". It is home to numerous locally owned boutiques, retail stores, small businesses, national chain stores, diverse eateries, financial offices, and medical offices. There is no significant future development planned in Mount Kisco. The only major potential development is a 129 unit, two story, assisted living facility to be built off of Kisco Avenue. The Village intends to enforce its Flood Damage Prevention Ordinance, Stormwater Management and Erosion and Sediment Control Ordinance, and Uniform Building Codes.

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 Mount Kisco, 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.

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.D 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 Mount Kisco (See Sections 4 and 5), the next step is to identify planning goals to guide the development of mitigation actions. The Hazard Mitigation Planning Committee, with the consultant's input and review by the community, proposed these goals and objectives for developing mitigation measures that are presented 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. Five hazard mitigation goals were proposed for implementing the Village mitigation measures. These include:

1. Avoid and reduce the impacts from flood hazards.
2. Protect the community from catastrophic disasters to avoid loss of life and injury.
3. Protect public and private property and infrastructure from catastrophic disasters.
4. Protect environmental and natural resources.
5. Promote mitigation efforts through existing programs and partnerships.

These goals are derived from primary hazards of concern which were evaluated previously in Sections 4 and 5. The primary hazard of concern is flooding and damage from major storms such as coastal storms, thunder storms, severe rain storms, Nor'easters, tropical storms and hurricanes. The goals however are sufficiently broad to encompass other hazards discussed in Section 4. 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 that cause flooding and wind damage. 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. These proposed goals are broad and inclusive of technological and human-caused hazards.

The five goals consider the existing resources and capabilities of the Village government and strive to reduce vulnerabilities and mitigate hazards having significant risks. These goals will be evaluated in future updates of this Plan. (See Section 9.) Each of the goals established encompass the primary hazards of concern.

6.A.1 Goals for Reduction of Vulnerabilities

Each goal is intended to reduce hazard risks and vulnerabilities and was discussed in Section 5, *Assess the Impacts*. The hazards of concern were discussed in detail in Section 4 and were eliminated from further evaluation in Section 5. Several hazards that contribute to the major hazard of flooding and wind damage were selected for further evaluation and assessment. These hazards include:

- Floods
- Coastal storms
- Winter storms
- Utility Failure
- Tornados
- Wind storms
- Hurricanes
- Water Failure
- Severe Rain Storms
- Thunderstorms
- Extreme Temperatures
- Ice Storms

Vulnerabilities to these hazards include people, Village buildings, infrastructures and public and private property. Vulnerabilities to people include Village residents, visitors, commuters, travelers and Village workers who are potentially impacted by these hazards. Vulnerabilities of structures include critical facilities, private homes and businesses. Vulnerabilities of public and private property include trees, vehicles and land. Infrastructures include power distribution systems, roads, bridges, rail transportation, storm water systems. (See Section 5 for vulnerability details.)

The first goal (*Avoid and reduce the impacts from flood hazards*) is intended to protect people and property in flood prone areas that were identified in Sections 4 and 5. This goal focuses on the mitigation of impacts from flooding on vulnerable properties, structures and people. The Village of Mount Kisco is known to flood frequently in several areas. (See Section 4.) This goal is aimed to mitigate impacts related to water damage through upgrading drainage and sewage systems, and improvement of roads. Portions of the existing sewer and storm drain system are more than 100 years old. In addition, significant structural defects in the storm and sanitary sewer systems could impact the entire system.

The second goal (*Protect the community from catastrophic disasters to avoid loss of life and injury*) is intended to cover any hazard that has the potential to cause catastrophic impacts on people. Protecting the safety of the public in the community is of prime concern. This goal includes impacts from natural as well as man-caused hazards. Multiple government services may be involved that include emergency operations command, police, fire and emergency response units, Village administration and Village communications center as well as State and Federal resources.

The third goal (*Protect public and private property and infrastructure from catastrophic disasters*) is intended to cover any hazard that has the potential to cause catastrophic damage to public and private property, buildings, homes and infrastructures. It is also intended to protect vulnerable businesses and critical facilities from loss of use from any hazard including impacts from natural and man-caused hazards. These impacts may require multiple government services that include response from emergency units, police, and fire department, Village administration resources as well as State and Federal agencies.

The fourth goal (*Protect environmental and natural resources*) includes protecting valuable resources such as open spaces, parks, streams, ponds, air quality, water quality, environmentally sensitive areas, land use as well as hazardous waste and municipal waste. Preparing for global warming impacts is a significant concern in this goal. Potential changes may already be beginning as flooding, storms and warmer temperatures in recent decades seem to indicate.

The fifth goal (*Promote mitigation efforts through existing programs and partnerships*) emphasizes the importance of community and stakeholder involvement in protecting lives, safety and property. Effective public communication and action is critical in implementing this mitigation goal. Stakeholder involvement includes maintaining inter-jurisdiction involvement of neighboring communities and interagency coordination of mitigation measures. By involving stakeholders and upgrading existing programs, certain mitigation actions can be efficient and cost effective.

6.A.2 Strategy for Objectives

The Village Hazard Mitigation Committee evaluated several specific objectives for each of the five general primary goals discussed above. These objectives offer a strategy for identifying and proposing mitigation measures in Section 7 that meet these established goals. The primary objectives for each goal are listed in Table 6-1. These objectives and the proposed mitigation activities listed in Section 7 comply with relevant criteria provided in FEMA guidance. These criteria include Technical, Political, Legal, Economic, Environmental, and Social criteria and Administrative evaluation criteria.

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

- Technical - Develop technically feasible mitigation efforts
    - Be effective in reduction of long-term losses, impacts and risks
    - Be effective in minimizing secondary losses
    - Be effective in solving the problem and not only the symptoms.
    - Eliminate actions that will not technically meet the goals.
- Political - Acceptable to and supported by community politicians
    - Have full support of the Village Board and Administration
    - Involve political leaders in the planning process
    - Have support and involvement of stakeholders
    - Have public support and involvement

Table 6-1. Hazard Mitigation Goals and Primary Objectives - Mount Kisco, NY

1. Avoid and reduce the impacts from flood hazards.
    - 1.1. Prevent flooding from the Kisco River, Branch Brook, and other streams, lakes, and ponds that run through the Village.
    - 1.2. Identify and eliminate inflow and infiltration problems.
    - 1.3. Correct storm and sanitary sewer backup problems from floods.
    - 1.4. Improve the storm water collection and drainage system.
    - 1.5. Control sediment disposition and erosion.
    - 1.6. Manage flood impact problems through planning.

2. Protect the community from catastrophic disasters to avoid loss of life and injury.

    - 2.1. Enhance the community awareness of emergency procedures.
    - 2.2. Maintain, enhance and ensure the efficient operation of early warning, notification and communication systems.
    - 2.3. Develop, integrate, and/or enhance emergency action plans.
    - 2.4. Reduce impacts of hazards on vulnerable populations.
    - 2.5. Update disaster plans and coordinate with Red Cross and other agencies.
    - 2.6. Ensure continuity of government operations, emergency services, and essential facilities during and immediately after disaster and hazard events.

3. Protect public and private property and Infrastructure from catastrophic disasters.

    - 3.1. Protect Critical Facilities, buildings, and infrastructure from damage and loss.
    - 3.2. Reduce impacts of hazards on homes, businesses, and institutions.
    - 3.3. Manage hazard impacts through planning.

4. Protect environmental and natural resources.

    - 4.1. Protect and preserve open space and environmentally sensitive and critical areas.
    - 4.2. Protect and restore natural lands and features that serve to mitigate losses.
    - 4.3. Incorporate hazard considerations into land-use planning and natural resource management.
    - 4.4. Encourage hazard mitigation measures that result in the least adverse effect on the natural environment.

5. Promote mitigation efforts through existing programs and partnerships.

    - 5.1. Strengthen inter-jurisdiction and interagency communication, coordination, and partnerships to foster hazard mitigation actions or projects.
    - 5.2. Evaluate impacts using engineering analyses and studies of water courses impacting the community.
    - 5.3. Coordinate with neighboring communities.

Evalluation criteria (Contd.)

- Legal - Have 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
  - Provide economic costs and benefits of a mitigation action
  - Have minimal burden to the tax base or local economy
- Environmental - Improve environmental quality
  - Identify and evaluate environmental impacts
  - Comply with all environmental laws and regulations
  - Benefit the environment
- Social - Improve the quality of life and reduce neighborhood impacts.
  - Include public support and involvement
  - Consider effects on selected segments of the population
  - Be compatible with present and future community values
  - Consider cultural impacts on the community
- Administrative - Provide resources and staffing to implement proposed actions
  - Have jurisdiction and capability necessary to implement an action
  - Have jurisdiction to accomplish activities in a timely manner
  - Have jurisdiction to maintain and manage the mitigation measure

The objectives presented are not mutually exclusive and may apply to one or more goals. (See Table 6-2.) For example, several objectives listed under the second goal "*Protect the community from catastrophic disasters*" can also apply to "*Avoid and reduce the impacts from flood hazards*". For simplicity, objectives are listed once under a primary goal. Each of the objectives discussed below form the basis for the mitigation measures presented and discussed in detail in Section 7.

Table 6-2. Mount Kisco Hazard Mitigation Objectives with their Corresponding Goals

	GOAL STATEMENTS				
OBJECTIVE STATEMENTS	1. Avoid/ Reduce Flood Impacts	2. Protect the community from Disasters	3. Protect public and private Property / Infrastructure	4. Protect Environment/ Natural resources	5. Promote Partnerships
1-1 Prevent flooding from Kisco River, Branch Brook and other streams, lakes and ponds	***X**	x	x	x	
1-2 Identify and eliminate inflow and infiltration problems	***X**			x	
1-3 Correct storm and sanitary sewer backup problems from floods	***X**	x	x	x	
1-4 Improve the storm water collection and drainage system	***X**	x	x		x
1-5 Control sediment disposition and erosion	***X**		x	x	
1-6 Manage flood impact problems through planning	***X**	x	x	x	
2-1 Enhance the community awareness of emergency procedures	x	***X**			
2-2 Maintain, enhance and ensure the efficient operation of early warning, notification and	x	***X**	x		x
2-3 Develop, integrate, and/or enhance emergency action plans		***X**			x
2-4 Reduce impacts of hazards on vulnerable populations	x	***X**		x	
2-5 Update disaster plans and coordinate with Red Cross and other agencies	x	***X**			x
2-6 Ensure continuity of government operations, emergency services, and essential facilities		***X**		x	x
***X – Primary Objective** x – Secondary Objective					

OBJECTIVE STATEMENTS	1. Avoid/ Reduce Flood Impacts	2. Protect the community from Disasters	3. Protect Property / Infrastructure from Disasters	4. Protect Environment/ Natural resources	5. Promote Partnerships
3-1 Protect Critical Facilities, buildings, and infrastructure from damage and loss	x		***X**		
3-2 Reduce impacts of hazards on homes, businesses, and institutions	x	x	***X**		x
3-3 Manage hazard impacts through planning	x		***X**		x
4-1 Protect and preserve open space and environmentally sensitive and critical areas.	x			***X**	
4-2 Protect and restore natural lands and features that serve to mitigate losses	x			***X**	
4-3: Incorporate hazard considerations into land-use planning and natural resource management,	x			***X**	x
4-4 Encourage hazard mitigation measures that result in the least adverse effect on the natural environment	x			***X**	
5.1 Strengthen inter-jurisdiction, coordination and partnerships					***X**
5.2 Evaluate impacts using engineering analysis and studies	x				***X**
5.3 Coordinate with neighboring communities	x			x	***X**

***X – Primary Objective for the goal.**
x – Secondary objective for the goal.

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 Avoid and reduce the impacts from flood hazards

The goal to "*Avoid and reduce impacts from flood hazards*" is a focus of major concern for the community since flooding is so frequent and destructive. The following Six objectives are intended to meet this goal. These include:

1. Prevent flooding from the Kisco River, Branch Brook and other streams, lakes, and ponds that run through the Village.
2. Identify and eliminate inflow and infiltration problems.
3. Correct storm and sanitary sewer backup problems from floods.
4. Improve the storm water collection and drainage system.
5. Control sediment deposition and erosion.
6. Manage flood impact problems through planning.

Flooding is the most significant hazard for the damage it does in Mount Kisco. Important to this goal is the mitigation of flooding from stream running through the Village. Preventative mitigation measures for flood control would reduce the hazard to the Village. Mitigating impacts from flood hazards is needed in high risk areas which exceed the 100-year/500-year flood zones levels. Correcting problems in the storm and sanitary sewer systems would help meet this goal by having more drainage capacity and effective removal of storm water. Overflow problems of the sanitary system should be corrected and improved. Actions that prevent sewer backup need to be developed. Actions that would eliminate the inflow and infiltration problems would meet this objective.

The community needs to identify the mitigation activities that require development of plans and implement such plans. Preparing a set of plans for flood control would include improving storm water collection and drainage and implement measures to control sediment deposition and erosion.

6.B.2 Protect the community From Catastrophic Disasters to Avoid Loss of Life and Injury

Avoiding loss of life and injury from disasters is a central goal for the Village. 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.

Primary objectives to "*Protect the community against catastrophic disasters*" include:

1. Enhance the community's awareness of emergency procedures.
2. Maintain, enhance and ensure the efficient operation of early warning, notification and communication systems.
3. Develop, integrate, and/or enhance emergency action plans.
4. Reduce impacts of hazards on vulnerable populations.
5. Update disaster plans and coordinate with the Red Cross and other agencies.
6. Ensure continuity of government operations, emergency services, and essential facilities. during and immediately after disaster and hazard events.

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 of government. It involves using mass media, email, newspapers, churches, community groups and other organizations.

One of the major objectives is to ensure that adequate planning is conducted and updated to avoid loss of life and injuries during a major storm or other hazardous events by having a well-prepared and approved emergency response and escape plan. Action plans should identify appropriate staff, required training and the necessary equipment and supplies to meet response needs. Village residents need to be aware of emergency procedures to assure that basic emergency services are not disrupted and that emergency services are not disrupted so that people in need of emergency services get them during a hazardous event.

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.3 Protect public and private property and infrastructure from catastrophic disasters

This goal is aimed at mitigating losses through various property protection activities before a hazardous event occurs. Protecting residential property from catastrophic disasters is also included. This goal focuses on protecting the Village from major losses. Severe storms are noted for the damage they can do in Mount Kisco. (See Sections 4 and 5.)

Three prime objectives related to this goal are:

1. Protect Critical Facilities, buildings, and infrastructure from damage and loss.
2. Reduce impacts of hazards on homes, businesses, and institutions.
3. Manage catastrophic impacts through emergency planning.

Critical facilities, commercial and residential buildings and associated infrastructures need to be protected from hazards to assure that basic Village services for healthcare, police, transportation, government, fire and emergency services are not disrupted and that people in need of emergency services get them during a major hazardous event. Mitigation measures that reduce impacts on homes, businesses and institutions also need to be identified and implemented. Village infrastructures, including storm water conveyances need to be reviewed for expansion and enhancement for control of storm water.

Developing comprehensive emergency plans are needed to prepare for impacts from catastrophic events. These emergency plans are required by FEMA.

6.B.4 Protect environmental and natural resources.

The objectives for environmental and resource protection will help conserve resources that are important for preserving open space, plants, wildlife, fish, sensitive ecosystems and wetlands. Four objectives have been developed to help meet this goal.

1. Protect and preserve open space and protect environmentally sensitive and critical areas.
2. Protect and restore natural lands and features that serve to mitigate losses.
3. Incorporate hazard considerations into land-use planning and natural resource management.
4. Encourage hazard mitigation measures that result in the least adverse effect on the natural environment.

Actions that protect and preserve open space and protect environmentally sensitive and critical areas are important for flood control. Depending on the location, actions proposed may involve a variety of measures such as vegetation management, acquisition of impacted properties and structures, redirecting flood water and other methods to restore natural features.

Hazard mitigation actions may require land-use planning and management of natural resources. Any measure proposed must have minimal adverse impact on the natural environment.

6.B.5 Promote mitigation efforts through existing programs and partnerships.

The fifth goal, (*Promote mitigation efforts through existing programs and partnerships*) emphasizes the importance of community and stakeholder involvement in protecting lives, safety and property. Effective public communication and action is critical in implementing this mitigation goal. Stakeholder involvement includes one or more inter-jurisdictions, neighboring communities and interagency coordination of mitigation measures.

Three specific objectives were developed that relate to this goal:

1. Strengthen inter-jurisdiction and interagency communication, coordination, and partnerships to foster hazard mitigation actions or projects.
2. Evaluate impacts using engineering analyses and studies of water courses impacting the community.

3. Coordinate with neighboring communities.

Inter-jurisdiction and interagency communication and coordination needs to be strengthened. Partnerships are needed to foster hazard mitigation projects. Since many downstream structures and people could be impacted by mitigation projects in Mount Kisco, such projects need the cooperation of affected jurisdictions.

Additional engineering analyses and water course studies impacting the Village will likely be required and updated. Such activities may be needed prior implementing a mitigation measure.

Existing programs, projects or studies need to be integrated in this Hazard Mitigation Plan. Agencies such as the U.S. Army Corps of Engineers and Westchester County Department of Planning need to be involved.

The above goals and objectives provide a focus for proposing mitigation activities. Section 7 provides a variety mitigation activities and actions intended to meet the goals and objectives outlined above.

Section 7 - Review of Mitigation Activities

7.A Planning Process and Strategy

FEMA provides guidance on developing a hazard mitigation strategy which serves as a long-term blueprint for reducing potential losses that were identified in the risk assessment (Section 5) of this Hazard Mitigation Plan. There are three components to this strategy:

- Developing long-term goals or outcomes that you want to achieve.
- Identifying specific activities or actions that local government, community organizations and others can take to reduce the risk of identified hazards.
- Develop an Action Plan that prioritizes each action and how and when they will be implemented.

With the Village's and the Committee's help the principal goals and objectives were assembled as part of this strategy. The next step identifies specific actions the community can take to meet these objectives. To accomplish this, detailed mitigative actions or activities were assembled that are effective, feasible and meet the goals and objectives specified in Section 6.

Tables 7.1 through 7-5 summarize each proposed action item and associate details. These include:

- FEMA Activity Type
- Action Item, Activity or mitigation measure proposed.
- Primary Objective –The most appropriate objective from the Goals list in Section 6
- Priority – A score of 1, 2, or 3, with 1 being the highest priority to implement.
- Hazards Mitigated – Flooding, utility failure, wind storm, drought, etc.
- Benefits/Comments – Effectiveness of the action, problems and cost benefits.
- Approximate Costs –An approximate amount or range which considers local government and contractor costs to the nearest $1,000. ($10,000- $20,000). A detailed cost estimate will be prepared once the scope of the project is defined and funding source is identified.

This Section proposes mitigation activities that would reduce the impact of various hazardous events that may occur in Mount Kisco. 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 hazard of concern in Mount Kisco is flooding. The fact that flooding is rated as the most serious hazard (see Table 4-3) is due to a variety of storm hazards such as coastal storms, thunder storms, nor'easters, tropical storms, hurricanes and other storms that threaten the village almost every year and any one of these events can have a devastating impact. For example the hazard scorings Table 4-3 show hurricanes as a moderately high 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 less wind damage but cause 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 fallen trees, utility failures, dam failures, transportation accidents, water supply contamination and structural collapse. The principal hazards considered for proposed mitigation measures include:

High Hazards
- Floods

Moderately High Hazards
- Coastal Storms (including tropical storms, nor'easters)
- Winter Storms (blizzards, ice storms)
- Utility Failure
- Tornados
- Hurricanes
- Windstorms
- Severe Storms (including thunder storms)
- Fires (Structural)

Moderately Low Hazards
- Dam failure
- Hazardous Materials (in transit)

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 flooding.

In this current section we discuss the process and strategies used to develop and prioritize the mitigation activities to protect the community against the primary hazards identified. 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. Detailed ranking will be determined in Section 8. 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 and were made available to the community for comment.

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 five primary goals identified by the Hazard Mitigation Planning Committee are discussed in Section 6 and include:

1. Avoid and reduce the impacts from flood hazards.
2. Protect the community from catastrophic disasters to avoid loss of life and injury.
3. Protect public and private property and infrastructure from catastrophic disasters.
4. Protect environmental and natural resources.
5. Promote mitigation efforts through existing programs and partnerships.

The Committee helped identify several objectives to meet these goals. 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 four categories:

- Local Plans and Regulations (LPR)
- Structure and Infrastructure Projects (SIP)
- Natural Systems Protection (NSP)
- Education and Awareness Programs (EAP)

Local Plans and Regulations are a strategy of institutional steps that reduce the impacts from hazards, avoid or limit personal harm and decrease the loss of property value. They include administrative or regulatory actions by government authorities. 'LPR' in Tables 7-1 through 7-5 indicates these types of activities. These measures help keep problems from getting worse and 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.

Structure and Infrastructure Projects affect the way land, buildings and infrastructures are developed or modified to protect them from a hazard. An item is identified as 'SIP' to indicate it is a Structure and Infrastructure Projects Activity. These 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. This strategy may include projects such as elevating roads or flood control structures such as storm and sanitary sewers, or building retaining walls that direct floodwaters away from an area.

Natural Systems Protection reduces damage and losses to natural systems. It preserves or restores the functions of the natural system. These measures are intended to mitigate sediment accumulation, erosion, stream flow problems, wetland loss and other natural processes. The Village has limited open space and several natural areas are located adjacent to the Kisco River. Natural resource protection works to preserve or restore natural areas and the natural function of a floodplain. These activities may also include vegetation management, water quality control, pond management or wetland management. Each proposed Natural System Protection Measure is identified as 'NSP'.

Education and Awareness Programs 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 community. They include public meetings, Web Page productions, local public television, outreach programs and newspaper notices. 'EAP' in Tables 7-1 through 7-5 indicates Education and Awareness Program activities. These activities may be performed at various times and may be associated with several mitigation items.

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 specific future proposals for work and grant applications. The proposed activities represent a brief summary or conceptual plan for work items. The plan is 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 2013 dollars. The cost estimates include local government staff and contractor costs to the nearest $1,000 and may be expressed as a range of costs. Costs under $100,000 are rounded to the nearest $25,000. Costs under $1,000 are rounded to the nearest $250. These preliminary estimates include professional judgment and past experience and input from the Committee. A detailed cost estimate will be prepared after the scope of the project is defined and a funding source is identified. These estimated costs will be used in evaluating the cost benefit summary for each proposed activity.

7.A.4 Setting Priorities

A priority is assigned to each Activity Item shown in Tables 7-1 to 7-5. Priority 1 activities are the highest priority with group 3 having the lowest priority. Priority 1 activities are considered the most urgent or important projects to start with. Only three priority categories were chosen to keep decision-making easier and to promote consensus among the Committee. Section 8 will provide a detailed ranking of each action item. As the plan is implemented these priorities are expected to change based on resource availability, funding, new information, and future community needs. Some activity items that may have already started 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 criteria for analyzing the alternative priorities are based on Social, Technical, Administrative, Political, Legal and Environmental considerations provided in FEMA guidance. (See Section 6.A.) 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.

Activities that were most cost-effective were rated highest. Funding resources and availability were also important considerations. Actions that can be done using available resources or having identified sources of funds also have a higher priority.

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. Projects having high costs and high benefits or a high risk reduction would also have a higher priority. High-cost items having a lower benefit would have a lower priority. A low-cost item though important, may be given a lower priority because there were fewer direct property and safety benefits to the Village. These activities were proposed, reviewed and evaluated by the Committee, Village officials and the consultant.

The results of these reviews are described in the proposed mitigation measure in the following Sections 7.B.1 through 7.B.5. Each item includes:

- Action type

- Activity item
- The primary objective of concern
- A description of the proposed mitigation measure
- Priority rating of 1 to 3
- The hazards being addressed
- The benefits produced by the action
- Estimated costs

7.A.5 Capability and Resources

The Village of Mount Kisco will have the responsibility, jurisdiction, capability and authority to administrate and implement most all of the mitigation actions proposed below. In some instances a neighboring community or other agency may have jurisdiction that requires a joint Memorandum of Understanding or a partnership to implement the activity. The Village official in charge of a project will be responsible for interfacing with the public and appropriate neighboring jurisdictions, Westchester County, USCOE, 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 financial resources or human resources to prepare the plans, studies, and engineering designs or implement public outreach and conduct the construction required for many of the activities proposed. Therefore, external agency funding for consultants, engineers and contractors will be needed to successfully implement much of 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. Twenty-two mitigation activities were identified that were met one of our five goals. The proposed activities are listed by their primary goal in Tables 7-1 through 7-5. Each mitigation action is summarized with its action type, key objective, associated hazards (see Sections 7.A.2–7.A.4), 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 criteria listed in Section 6.A and 7.A.4. Unless noted under a specific activity, none of the criteria limit the activities evaluated below.

The proposed mitigation actions are consistent with the recommendations developed in the August 2000 Comprehensive Plan for the Village of Mount Kisco and the January 2003 US Army Corps of Engineer Branch Brook Flood Control Study. Sections 4 and 5 of this Hazard Mitigation Plan provide the technical support for these proposed activities. In addition, where applicable, those actions that are intended to aid the community with continued NFIP compliance are indicated.

7.B.1 Goal 1 - Avoid and reduce the impacts from flood hazards.

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 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. Perform Feasibility and Hydrology Study of Branch Brook, Kisco River, and Wetland Areas

This proposed feasibility and hydrology study of Branch Brook, Kisco River, and wetland areas is a Natural Systems Protection (NSP) activity with an objective of managing flood impacts through planning. Flooding is the primary hazard to mitigate. Secondary hazards that contribute to flooding include coastal storms, tropical storms, nor'easters, hurricanes and thunderstorms.

This proposed study is a follow up activity to the January 2003 Mount Kisco Branch Brook Flood Control Study–Interim Assessment Report by the US Army Corps of Engineers.

Recommendations from the 2003 study will be reevaluated for applicability in the three study areas. These recommendations included: Levees and flood wells; upstream retention; channel modifications; zoning and; flood-proofing of buildings. Structural measures proposed were considered too expensive and disruptive. Nonstructural measures such as zoning and flood proofing buildings were considered more feasible. This follow up study should lead to specific mitigation activities that improve flow and reduce flooding in Branch Brook, the Kisco River and wetlands. The cost of the studies for the three areas is around $375,000.

Table 7-1. Proposed Activities to Avoid and Reduce Impacts from Flood Hazards. ****

Action Type*	Action Item	Primary Objective **	Priority ***	Hazards Mitigated[#]	Benefits/Comments	Cost Estimate
NSP	1. Perform feasibility and hydrology study of Branch Brook, Kisco River, and wetland areas	1.6. Manage flood impact problems through planning	1	Flooding, storms, hurricanes	Improve flow in Branch Brook and Kisco River to reduce flooding	$375,000
NSP	2. Dredge pond at Shoppers Park	1.5. Control sediment deposition and erosion	2	Flooding, storms, hurricanes	Prevent flooding at Shoppers Park	$100,000
NSP	3. Perform stream and river maintenance -clean debris and sediment	1.1. Prevent flooding from rivers and streams	2	Flooding, storms, hurricanes	Improve flow of water and minimize water backup.	$30,000/ year
NSP	4. Make stream corridor improvements and bank stabilization	1.1.Prevent flooding from rivers and streams	2	Flooding, storms, hurricanes	Improve flow of stream and minimize erosion.	$500,000
NSP	5. Dredge and perform maintenance on retention area at Diplomat Towers	1.5. Control sediment deposition and erosion	3	Flooding, storms, hurricanes	Improve capacity for retention of storm water and drainage.	$125,000
SIP	6. Purge catch basins, pipes, drainage network; clean drainage piping network	1.3. Correct storm and sanitary sewer backup problems from floods.	1	Flooding, storms, hurricanes	Improve flow and capacity of drainage network.	$500,000
SIP	7. Reline sanitary sewer lines	1.4. Improve storm water collection and drainage system.	1	Flooding, storms, hurricanes	Eliminate sewer backups at sewage pump station; improve water quality at wetlands	$1,000,000
SIP	8. Make piping repairs in the sanitary & storm systems	1.3 Correct storm and sanitary sewer backup problems from floods	1	Flooding, storms, hurricanes	Improve I and I; protect watershed from overflows; reduce capacity problems for other facilities	$1,000,000

***Action Type:** **LPR – Local Plans and Regulations** **SIP – Structure and Infrastructure Projects**
NSP - Natural Systems Protection **EAP – Education Awareness Programs**

*****Priority:** **1 - High** **2 - Medium** **3 – Low**

****Activity may also meet other goals and objectives – see text. Number for goal and objective from Table 6-1.**

 # For primary hazards included see page 7-2, Sect. 7.A.

****** These items are intended to aid the community with continued NFIP compliance.**

7.B.1.2. Dredge Pond at Shoppers Park

The dredging of the pond at Shoppers Park is a Natural Systems Protection (NSR) action that is intended to control sediment deposition and erosion. Dredging would result in a larger capacity for the pond to hold runoff. This activity would reduce the extent of flooding in the area. The expected cost would be in the range of $100,000 +/- $25,000. Dredging is highly feasible but relative to its costs it has a lower effectiveness than other technologies. Therefore a priority of 2 is given to this action.

7.B.1.3 Perform Stream/River Maintenance

Perform stream/river maintenance is a Natural Systems Protection (NSP) action. It involves cleaning debris and sediment from the Village streams and river. This is an action that will require periodic effort over the years in order to keep the Kisco River, Branch Brook and other streams flowing freely and draining properly. Its objective is intended to prevent flooding from rivers and streams. If properly maintained the activity would be effective. The improved flow of water should minimize backup and overflow of water in the streams. Approximate annual costs could be $30,000 per year. Due to the large area covered and regular maintenance this activity would be highly effective with a priority of 2.

7.B.1.4. Make Stream Corridor Improvements and Bank Stabilization

Making stream corridor improvements such as stream bank stabilization helps prevent flooding from rivers and streams running through the Village. Stabilizing stream banks reduces erosion which in turn improves the flow of the stream. Depending on the methods used to stabilizing the banks, costs could vary widely. The estimated cost is $500,000 assuming vegetative planting of the stream banks. This is a highly feasible action for stabilizing stream banks. This project was given a priority of 2 since its effectiveness for improving stream flow is not as great as other activities. However, in the long-term the vegetation will help reduce sedimentation in the streams.

7.B.1.5. Dredge and Perform Maintenance on Retention Area at Diplomat Towers

Dredging and performing maintenance on a retention area at Diplomat Towers is classed as a Structure and Infrastructure Project (SIP). The objective is to control sediment deposition and erosion in the area and was assigned a priority of 3. A benefit would be improvement in the capacity to retain storm water and drainage. The action is highly feasible and cost effective for a one-time expense of $125,000.

7.B.1.6. Purge Catch Basins, Pipes, Drainage Network; Clean Drainage Piping Network

Purging catch basins, pipes, drainage network and cleaning drainage piping network is a Structure and Infrastructure Project (SIP). Its objective is to protect storm and sanitary sewer backup problems from floods. It is expected that this activity would greatly improve the flow and capacity of the drainage network. For a cost of $500,000 this activity would be cost effective.

7.B.1.7. Reline Sanitary Sewer Lines

Relining sanitary sewer lines is a Structure and Infrastructure Project (SIP) designed to improve the storm water collection and drainage system. It is a standard and effective procedure for improving flow in storm and sanitary sewer lines. Its benefits include eliminating sewer backups at the sewage pump station and improved water quality in wetlands. It was assigned a priority of 1 due to its effectiveness and reasonable costs. The estimated cost of this activity is $1,000,000.

7.B.1.8. Make Piping Repairs in the Sanitary & Storm Systems

Making piping repairs in the sanitary and storm systems is a Structure and Infrastructure Project (SIP). The primary objective of this activity is to correct storm and sanitary sewer backup problems from floods. An important benefit is to improve inflow and infiltration (I and I) problems from sewers and protection of the watershed from contaminated overflows. Another benefit is reduction of capacity problems for other facilities. Considering the high potential for sewage contamination of storm water, this project is assigned a priority of 1. The benefits are high relative to the costs of $1,000,000.

7.B.2. Goal 2 - Protect the community from catastrophic disasters to avoid loss of life and injury.

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 an occurrence of a hazardous event. Technological and man-caused hazards discussed in Sections 4 and 5 also apply and may be evaluated in future updates to this plan. Five remediation activities were identified for this Goal that meet three objectives listed in Section 6.B.2. Three objectives that meet this goal apply to these activities:

- Ensure continuity of community services during and after hazard events.
- Maintain/enhance efficient early warning and communication systems.
- Reduce impacts of hazards on vulnerable populations.

7.B.2.1. <u>Procure a Permanent Dedicated Generator For Boys and Girls Club Shelter</u>

Procuring a permanent dedicated generator for the Boys and Girls Club shelter is a Structure and Infrastructure Project (SIP). Electrical generators are critical devices for mitigating hazards during an emergency. Its objective is to reduce impacts of hazards on vulnerable populations and was given a priority of 2. The dedicated generator would apply to all hazards requiring community shelter from floods, storms, utility failures, release of hazardous materials, fires or other man-caused hazards. This activity would benefit the community by providing a functional shelter during emergencies at a cost of $45,000. This cost includes purchasing and installation of the equipment

7.B.2.2. <u>Implement Reverse 911 Notification System</u>

Implementing the reverse 911 notification system is a Structure and Infrastructure Project (SIP). Its objective is to maintain and enhance an efficient early warning communication system. It is considered a number 1 priority for mitigating flooding and severe storm hazards. It can also serve to mitigate other hazards such as hazardous materials releases. It would provide early warning of hazards to residents for about $10,000 per year.

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. Reverse 911 can target specific geographic locations, warning only those people who are directly at risk. The system can also deliver text messages.

Table 7-2. Proposed Activities to Protect Community from Catastrophic Disasters.

Action Type*	Action Item	Primary Objective **	Priority ***	Hazards Mitigated#	Benefits/Comments	Cost
SIP	1. Procure a permanent dedicated generator for Boys and Girls Club shelter	2.4 Reduce impacts of hazards on vulnerable populations	2	All Hazards	Provide functional shelter during emergencies	$45,000
EAP	2. Implement reverse 911 notification system	2.-2 Maintain/enhance efficient early warning and communication systems	1	Flooding, severe storms	Provide early warning of hazards to residents	$10,000/Yr
LPR	3. Make a permanent dedicated Emergency Operations Center (EOC) with dedicated generator	2-6 Ensure continuity of community services during and after hazard events	2	All Hazards	Provide unified center for emergency operations	$250,000
LPR	4. File required CRS documentation ****	2.4 Reduce impacts of hazards on vulnerable populations	2	Flooding	Reduced flood insurance for protection of buildings	$25,000
LPR	5. Develop and manage the CRS program for Mt. Kisco ****	2.4 Reduce impacts of hazards on vulnerable populations	3	Flooding	More cost effective flood insurance covered in CRS program	$25,000/yr

***Action Type: LPR – Local Plans and Regulations; NSP - Natural Systems Protection; SIP – Structure and Infrastructure Projects; EAP – Education Awareness Programs**

*****Priority: 1 - High; 2 - Medium; 3 – Low**

****Activity may also meet other goals and objectives – see text. Number for goal and objective from Table 6-1.**

 # For primary hazards included see page 7-2, Sect. 7.A.

****** These items are intended to aid the community with continued NFIP compliance.**

7.B.2.3. Make a Permanent Dedicated Emergency Operations Center (Eoc) With Dedicated Generator

The Village is in need of a permanent dedicated Emergency Operations Center (EOC) with a dedicated generator. This project would be a Local Plans and Regulation (LPR) activity type. It would serve as a unified center of command for the various emergency services during a hazard event. The principal objective of this action is to ensure continuity of community services during and after hazard events.

The operations center would respond to all hazards. Assuming an existing facility could be used without remodeling, the approximate cost would be $250,000. These costs include communications equipment, electrical generator, computers, software and furniture. Emergency equipment is not included in the cost.

7.B.2.4 Filing Required CRS Documentation

The National Flood Insurance Program (NFIP) Community Rating System (CRS) 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 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.

Filing the required CRS documentation is a Local Plans and Regulation (LPR) activity. Documentation filing is the first action to be taken to become a member. The principal benefit of this activity is reduced flood insurance for protection of buildings up to 15%. It has a priority of 2 and is estimated to cost about $25,000 to collect the necessary documentation and file it with the NFIP.

This activity addresses flooding hazards. This activity is highly feasible.

7.B.2.5. Develop and Manage The Community Rating System (CRS) Program

Develop and manage the National Flood Insurance Program's (NFIP) Community Rating System (CRS) program for Mt. Kisco is a Local Plans and Regulation (LPR) activity. The CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS:

- Reduce flood damage to insurable property;
- Strengthen and support the insurance aspects of the NFIP, and
- Encourage a comprehensive approach to floodplain management.

The primary benefit is more cost effective flood insurance covered in CRS program. The annual cost of maintaining records for the village to qualify is $25,000/year.

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. The activity is highly feasible and has a Priority of 3 based on the indirect benefit of insurance costs.

7.B.3. Goal 3 - Protect Public and Private Property and Infrastructure From Catastrophic Disasters.

The third goal includes any hazard that has the potential to cause catastrophic damage to public and private property, buildings, homes and infrastructures. It is also intended to protect vulnerable businesses and critical facilities from loss of use from any hazard including impacts from natural and man-caused hazards. These impacts may require multiple government services that include response from emergency units, police, and fire department, Village administration resources as well as State and Federal agencies.

Three activities are proposed to help meet this goal which focuses on one objective - Protect Critical Facilities, buildings, and infrastructure from damage and loss. Critical facilities, commercial and residential buildings and associated infrastructures need to be protected from hazards to assure that basic Village services for healthcare, police, transportation, government, fire and emergency services are not disrupted and that people in need of emergency services get them during a major hazardous event. Village infrastructures need to be reviewed for expansion and enhancement of storm water controls.

Table 7-3. Proposed Activities to Protect Property and Infrastructures from Disasters.

Action Type*	Action Item	Primary Objective **	Priority ***	Hazards Mitigated#	Benefits/Comments	Cost
SIP	1. Procure a permanent functional generator at DPW (critical facility)	3.1 Protect critical facilities, buildings and infrastructure	1	All hazards	Provide emergency backup power for DPW during a hazard event	$45,000
SIP	2. Implement a flood control system for emergency equipment in municipal facilities (including existing EOC and Green St. Firehouse) ****	3.1 Protect critical facilities, buildings and infrastructure	1	Flooding	Protect emergency equipment	$100,000
SIP	3. Make upgrades and improvements to the sewage lift station at the SMP ****	3.1 Protect critical facilities, buildings and infrastructure 4.4 Encourage measures resulting in the least adverse effect	2	Flooding	Improve I&I; protect watershed from overflows from sanitary sewers.	$1,000,000

***Action Type:** **LPR – Local Plans and Regulations** **SIP – Structure and Infrastructure Projects**
NSP - Natural Systems Protection **EAP – Education Awareness Programs**

*****Priority:** **1 - High** **2 - Medium** **3 – Low**

****Activity may also meet other goals and objectives – see text. Number for goal and objective from Table 6-1.**

 # For primary hazards included see page 7-2, Sect. 7.A.

****** These items are intended to aid the community with continued NFIP compliance.**

7.B.3.1. Procure a Permanent Functional Generator at DPW

The Department of Public Works (DPW) needs a permanent functional generator that is operable during power outages. The DPW is a critical facility and this procurement represents a Structure and Infrastructure Project (SIP). Its primary objective is to protect critical facilities, buildings and infrastructure during any hazard event and is a number one priority. It is a cost effective activity and its benefit is in providing emergency backup power for DPW during a hazard event. The cost is expected to be around $45,000.

7.B.3.2. Implement a Flood Control System for Emergency Equipment in Municipal Facilities

A flood control system needs to be implemented in municipal facilities including existing Emergency Operations Center (EOC) and the Green St. Firehouse to protect emergency equipment. This activity would be a Structure and Infrastructure Project (SIP) with an objective to protect critical facilities, buildings and infrastructure. The primary benefit would be the protection of emergency equipment from floods. Specific actions need to be defined and scoped out for each facility requiring mitigation controls. The estimated costs for flood control designs would be around $100,000 for all structures involved.

7.B.3.3. Make Upgrades and Improvements to The Sewage Lift Station at The SMP

Making upgrades and improvements to the sewage lift station at the SMP would be a Structure and Infrastructure Project (SIP). The action has an objective to protect critical facilities, buildings and infrastructures. Another objective of importance is under Goal 4 objective 4.4 Encourage hazard mitigation measures that result in the least adverse effect on the natural environment.

When storms impact the Village, storm sewers and sanitary sewers overflow and comingle. Removing inflow and infiltration (I&I) problems from storm and sanitary sewer overflow is a preventative measure. This activity is assigned a priority of 2. Key benefits from improvements to the sewage lift station include improving inflow and infiltration (I&I) problems and protecting the watershed from overflows of sewage in storm water. Another principal benefit is improvement of the storm water quality and drainage by 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. The approximate cost of $1,000,000 includes a variety of upgrades.

7.B.4. Goal 4 - Protect Environmental and Natural Resources.

The fourth goal includes protecting valuable resources such as open spaces, parks, streams, ponds, air quality, water quality, environmentally sensitive areas, land use as well as hazardous waste and municipal waste activities. There two action items for this goal that meet two objectives.

7.B.4.1 Repair/Upgrade Sewer Manholes in Wetlands and Village's Open Space Areas

This activity is a Structure and Infrastructure (SIP) project. This task's objective is to "protect and preserve open space and environmentally sensitive and critical areas". Repairing and upgrading sewer manholes in wetlands and the Village's open space areas is a highly feasible and cost effective activity to protect wetlands. The estimated cost is $200,000. This mitigation action would help drain the excess water in wetland areas and help keep wetland vegetation from invading surrounding non wetland areas. The improved flow of flood water in wetlands would also reduce the adverse impact to a natural ecosystem.

7.B.4.2. Implement a Tree Management/Inventory Program

The primary objective for this Natural Systems Protection (NSP) action is to protect and restore natural lands and features that serve to mitigate losses. A tree management and inventory program will minimize power failures identifying potential for falling limbs and trees from wind storms and maximize the growth of beneficial trees that will not interfere with power lines. Tree management can also reduce erosion of soil and help reduce flooding impacts. It has a low cost of $50,000 and is highly feasible. However its effectiveness in reducing flooding hazards is limited and is therefore given a priority of 3. Falling trees and limbs cause blackouts and phone outages result in financial losses to businesses, school closures, and in general, disruption of life in the Village. The benefits achieved would be long term.

Table 7-4. Proposed Activities to Protect Environmental and Natural Resources.

Action Type*	Action Item	Primary Objective **	Priority ***	Hazards Mitigated#	Benefits/Comments	Cost
SIP	1. Repair/upgrade sewer manholes in wetlands and village's open space areas ****	4.1 Protect and preserve open space and environmentally sensitive and critical areas.	2	Flooding	Improved flow of flood water in wetlands, reduced impact to natural system.	$200,000
NSP	2. Implement a tree management/inventory program	4.4 Encourage hazard mitigation measures that result in the least adverse effect on the environment.	3	Windstorm, utility failure	Preservation of trees, reduced power failure from fallen limbs and trees	$50,000

***Action Type:** **LPR – Local Plans and Regulations** **SIP – Structure and Infrastructure Projects**
NSP - Natural Systems Protection **EAP – Education Awareness Programs**

*****Priority:** **1 - High** **2 - Medium** **3 – Low**

****Activity may also meet other goals and objectives – see text.**
Number for goal and objective from Table 6-1.

 # For primary hazards included see page 7-2, Sect. 7.A.

****** These items are intended to aid the community with continued NFIP compliance.**

7.B.5. Goal 5 - Promote Mitigation Efforts Through Existing Programs and Partnerships.

The fifth goal promotes mitigation efforts through existing programs and partnerships. It stresses the importance of community and stakeholder involvement in promoting the proposed actions. Effective public communication is critical in implementing this mitigation goal. Stakeholder involvement includes maintaining inter-jurisdiction involvement of neighboring communities and interagency coordination of mitigation measures. By involving stakeholders, certain mitigation actions can be more efficient and cost effective. Five tasks and two objectives were identified as actions that support this goal.

7.B.5.1 Coordinate with hospital, County, Metro North on Nuclear Biological Chemical (NBC) Plan

The primary objective of this NBC Plan is to coordinate with the local hospital, Westchester County and Metro North on development of a Nuclear Biological Chemical (NBC) Plan. The objective is to strengthen inter-jurisdiction and interagency communication, coordination and partnerships to reduce the risk of transport, use and storage of nuclear, biological and chemical materials. This action type is a Local Plans and Regulation (LPR). The activity was given a number 3 priority with a cost of $25,000. The primary hazard is the transport of hazardous materials in the Town. The low priority is based on the low rating of this hazard for Mount Kisco.

7.B.5.2 Coordinate With Neighboring Communities (New Castle & Bedford) to Improve Communication For Fires and Other Emergencies)

The action type for this task is a Local Plans and Regulation (LPR) with a number 2 priority at an approximate cost of $35,000. Structural fires are the primary hazard of concern. For over 100 years, the all-volunteer Mount Kisco Fire Department has provided residents of Mount Kisco, New Castle and Bedford with fire protection. Improved coordination with these communities would enhance fire and other emergency services. The principal objective is to strengthen inter-jurisdiction and interagency communication, coordination and partnerships.

Table 7-5. Proposed Activities to Promote Mitigation Efforts Through Existing Programs and Partnerships.

Action Type*	Action Item	Primary Objective **	Priority ***	Hazards Mitigated[#]	Benefits/Comments	Cost
LPR	1. Coordinate with hospital, County, Metro North on Nuclear Biological Chemical (NBC) Plan	5.1 Strengthen inter-jurisdiction and interagency communication, coordination and partnerships	3	Hazardous material transport	Reduce risk of transport, use and storage of nuclear, biological and chemical materials	$25,000
LPR	2. Coordinate with neighboring communities (New Castle & Bedford) to improve communication for fires & other emergencies	5.1 Strengthen inter-jurisdiction and interagency communication, coordination and partnerships	1	Fires	Provide cohesive emergency response	$35,000
LPR	3. Partner with adjacent municipalities to study flooding and improve hydrology ****	5.1 Strengthen inter-jurisdiction and interagency communication, coordination and partnerships	2	Flooding	Reduce flood damage downstream	$50,000
SIP	4. Update the engineering assessment for Byram Lake Dam ****	5.2 Evaluate impacts using engineering analyses and studies of water courses impacting the community	3	Flooding, Dam failure	Reduce the risk of catastrophic dam failure	$75,000
SIP	5. Upgrade & improve interagency communication and communication equipment	5.1 Strengthen inter-jurisdiction and interagency communication, coordination and partnerships	2	All hazards	More efficient response to mitigating hazards	$50,000
LPR	6. Update the Hazard Mitigation Plan (5 years)	5.1 Strengthen inter-jurisdiction and interagency communication, coordination and partnerships	3	All hazards	Qualify for future funding and grants	$35,000

***Action Type:** **LPR – Local Plans and Regulations** **SIP – Structure and Infrastructure Projects**
NSP - Natural Systems Protection **EAP – Education Awareness Programs**

*****Priority:** **1 - High**
2 - Medium
3 – Low

****Activity may also meet other goals and objectives – see text. Number for goal and objective from Table 6-1.**

 # For primary hazards included see page 7-2, Sect. 7.A.

****** These items are intended to aid the community with continued NFIP compliance.**

7.B.5.3. Partner With Adjacent Municipalities to Study Flooding and Improve Hydrology

The action type for this partnering with adjacent municipalities is Local Plans and Regulation (LPR) with a number 2 priority at an approximate cost of $50,000. The costs are primarily for meetings, a consultant, public meetings and resulting mitigation plans. The objective of the action is to strengthen inter-jurisdiction and interagency communication, coordination and partnerships particularly to resolve flood hazard issues with surrounding towns and villages. A key benefit from partnering is an integrated study and improved. Partner with adjacent municipalities to study of common flooding issues and improved flooding mitigation actions that are integrated for the local region. Reducing downstream flooding is a particular concern.

7.B.5.4. Update the Engineering Assessment for Byram Lake Dam

This activity is a Structure and Infrastructure Project (SIP). The engineering assessment for Byram Lake Dam is out of date and needs to be reassessed. The objective of this task is to evaluate impacts using engineering analyses and studies of water courses impacting the community. The primary benefit of this activity is a reduced risk of catastrophic dam failure. Although it has a high hazard potential and a cost of $75,000 to conduct the study, the assessment was given a low priority 3 because of its distance from the Village.

7.B.5.5. Upgrade and Improve Interagency Communication And Communication Equipment

Upgrading communication and equipment is an (SIP) action type. The primary objective is to strengthen inter-jurisdiction and interagency communication, coordination and partnerships. The primary benefit is a more efficient response to mitigating hazards. This action has been given a priority of two and will cost approximately $50,000.

7.B.5.6. Update the Hazard Mitigation Plan

Every 5 years the village needs to submit to NYSOEM and FEMA an update to this Hazard Mitigation Plan. This update will continue to Strengthen Inter-jurisdiction and Interagency Communication, Coordination and Partnerships. This LPR action will include an update of all applicable hazards, progress of projects in this plan and planning for any new activities to mitigate. The 5 year update is required to qualify for future funding and grants from FEMA.

Although it was given a priority of 3 because it is completed by the end of the current plan, its priority will become 1 before the end of this period. The estimated cost is $35,000.

Section 8 – Draft Action Plan

8.A Introduction

This Draft Action Plan summarizes mitigation strategies applicable to the Village of Mount Kisco'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, Tables 7-1 to 7-5 that were 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 that are feasible and cost-effective are addressed first. The Hazard Mitigation Planning Committee considered additional hazards of concern that are not included. The recommended actions were reviewed by the consultant with the Village administration and the Planning Committee. The Plan was then presented to the public in a meeting and was made available to them for review and comment.

The proposed mitigation actions in Section 7.B meet FEMA's criteria for developing mitigation actions and priorities. (See Sections 6.A and 7.A.) Current needs were considered which are acceptable to the community, 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:

- FEMA Action Type
- Priority Order
- Action Item
- Relative Cost Benefit/Objectives
- Lead/Administrative Responsibility
- Available Resources Needed
- Schedule and 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 and 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 mitigation action items are summarized in Tables 8-2 through 8-4 in the order of their implementation priority. 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. An updated Plan will be submitted by the end of the 5th year. Priorities will be evaluated 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 must approve the Multi-Hazard Mitigation Plan before it can be implemented. This approval process is documented in Section 9 of this Plan. This Plan will be implemented and administered by the

Village of Mount Kisco 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, consultants, 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 four categories or types 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 Section 7.A.2 and include:

- Local Plans and Regulations (LPR)
- Structure and Infrastructure Projects (SIP)
- Natural Systems Protection (NSP)
- Education and Awareness Programs (EAP)

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 Manager's office and the Hazard Mitigation 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.

Technical, Political, Legal, Environmental, Social, and Administrative criteria were applied to all of the activity items in Section 7. Priorities were based on the need for cost-effectiveness, early implementation, dependence on completed activities, economic affordability, availability of administrative resources, and funding for contractors, engineers and consultants. The highest priority activities listed in Table 8-2 were based on the need to be performed sooner than other activities. 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. Projects having high costs and high benefits would have a lower priority because of the high costs, and length of time to complete the project. Items 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 Mount Kisco 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 or a joint partnership to implement the activity. The Village official in charge of a project will be responsible for interfacing with the public, 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 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 or an engineer.

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 Mount Kisco are listed in Table 8-1. Identifying primary sources of funding for each activity are given in Table 8-2 through Table 8-4 is tentative. The suggestions in these tables maybe contacted for availability of funding for your specific mitigation activity. There are numerous agency programs in 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. The internet and contacts should be checked before a specific grant or funding source is selected.

Table 8-1 identifies Federal and State agencies that fund activities for actions discussed. 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 may have funding for projects proposed. For example the Village Board may appropriate a capital improvement budget for upgrading village-owned critical facilities. Operating budgets such as the Public Works Department or the Building Department can include salaries or consultant fees to complete some mitigation activities. Existing staff time can be used as an "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 NYSOEM http://www.fema.gov/about/divisions/mitigation/mitigation.shtm http://www.NYSOEM.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 form a disaster. Projects may include acquiring, retrofitting or relocating structures; constructing localized flood controls; or constructing safe rooms.	FEMA Through NYSOEM http://www.fema.gov/hazard-mitigation-grant-program http://www.NYSOEM.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 NYSOEM http://www.fema.gov/about/divisions/mitigation/mitigation.shtm http://www.fema.gov/government/grant/pdm/ http://www.NYSOEM.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 NYSOEM 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 NYSOEM http://www.fema.gov/government/grant/rfc/

*** Web site addresses as of January 2013. 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
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
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

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 (NYSOEM)	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. Includes development and mitigation-related planning initiatives and acquisition projects for conserving open space.	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.ny.gov/GrantFunding/GrantsOverview.aspx
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/grantopps.asp

*** Web site addresses as of January 2013. 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 Mitigation Action Implementation

Implementation of specific actions presented in Section 7 is discussed below for each of the three priority groups identified. The following sections provide the information on:

- Priority order of each action item,
- Approximate costs,
- Administrative responsibility for each action,
- Approximate schedule and duration, and
- Possible funding sources.

Each action item will be administered and managed by the Village Manager's Office or designated department manager. Where resources are limited to implement an action item, a consultant or contractor may be hired to manage and conduct the project. The Village Manager or designee will have overall responsibility for managing the implementation of this Hazard Mitigation Plan. Schedules will be planned to minimize strains from work overload. Any FEMA funded projects are not likely be started earlier than September 1, 2013 following submittal of the FEMA approval of this Hazard Mitigation Plan. Village budgeted actions can begin as soon as approval of the Village Board is obtained.

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 priority 1, 2 and 3 action items is given at the bottom of Table 8-4.

As discussed above in Section 8.E, there may be various funding sources available. The funding received depends on the grants available at the time. Therefore, the funding sources listed in Tables 8-2, 8-3 and 8-4 are suggested sources and may change with time and an agency's budget. Table 8-1 can serve as a potential resource of funding.

8.F.1 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 implemented and have readily obtainable resources or available funding. Some of these activities may need to be completed prior to starting other activities.

8.F.1.1 Perform Feasibility and Hydrology Study of Branch Brook, Kisco River, and Wetland Areas.

This study will be a follow up study of the US Army Corps of Engineers USACE) 2003 Interim Assessment Report for the Branch Brook Flood Control Study. Recommendations from the 2003 study will be reevaluated for the three study areas. The Village will work closely with the USACE and Westchester County. A consulting engineer would be contracted to do the study. The Mount Kisco Engineering Department will have administrative responsibility for this project. The duration of the project including field studies, hydrology evaluations, feasibility analysis, public review and public participation will likely take a year at most and begin soon after funding of the study is approved. It may be possible to start the study in September 2013.

8.F.1.2 Reline Sanitary Sewer Lines

The Village plans to reline and refurbish storm and sanitary sewer lines to repair leaks and damaged sections that reduce effective drainage. This approved project is being procured through the Village Manager’s Office. Oversight of the contractor’s work will be the Village Water and Sewer Department. The project can begin in the spring of 2013 following procurement of a contractor and will likely take several months to complete. The relining and refurbishing of the sanitary sewer lines will improve sewer flow.

There would be a significant benefit relative to costs since flow through the sewers would be improved thereby mitigating a significant amount of flooding from sewer backup. The activity has a Priority Order of 1-2. This would also reduce pollution in the Kisco River and Branch Brook from leaky sewers. Key participants would include NYSDEC and the Dept. of Planning, Westchester Co. NY.

Table 8-2. Priority 1 Action Items Implementation - Village of Mount Kisco Hazard Mitigation Plan.

Action Type*	Priority Order	Action Item	Costs**	Administrative Responsibility	Schedule/ Duration	Possible Funding Sources
NSP	1-1	Perform feasibility and hydrology study of Branch Brook, Kisco River, and wetland areas.	$375,000	Engineering Dept.	1 year, starting Sept. 2013	USACE/FEMA
SIP	1-2	Reline sanitary sewer lines.	$1,000,000	Water & Sewer	Begin Mar. 2013 Complete Oct. 2013	Village Budget
SIP	1-3	Purge and clean catch basins, pipes, drainage network.	$500,000	Water & Sewer	6 months	FEMA/NYSOEM
NSP	1-4	Dredge and perform maintenance on retention area at Diplomat Towers.	$125,000	Highway Dept.	2 months	FEMA/NYSOEM
SIP	1-5	Make piping repairs in the sanitary & storm systems.	$1,000,000	Water & Sewer	6 months starting Sept. 2013	Village Budget
EAP	1-6	Implement reverse 911 notification system.	$10,000/Yr	Village Manager/ Emergency Services	6 months Starting Jun. 2013	Village Budget
SIP	1-7	Implement a flood control system for emergency equipment in municipal facilities (including existing EOC and Green St. Firehouse)	$100,000	Fire Department	3 months, Starting Oct. 2013	FEMA/NYSOEM
LPR	1-8	Coordinate with neighboring communities (New Castle & Bedford) to improve communication for fires & other emergencies.	$35,000	Fire Department	Ongoing/Annual costs	Village Budget
		Subtotal Cost	**$3,145,000**			

Table 8-2 Footnotes: * See Section 8.B for definitions of Action Type. ** Detailed cost estimates will be prepared for work that will be scoped out or when this Plan is periodically updated.

8.F.1.3 Purge and Clean Catch Basins, Pipes, Drainage Network

This action is proposed to correct storm and sanitary sewer backup problems during flooding and improve capacity for retention of storm water and drainage. The Water and Sewer Department will provide administrative responsibility under the Village Manager's Office. This project will likely require an outside funding source from FEMA or other state or county support. Once funded, the project will likely take 6 months to finish.

8.F.1.4 Dredge and Perform Maintenance on Retention Area at Diplomat Towers

Dredging and maintenance of the retention area will help control sediment deposition and erosion. It will improve the capacity for retention of storm water and drainage. This activity will involve the Village Highway Department and be administered by the Village Manager's office. Outside funding likely from FEMA through NYSOEM will be needed. Obtaining the necessary funding can begin in September 2013 after submittal of the Final Hazard Mitigation Plan. The project will likely take two months once a contractor is obtained.

8.F.1.5 Make Piping Repairs in the Sanitary & Storm Systems

Repairs of the storm and sanitary sewers will help prevent backup problems from floods. These piping repairs will also improve inflow and infiltration problems and protect the watershed from sewer overflows. Due to the health and environmental concerns, this mitigative action has a high priority.

The Village Water and Sewer Department will have primary oversight of this activity and the Village Manager's office will have administrative responsibility for this project. The cost of $100,000 includes a contractor for making the necessary repairs. Funding is assumed to be requested in the Village budget and approved by the Board unless awarded from FEMAs Hazard Mitigation Grant Program, the State or the County. If funds can be earmarked in the Village budget, work can begin in September 2013 and take six months to complete.

8.F.1.6 Implement Reverse 911 Notification 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 priority order of 1-6 and is highly feasible. The 911 communication protocols have a low cost and a high benefit. 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 Village community. Criteria need to be established to minimize false alarms and what constitutes a serious hazard.

The Village Manager's Office will administer the activity in conjunction with Emergency Services staff. They have the resources to complete the activity and will take the lead in this effort. There may not be a need for outside funding. Should the Village budget not be approved, outside funding from FEMA/NYSOEM will be sought. The cost of $10,000 per year includes training, purchasing and testing the system and community support activities. Completion of this activity will take less than 9 months and there will be long-term benefits to the community. Since the project costs are low, the cost benefit ratio is high.

8.F.1.7 Implement a Flood Control System For Emergency Equipment in Municipal Facilities (Including Existing EOC and Green St. Firehouse)

The Village recognizes the need to identify, move and protect emergency equipment in municipal facilities so that it is not adversely impacted during a hazard event such as a flood. A flood control system would protect the equipment from loss or damage and keep it readily accessible to emergency responders. In particular, the current emergency operations center (EOC) and the Green Street Firehouse need a safe flood-proof storage and staging area. The Mount Kisco Fire Chief will have administrative responsibility for this task under the authority of the Board of Fire Commissioners.

8.F.1.8 Coordinate With Neighboring Communities (New Castle & Bedford) to Improve Communication For Fires & Other Emergencies

The Mount Kisco Fire Department and other emergency services provide their services to the towns of New Castle and Bedford. This arrangement requires clear and effective communication between these Towns in response to emergency calls. Although this is an ongoing service, procedures need to be formalized with periodic meetings with key members from each community. This action item requires no special funding or fixed schedule or duration. The cost represents annual expenditures of existing staff time for meetings, correspondence, and formal procedures devoted to improvement of services. The Fire Chief for Mount Kisco will be the responsible authority.

8.F.2 Implementation of Priority 2 Action Items

Group 2-priority action items are listed below in Table 8-3 and have a moderate priority. These items have a reasonable benefit relative to costs and a need to be implemented since they will help mitigate some of the flooding in the area. Several actions are easily implemented, have obtainable resources and potential funding. Some of these activities may need to be completed prior to starting other activities.

8.F.2.1 Perform Stream and River Maintenance; Clean Debris And Sediment

Removal of debris, sediments and obstructions in the Kisco River and Branch Brook will reduce blockages to flowing water and improve the streams' water capacity. The Village Manager's Office would be responsible for managing a contractor to clean and maintain stream basins as a preventative measure.

This action is given a Priority Order of 2-1. This activity is meant to reduce flooding from the streams. This activity will be scheduled to begin in 2014 and in following years it will become part of the Village's ongoing maintenance. The relative benefits achieved and costs are both moderate.

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. This moderate cost activity of $30,000 per year would be authorized by the Village Board of Trustees.

Table 8-3. Priority 2 Action Items Implementation- Village of Mount Kisco Hazard Mitigation Plan.

Action Type*	Priority Order	Action Item	Costs** ($1,000)	Administrative Responsibility	Schedule / Duration	Funding Sources
NSP	2-1	Perform stream and river maintenance; clean debris and sediment.	$30,000	Village Manager	6 months following funding	FEMA/NYSOEM
NSP	2-2	Make stream corridor improvements and bank stabilization.	$500,000	Engineering Dept.	6 months following funding	USACE
SIP	2-3	Procure a permanent dedicated generator for Boys and Girls Club Shelter.	$45,000	Emergency Services	2 months after Board approval	Village Budget
LPR	2-4	File required CRS documentation.	$25,000	Village Manager	10 months after Board approval	Village Budget
SIP	2-5	Make upgrades and improvements to the sewage lift station at the SMP.	$1,000,000	Engineering Dept.	8 months (2014-2015) following funding	FEMA/NYSOEM
SIP	2-6	Repair/upgrade sewer manholes in wetlands and Village’s open space areas.	$200,000	Water & Sewer	3 months following funding	FEMA/NYSOEM
LPR	2-7	Partner with adjacent municipalities to study flooding and improve hydrology.	$50,000	Engineering Dept.	12 months following funding	Westchester Co.
SIP	2-8	Upgrade & improve interagency communication and communication equipment.	$50,000	Emergency Services	8 months following funding	FEMA/NYSOEM
LPR	2-9	Make a permanent dedicated Emergency Operations Center (EOC) with dedicated generator.	$250,000	Emergency Services	8 months following funding	FEMA/NYSOEM
NSP	2-10	Dredge Pond at Shoppers Park.	$100,000	Village Manager	3 months following funding	FEMA/NYSOEM
		Subtotal Cost	**$2,250,000**			

Table 8-3 Footnotes: * See Section 8B for definitions of Action Type. ** Detailed cost estimates will be prepared for work that will be scoped out or when this Plan is periodically updated.

8.F.2.2 Make Stream Corridor Improvements and Bank Stabilization

Making stream corridor improvements such as stream bank stabilization helps prevent flooding from rivers and streams running through the Village. Stabilizing stream banks reduces erosion which in turn improves the flow of the stream. Depending on the methods used to stabilize the banks, costs could vary widely. Stabilization may involve planting vegetation to reduce erosion or constructing walls or altering the bank to reduce erosion. The estimated cost is $500,000 assuming a mix of the stream bank actions. This is a feasible action for stabilizing stream banks. This project was given a priority of 2 since its effectiveness for improving stream flow is moderate. However, in the long-term the vegetation will help reduce erosion and sedimentation in the streams.

8.F.2.3 Procure a Permanent Dedicated Generator For Boys and Girls Club Shelter

This activity is a Structure and Infrastructure Project action with a Priority Order of 2-3. The purchase of a power generator for the Boys and Girls Club Shelter 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 protecting the public 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 2014.

8.F.2.4 File Required CRS Documentation

The Village does not currently qualify for Community Rating System (CRS) rating. Some activities that provide credit points for the rating are being done. 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 National Flood Insurance Program (NFIP) compliance to qualify for a CRS rating of at least 8. High CRS ratings can result in lower flood insurance rates. The first step for qualification is to collect and file the necessary documentation and submit it to the NFIP. The next step is to develop and manage the CRS program for the Village. This is a separate activity listed in Table 8-4 and discussed in Section 8.F.2.4.

The documentation activity has a moderate Priority Order of 2-4. Relative benefits for the cost are moderate in the short term. The Village Manager's Office will be the lead for this activity. Costs will be in kind services from the Village budget. If the Village Board authorizes this activity it may require 10 months to complete and submit the documentation needed.

8.F.2.5 Make Upgrades and Improvements to The Sewage Lift Station at the SMP

This action item will result in lowering adverse effects from sewage contamination of storm water. The Engineering Department will have primary administrative responsibility for this project with assistance from the Water and Sewer Department. It is expected to take about 8 months in 2014 following funding approval.

Although funding of about $1,000,000 is high relative to other priority 2 activities, the potential to contaminate storm water and streams with sewage is high. This action item should be done as early as feasible.

8.F.2.6 Repair/Upgrade Sewer Manholes in Wetlands And Village's Open Space Areas

The Water and Sewer Department will have primary administrative responsibility for this project. This action item will result in lowering adverse effects of flooding and overflow from storm water in wetlands and open spaces.

With a moderate cost of $200,000, the cost-benefit is judged to be good. It is expected to take about 3 months in 2014 following funding approval.

8.F.2.7 Partner With Adjacent Municipalities to Study Flooding and Improve Hydrology

The Engineering Department will have administrative responsibility for this project. This action requires clear and effective communication between the surrounding Towns and Mount Kisco. Participants need to meet periodically with key members from each community. This action item requires no special funding or fixed schedule or duration. Studies relating to flooding would be shared and commented on between communities. The cost represents annual expenditures of existing staff time for meetings, correspondence and formal procedures devoted to improvement of downstream flooding hazards related to upstream actions.

8.F.2.8 Upgrade & Improve Interagency Communication and Communication Equipment

This activity requires clear and effective communication between different local, county, State and Federal agencies in response to emergencies. The Village Manager's Office will be the responsible authority. In order to better communicate with other agencies during an emergency, the Emergency Operating Center needs to have compatible communication equipment. This task will involve identifying equipment needs and obtaining the necessary compatible systems. The moderate costs of this task have a high benefit particularly if there is a missed communication during an emergency.

8.F.2.9 Make a permanent dedicated Emergency Operations Center (EOC) with dedicated generator

This action item will ensure continuity of community services during and after hazard events and will reduce impacts of hazards on vulnerable populations. This item is a Structure and Infrastructure Project action with a Priority Order of 2-9. The purchase of a power generator for the EOC facility will prepare the community for any hazard that causes power outages.

The Village Administration will take the lead in this acquisition with assistance from Emergency Services. This project would result in long-term benefits to the community by being prepared for an emergency. The value received from a new EOC would aid in saving lives and is worth more than the cost of $250,000. It is assumed that an existing structure can be obtained and remodeled for use as an EOC. The start of this activity will begin immediately upon receipt of funding from FEMA via NYSOEM. Establishing a permanent EOC facility with a generator is expected to take 8 months in 2014-2015.

8.F.2.10 Dredge Pond at Shoppers Park

The small pond at the south end of Shoppers Park in downtown Mount Kisco collects sediment and debris from the stream running through the parking area. This mitigative action is intended to control sediment deposition and erosion and hence reduce flooding at Shoppers Park. The Village Manager will be responsible for managing this action. The highway department will dredge the pond. Although limited, this dredging activity can help reduce the severity of flooding at Shoppers Park.

8.F.3 Implementation of Priority 3 Action Items

Group 3-priority actions are listed in Table 8-3 and have a lower priority. These items provide some benefits relative to costs and a less urgent need to be implemented. Several actions are easily implemented, have obtainable resources and potential funding.

8.F.3.1 Develop and Manage the CRS Program for Mt. Kisco.

See also Section 7.B.2.5 regarding the Community Rating System (CRS) Program. This activity is a Local Plans and Regulations action with Priority Order of 3-1. A part-time CRS coordinator on the Village staff is needed to develop and manage a program as specified in CRS requirements and procedures. The primary objective is to reduce impacts of hazards on vulnerable populations which will then result in reduced insurance premiums for flooding.

The lead responsibility for this activity would be the Village Manager who would appoint the 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 is an ongoing activity using existing staff.

This activity has a lower priority since filing of documentation needs to be completed before the Village can qualify for the program. Benefits are moderate, namely lower flood insurance rates resulting from modifications of buildings in the flood plain. Cost benefits are moderate to low. This project can begin as soon as the Village Board authorizes it.

Table 8-4. Priority 3 Action Items Implementation - Village of Mount Kisco Hazard Mitigation Plan.

Item Type	Priority Order	Action Item	Costs ($1,000)	Administrative Responsibility	Schedule / Duration	Funding Sources
LPR	3-1	Develop and manage the CRS program for Mount Kisco	$25,000	Village Manager	Ongoing/annual (2013-2018) with Board approval	Village Budget
NSP	3-2	Implement a tree management/inventory program	$50,000	Village Manager	3 months following funding (2014-2017)	Westchester County
LPR	3-3	Coordinate with NW Hospital, Metro North, County on a Nuclear, Biological, Chemical (NBC) Plan	$25,000	Emergency Services	3 months following funding (2014-2016)	Westchester County/ Village Budget
SIP	3-4	Update the engineering assessment for Byram Lake Dam	$75,000	Engineering Department	9 months following funding (2015-2016)	USACE/FEMA
LPR	3-5	Update the Hazard Mitigation Plan (5 years)	$35,000	Village Manager	9 months (2018) with Board approval	Village Budget
		Subtotal Costs	**$210,000**			
		Total Cost of Planned Actions	**$5,605,000**			

Table 8-4 Footnotes: * See Section 8.B for definitions of Action Type. ** Detailed cost estimates will be prepared for work that will be scoped out or when Plan is periodically updated.

8.F.3.2 Implement a Tree Management/Inventory Program

This activity is a Natural Systems Protection action with a Priority Order of 3-2. The Village will continue to work with the local utilities to identify trees that are a hazard to utility lines. Removal of trees impacting power lines is generally the responsibility of the power utility.

Implementing a tree management and inventory program will minimize power failures caused by fallen limbs and trees from wind storms. A tree inventory will also maximize the growth of beneficial trees that will not interfere with power lines and that will enhance a more natural setting. The Village Highway Department will be the lead on this activity for a tree inventory and planting.

The effectiveness in reducing flooding hazards is limited and is therefore given a priority of 3. Falling trees and limbs cause blackouts and phone outages which result in financial losses to businesses, school closures, and in general, disruption of life in the Village. The benefits achieved would be long term. This project would be ongoing and will continue as locations are found during inspections, where trees need to be trimmed or planted. The project does not result in any additional procurement of contractors. The cost benefit ratio is moderate.

8.F.3.3 Coordinate With NW Hospital, Metro North, County On A Nuclear, Biological, Chemical (NBC) Plan

This plan is currently being updated by the Northern Westchester Hospital. The Village Manager's Office will assist in this action with support from Mount Kisco Emergency Services. A clear and effective communication is needed between Mount Kisco's Northern Westchester Hospital, Village staff, Westchester County, and Metro North for an emergency response in case of release of nuclear, biological hazards or chemicals. Although this is an uncommon problem, ongoing procedures need to be formalized in a response plan and agreed upon by the Village emergency staff. Meetings with key members from each participating partner are recommended to assure key issues are addressed.

This action item requires no special funding since in-kind services from participating partners will be used. The $25,000 cost represents in kind services for existing Village staff time for review of the NBC plan, meetings, correspondence, advising development of formal procedures and integration into the Village mitigation plan.

8.F.3.4 Update the Engineering Assessment for Byram Lake Dam

Byram Lake Reservoir is in the Towns of Bedford and North Castle but is owned by the Village of Mount Kisco. It serves as the Village's municipal water supply. The dam's condition has not been assessed recently under the National Dam Safety Program. The Village Engineering Department will conduct the Dam assessment with the assistance of the Water and Sewer Department. Considering the potential damage from a dam failure, the cost is low relative to a high benefit of this action. Funding could come from the US Army Corps of Engineers or FEMA. Work could begin as soon as funding is approved. It is expected that the study and the inspection report would take 9 months and would start early in 2014.

8.F.3.5 Update the Hazard Mitigation Plan (5 years)

This Hazard Mitigation Plan is considered an active document. Once the Plan is approved and implemented, the Hazard Mitigation Committee will maintain the Plan. 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.

The Village of Mount Kisco is committed to reviewing and updating the Plan every five years. By March of the fifth year of the program, the Committee needs to review original goals and objectives and update mitigation activities. See Section 9 for detailed requirements.

8.G Next Steps

The above action plan emphasizes implementation of the proposed mitigation activities based on priorities that consider costs, benefits as well as Technical, Political, Legal, Social, Environmental and Administrative considerations. Once the Plan has been reviewed by Village officials, the community and FEMA, there are two additional steps needed to complete this 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 it to NYSOEM who will forward it to FEMA for their comments. Upon receipt of the FEMA's comments, the Plan will be revised and all required changes incorporated. It will then be resubmitted for final review and approval by FEMA.

Section 9 - Implement, Maintain, Evaluate and Revise the Plan

Pending final approval of this Hazard Mitigation Plan FEMA, the Mount Kisco 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 Hazard Mitigation Planning Committee is described in Section 1 and Figure 1-3. Under the direction of the Chairperson, the Committee reviews and monitors 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, Highway Department, 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 by FEMA and the Village Board and implemented, the Planning Committee will monitor and maintain the Plan. They will periodically review the schedule, preparation of detailed procedures or specifications for funded action items, 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 adjustments will be added as Attachments to this present Plan. The progress of the work activities will be monitored; the schedule tracked in quarterly activity progress reports and reviewed by the Village Manager.

The Village 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 quarter. 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
- 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 Action Manager will be responsible for the successful implementation of his or her 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 action item's scope of work or specifications,
- Informing the Plan Administrator of progress or problems.

9.A.2 Public Participation

Involving and informing the public is a key goal of this mitigation plan. The Mount Kisco community will continue to be notified of all important project activities, reports, public meetings and recommendations through the 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 (http://www.mountkisco.org/Pages/index) will be updated and will include items related to emergency planning. 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, adjustments, and amendments will be available at the Village Hall, the Village web site and the public library for public review and comment.

The public participation program for this Hazard Mitigation Plan is 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 Village street and home flooding they face with major rain storms. The community 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. Updates will be posted on the Website: (http://www.mountkisco.org/Pages/index) The Village will send e-mail updates to individuals that request them. This will keep residents informed of events and meetings that are occurring in the town. Whenever a new event or document is posted to the website, they will have an opportunity to receive a copy of the posting in their personal e-mail inbox, automatically.

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 and included in the five-year update. Updates will be submitted three months prior to the due date to allow for review and comment. The Village will start the process of updating this plan no later than 24 months before it expires.

9.A.3 Incorporation with Other Plans and Activities

The Village of Mount Kisco has cited other related or ongoing projects separate from this Hazard Mitigation Plan. These include:

- Northern Westchester Hospital is preparing the NBC plan and the village will review and comment on the draft plan. The NWH NBC plan will be integrated into the Village's Hazard Mitigation Plan.
- Emergency Services personnel are in the process of updating the Village/Town (EOP) Emergency Operations Plan. The plan includes actions propose in this Hazard Mitigation Plan. Village staffs who are working on the EOP will be communicating with the Village and the Hazard Mitigation Committee to ensure the EOC includes Village input.

Several of these activities are discussed in Section 8 and involve some of the same village officials who served on the Hazard Mitigation Committee and are responsible for developing these items. These projects will be incorporated this Hazard Mitigation Plan since, they address the Plan's goals and objectives, use Village resources.

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 an Emergency Response/Operations Plan (EOP)
- Obtain certification in the CRS Program
- Northern Westchester Hospital's NBC plan

Village Emergency Response/Operations Plan (EOP): The Village Emergency Services has prepared a working copy of an EOP. The revision of this plan needs to be integrated with the Village Hazard Mitigation Plan, the State Emergency Response Plan and the Westchester County plan. The Village/Town Emergency Response Plan needs to be updated and will include coordination with Town, County and State input. Assistance from stakeholders and volunteer organizations will be needed. The Village Emergency Services is responsible for the revision and completion of this plan. Completion of this activity has been identified as action item in this plan.

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 Hazard Mitigation Plan is a prerequisite for the CRS acceptance. This activity will be implemented using existing Village resources and will not need a capital budget. Many of the elements of this Hazard Mitigation plan discussed above are the same as the requirements in the CRS program and could be integrated with that activity.

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 quarterly and annual project 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.mountkisco.org/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 copies of 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 Action Item Leaders 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 Mount Kisco is committed to reviewing and updating the plan every five years. By the beginning 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 Hazard Mitigation Planning Committee will be responsible for reviewing all adjustments and 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.

Before completing the review in the 5th year of the Plan, a draft revised plan will be submitted to NYSOEM for review and comment, revised and then forwarded to FEMA for review and comment. After receipt of comments from FEMA, the Village will revise the draft within two months and submit it to NYSOEM and FEMA for approval.

Section 10 - Adoption of the Plan

10.A Formal Village Government Process

On January 9, 2012, a resolution was offered, and officially accepted by the Board of Trustees of the Incorporated Village/Town of Mount Kisco giving the Hazard Mitigation Committee, designated Village staff, and a planning consultant, full authority to prepare a Multi-Hazard Mitigation Plan that will:

- Carry out identification of hazards,
- Assess the hazards impacts,
- Establish goals and objective for mitigating the hazards,
- Identify mitigation measures,
- Prepare a mitigation plan, and
- Implement the Plan.

On June 18, 2012 the Village Board authorized contracting ETG Inc. to prepare the Multi-Hazard Mitigation Plan

On July 9, 2012 The Village Manager and staff had a "kick off" meeting with the consultant ETG discussed the scope of the project and information needed from the Village management.

Between October 3 and October 12 the Village posted in 7 public places and in the Local Journal News an announcement for the October public meeting on the Pre-disaster Mitigation Plan. The Journal News is the official newspaper.

On October 22, 2012 a public meeting was held at the Village Hall Board room to summarize and discuss the Pre-disaster Mitigation Plan and receive input from the public regarding the Plan.

On February 14, 2013 copies of the draft Multi-Hazard Mitigation Plan were provided to the Hazard Mitigation Committee for their review and comment.

On April 15, 2013 the revised Multi-Hazard Mitigation Plan was presented to the Board of Trustees for their and approval at the monthly Board meeting to submit the pland to FEMA for review and comments.

On April 10 2013 draft 2 of the Multi-Hazard Mitigation Plan was provided to the Village for review and comment.

On _______, 2013, the Mount Kisco Village Board of Trustees adopted the plan following the review and pending acceptance by NYSOEM and FEMA. Final 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.

Public Meetings:

A notice for the first public meeting was published in the Journal News. The first meeting was held was October 22, 2012 at 7:00 PM in the Village Hall meeting room. (See Appendix for a copy of the announcement.

A second public meeting was held April ___, 2013 in conjunction with the Village Board of Trustees to present and review the contents of the Draft Multi-Hazard Mitigation Plan.

10.C Adoption of the Final Plan

At a meeting on _____, 2013 of the Board of Trustee for the Village of Mount Kisco, a motion was made and seconded to adopt the following resolution:

This resolution reads as follows:

VILLAGE/TOWN OF MOUNT KISCO

WESTCHESTER COUNTY, NEW YORK
104 Main Street, Mount Kisco, NY 10549-0150
Tel (914) 241-0500 • Fax (914) 241-9018
www.mountkisco.org

RESOLUTION

WHEREAS, The Village/ Town of Mount Kisco, with the assistance from Environmental Technology Group, Inc., has gathered information and prepared the Village/Town of Mount Kisco Multi-Hazard Mitigation Plan; and

WHEREAS, the Village/Town of Mount Kisco Multi-Hazard Mitigation Plan has been prepared in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS, The Village/ Town of Mount Kisco 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/ Town of Mount Kisco have reviewed the Plan and affirms that the Plan will be updated no less than every five years;

NOW THEREFORE, BE IT RESOLVED by The Village Board of Trustees that The Village/ Town of Mount Kisco adopts the Village/Town of Mount Kisco Multi-Hazard Mitigation Plan as this jurisdiction's Natural Hazard Mitigation Plan, and resolves to execute the actions in the Plan.

ADOPTED this 7th day of October, 2013 at the meeting of the Village Board of Trustees.

Hon. J. Michael Cindrich – Mayor of the Village/ Town of Mount Kisco

James M. Palmer – Village Clerk

Village of Mount Kisco- Multi-Hazard Mitigation Plan

Section 11 – References Cited

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2. Annals of Internal Medicine, "The Resurgence of West Nile Virus. December 4, 2012.

3. Association of State Dam Safety Officials, http://new.damsafety.org

4. Bergen County Skywarn,, http://www.bergenskywarn.org/

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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.
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

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 be 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

Map 1
Aerial Photograph

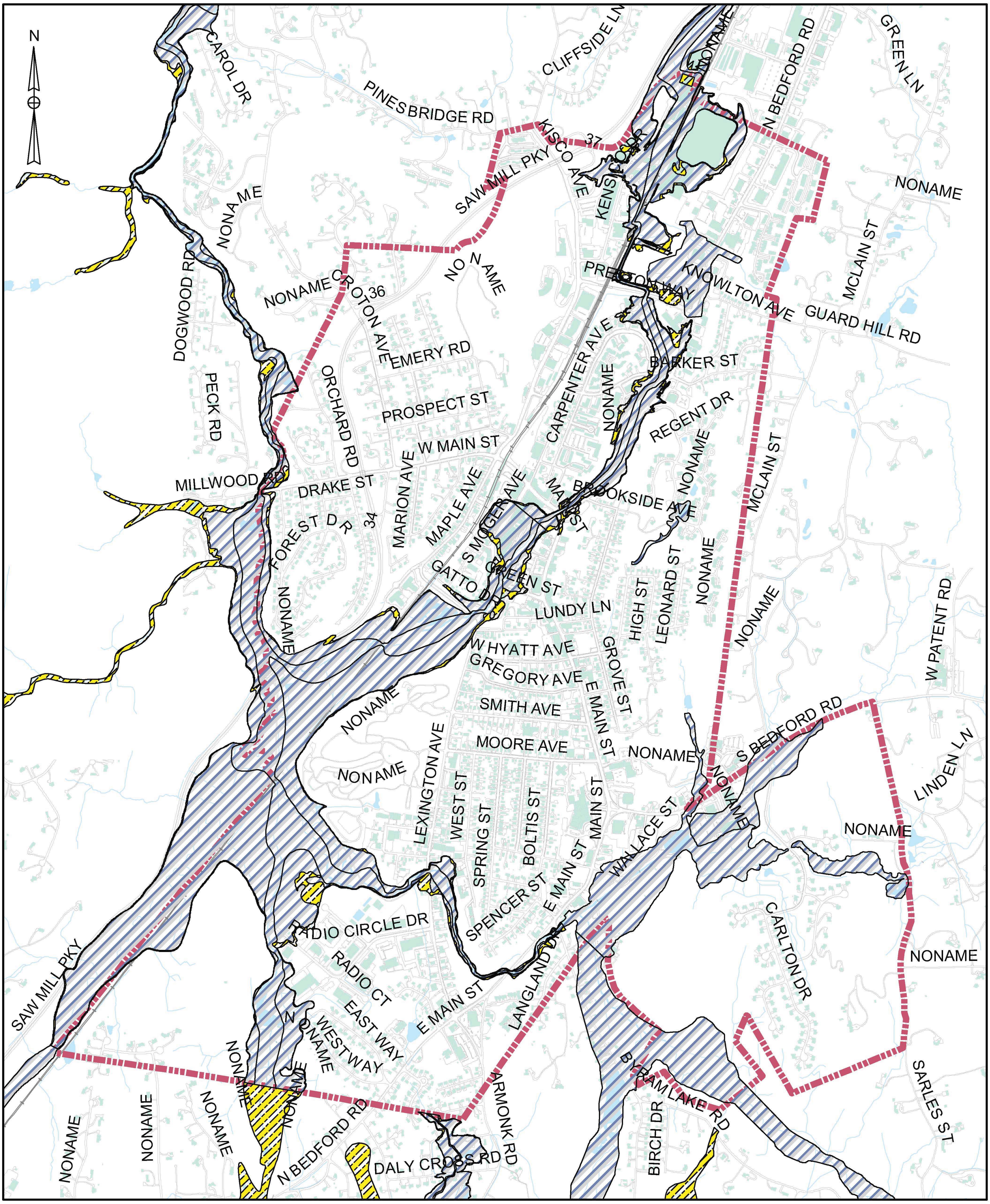
Environmental Technology Group, Inc.
300 WHEELER ROAD, SUITE 307, HAUPPAUGE, NEW YORK 11788

Basemap Information by Westchester County GIS

Incorporated Village/Town of Mount Kisco
Multi-Hazard Mitigation Plan

0 1,000 2,000 3,000 4,000
Feet

DWN BY: YS
CHK BY: JB
SCALE: AS SHOWN
DATE: 01/29/13



Map 2

100 and 500-Year Floodplain

Incorporated Village/Town of Mount Kisco
Multi-Hazard Mitigation Plan

Legend

FEMA Flood Mapping

100 Year Flood Line

500 Year Flood Line

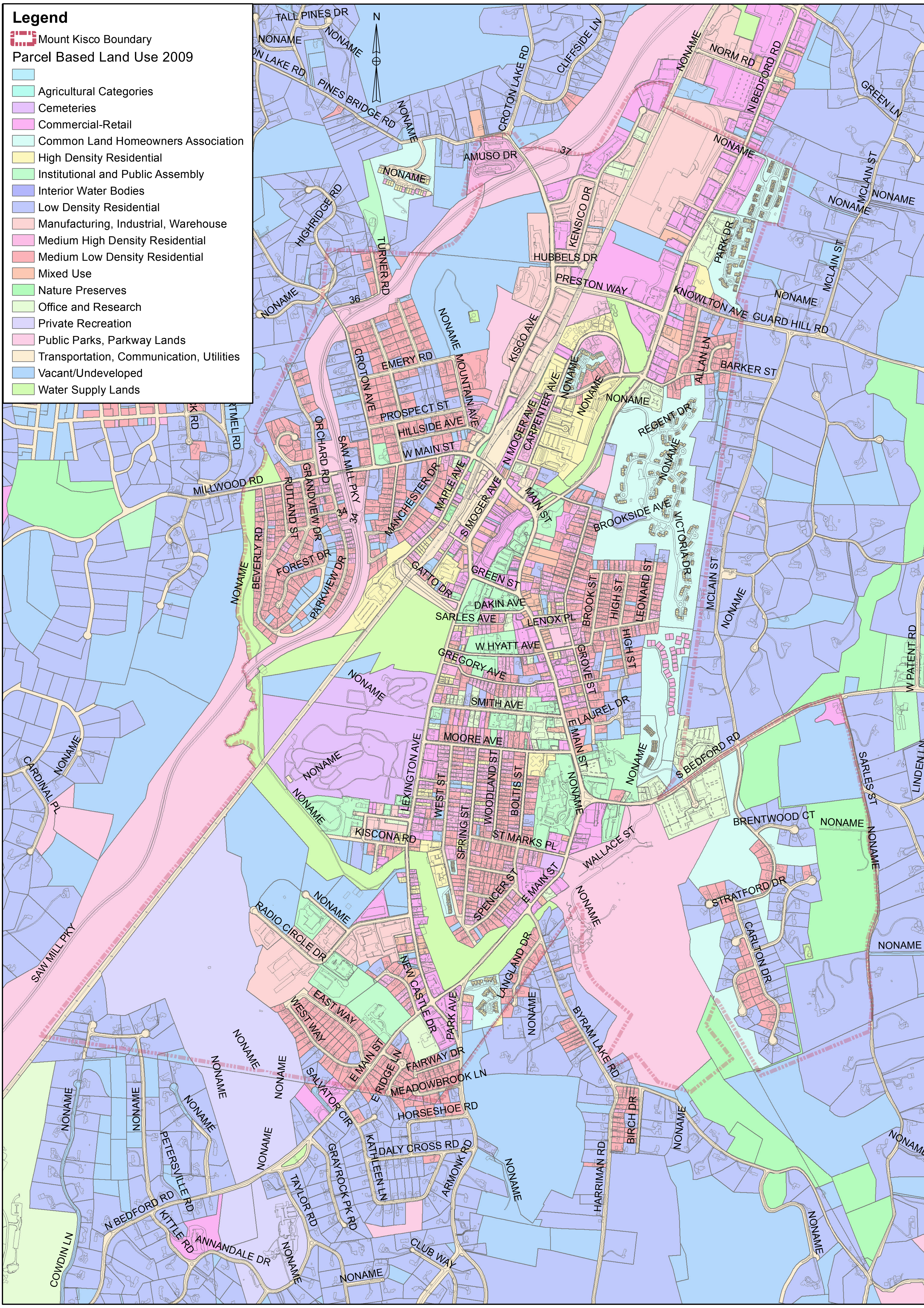
ETG Environmental Technology Group, Inc.

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

0 1,000 2,000 3,000 4,000 Feet

Basemap Information by Westchester County GIS

DWN BY: YS
CHK BY: JB
SCALE: AS SHOWN
DATE: 02/11/13



Map 3
Parcel Based Land Use

ETG
Environmental Technology Group, Inc.
300 WHEELER ROAD, SUITE 307, HAUPPAUGE, NEW YORK 11788

Basemap Information by Westchester County GIS

Incorporated Village/Town of Mount Kisco
Multi-Hazard Mitigation Plan

0 1,000 2,000 3,000 4,000 Feet

DWN BY: YS
CHK BY: JB
SCALE: AS SHOWN
DATE: 02/04/13

APPENDICES

Attachments and Supporting Documents

Appendix 1.
HAZNY Analysis

Background

On August 23, 2012, the Village/Town of Mount Kisco, NY 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 report.

***HAZNY* and the Village/Town of Mount Kisco, NY**

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. The Village/Town of Mount Kisco, NY assembled a group of local officials to consider and discuss the questions and issues raised by the *HAZNY* program. Representatives from The Environmental Technology Group, Inc. (ETG) facilitated the meeting and recorded the results.

The Results

The Group analyzed hazards potentially affecting the Village/Town of Mount Kisco, NY. *HAZNY* rated each hazard based on the Group's assessment and assigned a numerical value.

These values are categorized as follows:

321 to 400 HIGH HAZARD

241 to 320 MODERATELY HIGH HAZARD

161 to 240 MODERATELY LOW HAZARD

44 to 160 LOW HAZARD

The Group rated the 34 hazards as follows:

Hazard	***Rating***
FLOOD	324
COASTAL STORM	301
WINTER STORM (SEVERE)	290
UTILITY FAILURE	268
TORNADO	267
WINDSTORM	266
HURRICANE	265
WATER FAILURE	263
SEVERE RAIN STORM	262
THUNDERSTORM	262
EXTREME TEMPS	251
ICE STORM	250
FIRE (STRUCTURE)	244
EPIDEMIC	239
DAM FAILURE	238
EXPLOSION	233
TRANS ACCIDENT	230
HAZMAT (IN TRANSIT)	223
EARTHQUAKE	222
LANDSLIDE/ROCKSLIDE	221
TERRORISM	217
DROUGHT	214
HAZMAT (FIXED SITE)	214
WATER SUPPLY CONTAMINATION	210

OIL SPILL	202
RADIOLOGICAL (TRANSIT)	200
FUEL OIL SPILL	198
HAILSTORM	196
SEWAGE SPILLS	189
AIR CONTAMINATION	187
AIR ACCIDENT	185
RADIOLOGICAL (FIXED SITE)	172
CIVIL UNREST	130
RAIL ACCIDENT	128

Hazard(s) rated as high: FLOOD

FLOOD: 324, High Hazard

Potential Impact: Several Locations

Cascade Effects: Highly Likely

Frequency: A Frequent Event

Onset: Several Hours Warning

Hazard Duration: Four days to One Week

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

Hazard(s) rated as moderately high: COASTAL STORM, WINTER STORM (SEVERE), UTILITY FAILURE, TORNADO, WINDSTORM, HURRICANE, WATER FAILURE, SEVERE RAIN STORM, THUNDERSTORM, EXTREME TEMPS, ICE STORM, FIRE (STRUCTURE)

COASTAL STORM: 301, Moderately High Hazard

Potential Impact: Throughout a Large Region

Cascade Effects: Highly Likely

Frequency: A Frequent 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
- Severe Structural Damage to Public Facilities

WINTER STORM (SEVERE): 290, Moderately High Hazard

Potential Impact: Throughout a Large Region

Cascade Effects: Highly Likely

Frequency: A Frequent Event

Onset: Several Hours 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

- Moderate Damage to Private Property
- Moderate Structural Damage to Public Facilities

UTILITY FAILURE: 268, Moderately High Hazard

Potential Impact: Several Locations

Cascade Effects: Highly Likely

Frequency: A Frequent Event

Onset: No 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

TORNADO: 267, Moderately High Hazard

Potential Impact: Several Locations

Cascade Effects: Highly Likely

Frequency: A Regular 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

- Severe Damage to Private Property
- Severe Structural Damage to Public Facilities

WINDSTORM: 266, Moderately High Hazard

Potential Impact: Throughout a Large Region

Cascade Effects: Highly Likely

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

HURRICANE: 265, Moderately High Hazard

Potential Impact: Throughout a Large Region

Cascade Effects: Highly Likely

Frequency: A Regular 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
- Severe Structural Damage to Public Facilities

WATER FAILURE: 263, Moderately High Hazard

Potential Impact: Throughout a Small Region

Cascade Effects: Some Potential

Frequency: A Regular Event

Onset: No 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
- Severe Structural Damage to Public Facilities

SEVERE RAIN STORM: 262, Moderately High Hazard

Potential Impact: Throughout a Large Region

Cascade Effects: Highly Likely

Frequency: A Frequent Event

Onset: Several Hours 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

THUNDERSTORM: 262, Moderately High Hazard

Potential Impact: Throughout a Large Region

Cascade Effects: Highly Likely

Frequency: A Frequent Event

Onset: Several Hours 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

EXTREME TEMPS: 251, Moderately High Hazard

Potential Impact: Throughout a Large Region

Cascade Effects: Highly Likely

Frequency: A Frequent Event

Onset: Several Days Warning

Hazard Duration: Four days to One Week

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

ICE STORM: 250, Moderately High Hazard

Potential Impact: Throughout a Large Region

Cascade Effects: Highly Likely

Frequency: A Regular Event

Onset: Several Hours Warning

Hazard Duration: One Day

Recovery Time: One to 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

FIRE (STRUCTURE): 244, Moderately High Hazard

Potential Impact: Single Location

Cascade Effects: Some Potential

Frequency: A Frequent Event

Onset: No 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

- Moderate Damage to Private Property
- Little or No Structural Damage to Public Facilities

Hazard(s) rated as moderately low: EPIDEMIC, DAM FAILURE, EXPLOSION, TRANS ACCIDENT, HAZMAT (IN TRANSIT), EARTHQUAKE, LANDSLIDE/ROCKSLIDE, TERRORISM, DROUGHT, HAZMAT (FIXED SITE), WATER SUPPLY CONTAMINATION, OIL SPILL, RADIOLOGICAL (TRANSIT), FUEL OIL SPILL, HAILSTORM, SEWAGE SPILLS, AIR CONTAMINATION, AIR ACCIDENT, RADIOLOGICAL (FIXED SITE)

EPIDEMIC: 239, Moderately Low Hazard

Potential Impact: Throughout a Large Region

Cascade Effects: Highly Unlikely

Frequency: A Regular Event

Onset: Several Days 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

DAM FAILURE: 238, Moderately Low Hazard

Potential Impact: Throughout a Large 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

EXPLOSION: 233, Moderately Low Hazard

Potential Impact: Single Location

Cascade Effects: Highly Likely

Frequency: An Infrequent Event

Onset: No Warning

Hazard Duration: Less Than One Day

Recovery Time: One to 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

TRANS ACCIDENT: 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

HAZMAT (IN TRANSIT): 223, Moderately Low Hazard

Potential Impact: Single Location

Cascade Effects: Some Potential

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 is Likely, but not in Large Numbers
- Moderate Damage to Private Property
- Moderate Structural Damage to Public Facilities

EARTHQUAKE: 222, Moderately Low Hazard

Potential Impact: Throughout a Large Region

Cascade Effects: Highly Likely

Frequency: A Regular Event

Onset: No 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

LANDSLIDE/ROCKSLIDE: 221, Moderately Low Hazard

Potential Impact: Single Location

Cascade Effects: Highly Likely

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
- Moderate Damage to Private Property
- Moderate Structural Damage to Public Facilities

TERRORISM: 217, Moderately 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: One to Two Weeks

Impact:

- Serious Injury or Death to Large Numbers
- Severe Damage to Private Property
- Severe Structural Damage to Public Facilities

DROUGHT: 214, Moderately Low Hazard

Potential Impact: Throughout a Large Region

Cascade Effects: Highly Likely

Frequency: A Regular 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

HAZMAT (FIXED SITE): 214, Moderately Low Hazard

Potential Impact: Single Location

Cascade Effects: Some Potential

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 is Likely, but not in Large Numbers
- Moderate Damage to Private Property
- Little or No Structural Damage to Public Facilities

WATER SUPPLY CONTAMINATION: 210, Moderately Low Hazard

Potential Impact: Throughout a Small Region

Cascade Effects: Some Potential

Frequency: A Rare Event

Onset: No 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

OIL SPILL: 202, Moderately Low Hazard

Potential Impact: Several Locations

Cascade Effects: Some Potential

Frequency: A Regular Event

Onset: No Warning

Hazard Duration: Less Than 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

RADIOLOGICAL (TRANSIT): 200, Moderately Low Hazard

Potential Impact: Single Location

Cascade Effects: Some Potential

Frequency: A Regular Event

Onset: No 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

FUEL OIL SPILL: 198, Moderately Low Hazard

Potential Impact: Single Location

Cascade Effects: Highly Likely

Frequency: A Regular Event

Onset: No Warning

Hazard Duration: Less Than 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

HAILSTORM: 196, Moderately Low Hazard

Potential Impact: Throughout a Small Region

Cascade Effects: Highly Likely

Frequency: A Regular Event

Onset: Several Hours Warning

Hazard Duration: Less Than One Day

Recovery Time: Less Than One Day

Impact:

- Serious Injury or Death Unlikely
- Moderate Damage to Private Property
- Little or No Structural Damage to Public Facilities

SEWAGE SPILLS: 189, Moderately Low Hazard

Potential Impact: Several Locations

Cascade Effects: Some Potential

Frequency: A Regular Event

Onset: Several Hours Warning

Hazard Duration: One Day

Recovery Time: Less Than One Day

Impact:

- Serious Injury or Death Unlikely
- Little or No Damage to Private Property
- Moderate Structural Damage to Public Facilities

AIR CONTAMINATION: 187, Moderately Low Hazard

Potential Impact: Throughout a Large Region

Cascade Effects: Some Potential

Frequency: A Regular Event

Onset: One Day 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

AIR ACCIDENT: 185, Moderately Low Hazard

Potential Impact: Single Location

Cascade Effects: Highly Likely

Frequency: An Infrequent 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
- Moderate Damage to Private Property
- Little or No Structural Damage to Public Facilities

RADIOLOGICAL (FIXED SITE): 172, Moderately Low Hazard

Potential Impact: Throughout a Small Region

Cascade Effects: Some Potential

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 is Likely, but not in Large Numbers
- Little or No Damage to Private Property
- Little or No Structural Damage to Public Facilities

Hazard(s) rated as low: CIVIL UNREST, RAIL ACCIDENT

CIVIL UNREST: 130, Low Hazard

Potential Impact: Several Locations

Cascade Effects: Highly Likely

Frequency: A Rare Event

Onset: Several Hours Warning

Hazard Duration: One Day

Recovery Time: One to Two Days

Impact:

- Serious Injury or Death Unlikely
- Little or No Damage to Private Property
- Moderate Structural Damage to Public Facilities

RAIL ACCIDENT: 128, 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: 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

*HAZARDS THAT OCCUR WITH NO WARNING**
UTILITY FAILURE
WATER FAILURE
FIRE (STRUCTURE)
EXPLOSION
TRANS ACCIDENT
HAZMAT (IN TRANSIT)
EARTHQUAKE
LANDSLIDE/ROCKSLIDE
TERRORISM
HAZMAT (FIXED SITE)
WATER SUPPLY CONTAMINATION
OIL SPILL
RADIOLOGICAL (TRANSIT)
FUEL OIL SPILL
AIR ACCIDENT
RAIL ACCIDENT

- No warning was selected from the Onset Tab.

HAZARDS THAT OCCUR MOST OFTEN*
FLOOD
COASTAL STORM
WINTER STORM (SEVERE)
UTILITY FAILURE
WINDSTORM
SEVERE RAIN STORM
THUNDERSTORM
EXTREME TEMPS
FIRE (STRUCTURE)
TRANS ACCIDENT

*A frequent event was selected on frequency Tab.

HAZARDS THAT PRESENT THE GREATEST THREAT TO LIFE*
EPIDEMIC
DAM FAILURE
TERRORISM
WATER SUPPLY CONTAMINATION

*Serious injury and death in large or extremely large numbers was selected from the Impact Tab.

Appendix 2.
Meetings and Notices

SIGN-IN SHEET

Mount Kisco Hazard Mitigation Planning Committee Meeting

September 27, 2012, 2:00 p.m.

Name:	Organization:	Email:
Jim Brower	ETG	JeBrowerl@ Verizon.net
Valerie Rifkin	ETG	Valerierifkin@ gmail.Com
Carmine L LaBriola	→	Finance@ RELandscapes.com
Joe Cerretani	Village of Mt. Kisco	jcerretani@ mountkisco.org
George L Griffin	Dep Mayor Mt Kisco	TRUSTEEGRIFF@ YAHOO Com
Anthony Oliveri	DREPC	ANTHONY@ DREPC.com
Jim Palmer	MT. KISCO	JPALMER@ MOUNTKISCO.ORG

SIGN-IN SHEET

Mount Kisco Hazard Mitigation Planning Committee Meeting

Mount Kisco Village Hall
December 12, 2012, 2:30 p.m.

Name:	Organization:	Email:
Bill Seevers	ETC	WSeevers@AOL.Com
Jim Brower	ETG	JEBROWER1@Verizon.net
Valerie Rifkin	ETG	ValerieRifkin@gmail.com
Joe Cerretani	VMK	jcerretani@mountkisco.org
Carmine Cuaborniole	RElandscapes	Finance@Relandscapes.com
J. Palmer	V/T of Mt. Kisco	jpalmer@mountkisco.org
Al Bueti	Mt.Kisco FD	AlBueti14@optonline.net
Anthony Oliveri	DRE	Anthony@DREPC.com
Tom Jackson	MKFD	MKFDCHIEFS@gmail.com

Pre-Disaster Hazard Mitigation Plan Public Meeting 4/15/13

Village/Town of Mount Kisco

Notice of Public Meeting
To Solicit Public Input
For the preparation of a Pre-Disaster Hazard Mitigation Plan (PDHMP)
For the Village/Town of Mount Kisco, NY
Date:
Monday, April 15, 2013
Time: 7:30 PM
Place:
Village Hall Board Room

All interested residents are invited to attend a Public Meeting hosted by the Village/Town of Mount Kisco 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/Town of Mount Kisco.

The Village/Town is preparing this Pre-Disaster Plan with a grant from the Department of Homeland Security/Federal Emergency Management Association (FEMA) in the amount of $75,000. 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 (WCOEM).

A plan has been prepared in draft from the comments and considerations presented by the Committee Members and interested citizens in the Village/Town of Mount Kisco community. This is the second public meeting to obtain additional public input and comment on the draft plan, before it is considered ready for final submission to NYS OEM and FEMA.

For further information, or if you have any questions, please call Village Hall at (914) 864-0001.

SIGN-IN SHEET

Mount Kisco Hazard Mitigation Planning Committee Meeting

August 23, 2012, 2:00 p.m.

Name:	Organization:	Tel:
Jim Brower	ETG	631-707-1756
Valerie Rifkin	ETG	917-318-6981
Anthony J. Chiappinelli	Gencon Mgmt Grp.	914-666-7535
Carmine L Labriola	Relandscapes	914 403 7313
Joe Cerretani	V/T of Mt. Kisco	914-864-0059
Tom Jackson	MKFD	914-447-4190
Anthony Oliveri	Dolph Rotfeld PC	914-631-8600
Austin Cassidy	MK Bldg Dept	864-0018
Eric Hartman	NWH	914-242-8300
J Palmer	V/T of Mt. Kisco Mayor	864-0001
A. M. O'Reilly	Mt Kisco P.D.	864-1118
Joe Luppino	Mt Kisco DPW	666-8193

MOUNT KISCO HAZARD MITIGATION PLAN KICK OFF MEETING
Meeting Minutes
Mount Kisco Village Hall
July 9, 2012

Location: Mt. Kisco Village Hall

In attendance: Bill Seevers, ETG; James Brower, ETG; Valerie Rifkin, ETG; James Palmer – Village Manager, Village/Town of Mt. Kisco; Anthony Oliveri, Dolph Rotfeld Engineering, PC; Joseph Cerretani – Management Intern, Village/Town of Mt. Kisco.

Discussion:

The initial draft deadline for the Hazard Mitigation Plan is April 10, 2013.

Federal project #: 18690007

The Village submits a quarterly report. They will have to provide feedback on the status in the next report, which is due in September 2012. ETG will supply the Village with the status.

Certain village infrastructure was discussed. Emphasis was placed on the primary water supply, Byram Lake, and the sewage plant and pump station along the Saw Mill parkway.

Next Steps:

- The Village to provide the following documentation to ETG:
    - Master Plan – available online
    - Zoning code – available on Village website
    - Emergency Action Plan
    - Disaster Plans
    - FEMA Flood maps and LOMRs
    - Outfall maps
    - Building Stock and valuation information
    - Village Organization Chart
    - GIS information
    - Any other pertinent plans or studies related to the Village

- ETG to provide Village with a summary of the HAZNY Analysis process.
- Village to appoint hazard mitigation planning committee.
- Schedule meeting for HAZNY Analysis with planning committee. Meeting to take approximately 2 hours.

3/28/13

Village/Town of Mt. Kisco - Hazard Mitigation Committee Mtg.

Jim Brower	ETG	631-707-1756
Valerie Rifkin	ETG	917-318-6981
Joe Cerretani	VMK	914-864-0059
Bill Seevers	ETG	631-232-1987
J Palm	VMK	914-864-0001

Appendix 3.
HAZUS-MH: Sample Model Output

3.1 Hurricane Event Report

3.1.1 Hurricane Gloria Historical Model Event Report

3.1.2 Probabilistic Model Event Report
(Quick Assessment Report)
(100 Year Return Period)
(500 Year Return Period)
(1000 Year Return Period)

3.2 Earthquake Event Report

3.2.1 Historical Model Event Report

3.2.2 Probabilistic Model Event Report
(100 Year Return Period)
(500 Year Return Period)
(1000 Year Return Period)

3.3 Flood Event Report

3.3.1 Probabilistic Model Event Report
(100 Year Return Period)
(500 Year Return Period)

3.1 Hurricane Event Report

3.1.1 Hurricane Gloria Historical Model Event Report

3.1.2 Probabilistic Model Event Report
(Quick Assessment Report)
(100 Year Return Period)
(500 Year Return Period)
(1000 Year Return Period)

Hazus-MH: Hurricane Event Report

Region Name: Mt Kisco Hurricane

Hurricane Scenario: GLORIA

Print Date: Wednesday, February 27, 2013

Disclaimer:
Totals only reflect data for those census tracts/blocks included in the user's study region.

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.

Table of Contents

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 3.12 square miles and contains 2 census tracts. There are over 3 thousand households in the region and has a total population of 9,983 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 2 thousand buildings in the region with a total building replacement value (excluding contents) of 1,210 million dollars (2006 dollars). Approximately 82% of the buildings (and 57% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 2,925 buildings in the region which have an aggregate total replacement value of 1,210 million (2006 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 Tot
Residential	689,795	57.0%
Commercial	428,372	35.4%
Industrial	45,062	3.7%
Agricultural	4,137	0.3%
Religious	25,488	2.1%
Government	5,895	0.5%
Education	11,693	1.0%
Total	**1,210,442**	**100.0%**

Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 210 beds. There are 3 schools, 1 fire stations, 1 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:	GLORIA
Type:	Historic
Max Peak Gust in Study Region:	55 mph

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

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	29	99.85	0	0.15	0	0.00	0	0.00	0	0.00
Commercial	374	99.80	1	0.20	0	0.00	0	0.00	0	0.00
Education	13	99.79	0	0.21	0	0.00	0	0.00	0	0.00
Government	9	99.77	0	0.23	0	0.00	0	0.00	0	0.00
Industrial	87	99.78	0	0.22	0	0.00	0	0.00	0	0.00
Religion	20	99.82	0	0.18	0	0.00	0	0.00	0	0.00
Residential	2,389	99.89	3	0.11	0	0.01	0	0.00	0	0.00
Total	**2,921**		**4**		**0**		**0**		**0**	

Table 3: Expected Building Damage by Building Type

Building Type	None		Minor		Moderate		Severe		Destruction	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	92	99.73	0	0.27	0	0.00	0	0.00	0	0.00
Masonry	597	99.69	2	0.31	0	0.01	0	0.00	0	0.00
MH	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	258	99.77	1	0.23	0	0.00	0	0.00	0	0.00
Wood	1,972	99.96	1	0.03	0	0.00	0	0.00	0	0.00

Essential Facility Damage

Before the hurricane, the region had 210 hospital beds available for use. On the day of the hurricane, the model estimates that 210 hospital beds (only 100.00%) are available for use. After one week, 100.00% of the beds will be in service. By 30 days, 100.00% will be operational.

Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate Damage > 50%**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
Fire Stations	1	0	0	1
Hospitals	1	0	0	1
Police Stations	1	0	0	1
Schools	3	0	0	3

Induced Hurricane Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. 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, 0 tons (0%) is Other Tree Debris. Of the remaining 0 tons, Brick/Wood comprises 0% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible 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 building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 0 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier , uncompacted debris.

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 9,983) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the hurricane is 0.1 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 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
Property Damage						
	Building	33.58	0.00	0.00	0.00	33.58
	Content	19.45	0.00	0.00	0.00	19.45
	Inventory	0.00	0.00	0.00	0.00	0.00
	Subtotal	**53.04**	**0.00**	**0.00**	**0.00**	**53.04**
Business Interruption Loss						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	0.25	0.00	0.00	0.00	0.25
	Rental	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.25**	**0.00**	**0.00**	**0.00**	**0.25**
Total						
	Total	**53.28**	**0.00**	**0.00**	**0.00**	**53.28**

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	9,983	689,795	520,647	1,210,442
Total	**9,983**	**689,795**	**520,647**	**1,210,442**
Study Region Total	**9,983**	**689,795**	**520,647**	**1,210,442**

Quick Assessment Report

February 27, 2013

Study Region : Mt Kisco Hurricane

Scenario : Probabilistic

Regional Statistics

Area (Square Miles)	3
Number of Census Tracts	2
Number of People in the Region	9,983

General Building Stock

Occupancy	*Building Count*	*Dollar Exposure ($ K)*
Residential	2,392	689,795
Commercial	375	428,372
Other	158	92,275
Total	2,925	1,210,442

Scenario Results

Number of Residential Buildings Damaged

Return Period	*Minor*	*Moderate*	*Severe*	*Destruction*	*Total*
10	0	0	0	0	0
20	3	0	0	0	3
50	7	1	0	0	8
100	34	5	0	0	39
200	117	24	0	0	141
500	340	87	3	0	430
1000	581	189	10	3	783

Number of Buildings Damaged

Return Period	*Minor*	*Moderate*	*Severe*	*Destruction*	*Total*
10	0	0	0	0	0
20	4	0	0	0	4
50	10	1	0	0	10
100	39	6	0	0	45
200	133	26	1	0	159
500	392	97	4	0	493
1000	680	221	16	4	921

Shelter Requirements

Return Period	*Displaced Households (#Households)*	*Short Term Shelter (#People)*
10	0	0
20	0	0
50	0	0
100	0	0
200	9	3
500	36	9
1000	81	20

Economic Loss (x 1000)

	Property Damage (Capital Stock) Losses		*Business Interruption (Income) Losses*
ReturnPeriod	*Residential*	*Total*	
10	0	0	0
20	53	53	0
50	866	917	17
100	3,362	3,524	91
200	8,224	8,872	572
500	19,243	21,763	2,637
1000	35,236	42,153	5,454
Annualized	197	236	26

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

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:	Mt Kisco Hurricane
Hurricane Scenario:	Probabilistic 10-year Return Period
Print Date:	Wednesday, February 27, 2013

Disclaimer:
Totals only reflect data for those census tracts/blocks included in the user's study region.

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

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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 3.12 square miles and contains 2 census tracts. There are over 3 thousand households in the region and has a total population of 9,983 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 2 thousand buildings in the region with a total building replacement value (excluding contents) of 1,210 million dollars (2006 dollars). Approximately 82% of the buildings (and 57% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 2,925 buildings in the region which have an aggregate total replacement value of 1,210 million (2006 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 Tot
Residential	689,795	57.0%
Commercial	428,372	35.4%
Industrial	45,062	3.7%
Agricultural	4,137	0.3%
Religious	25,488	2.1%
Government	5,895	0.5%
Education	11,693	1.0%
Total	**1,210,442**	**100.0%**

Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 210 beds. There are 3 schools, 1 fire stations, 1 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

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	29	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	375	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	13	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	9	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	87	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	20	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	2,392	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Total	**2,925**		**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	92	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	599	100.00	0	0.00	0	0.00	0	0.00	0	0.00
MH	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	259	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	1,973	100.00	0	0.00	0	0.00	0	0.00	0	0.00

Essential Facility Damage

Before the hurricane, the region had 210 hospital beds available for use. On the day of the hurricane, the model estimates that 210 hospital beds (only 100.00%) are available for use. After one week, 100.00% of the beds will be in service. By 30 days, 100.00% will be operational.

Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate Damage > 50%**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
Fire Stations	1	0	0	1
Hospitals	1	0	0	1
Police Stations	1	0	0	1
Schools	3	0	0	3

Induced Hurricane Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. 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, 0 tons (0%) is Other Tree Debris. Of the remaining 0 tons, Brick/Wood comprises 0% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible 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 building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 0 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

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 9,983) 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
Property Damage						
	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**
Business Interruption Loss						
	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**
Total						
	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

		Building Value (thousands of dollars)		
	Population	Residential	Non-Residential	Total
New York				
Westchester	9,983	689,795	520,647	1,210,442
Total	**9,983**	**689,795**	**520,647**	**1,210,442**
Study Region Total	**9,983**	**689,795**	**520,647**	**1,210,442**

Hazus-MH: Hurricane Event Report

Region Name:	Mt Kisco Hurricane
Hurricane Scenario:	Probabilistic 50-year Return Period
Print Date:	Wednesday, February 27, 2013

Disclaimer:
Totals only reflect data for those census tracts/blocks included in the user's study region.

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.

Table of Contents

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 3.12 square miles and contains 2 census tracts. There are over 3 thousand households in the region and has a total population of 9,983 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 2 thousand buildings in the region with a total building replacement value (excluding contents) of 1,210 million dollars (2006 dollars). Approximately 82% of the buildings (and 57% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 2,925 buildings in the region which have an aggregate total replacement value of 1,210 million (2006 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 Tot
Residential	689,795	57.0%
Commercial	428,372	35.4%
Industrial	45,062	3.7%
Agricultural	4,137	0.3%
Religious	25,488	2.1%
Government	5,895	0.5%
Education	11,693	1.0%
Total	**1,210,442**	**100.0%**

Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 210 beds. There are 3 schools, 1 fire stations, 1 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 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

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	29	99.68	0	0.31	0	0.01	0	0.00	0	0.00
Commercial	374	99.60	1	0.39	0	0.00	0	0.00	0	0.00
Education	13	99.59	0	0.41	0	0.00	0	0.00	0	0.00
Government	9	99.57	0	0.43	0	0.00	0	0.00	0	0.00
Industrial	87	99.58	0	0.42	0	0.00	0	0.00	0	0.00
Religion	20	99.68	0	0.31	0	0.01	0	0.00	0	0.00
Residential	2,384	99.66	7	0.31	1	0.03	0	0.00	0	0.00
Total	**2,915**		**10**		**1**		**0**		**0**	

Table 3: Expected Building Damage by Building Type : 50 - year Event

	None		Minor		Moderate		Severe		Destruction	
Building Type	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	92	99.48	0	0.52	0	0.00	0	0.00	0	0.00
Masonry	594	99.19	5	0.76	0	0.04	0	0.00	0	0.00
MH	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	258	99.57	1	0.43	0	0.00	0	0.00	0	0.00
Wood	1,971	99.89	2	0.10	0	0.01	0	0.00	0	0.00

Essential Facility Damage

Before the hurricane, the region had 210 hospital beds available for use. On the day of the hurricane, the model estimates that 210 hospital beds (only 100.00%) are available for use. After one week, 100.00% of the beds will be in service. By 30 days, 100.00% will be operational.

Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate Damage > 50%**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
Fire Stations	1	0	0	1
Hospitals	1	1	0	1
Police Stations	1	0	0	1
Schools	3	0	0	3

Induced Hurricane Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. 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 286 tons of debris will be generated. Of the total amount, 82 tons (29%) is Other Tree Debris. Of the remaining 204 tons, Brick/Wood comprises 33% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 3 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 136 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

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 9,983) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the hurricane is 0.9 million dollars, which represents 0.08 % 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 1 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 94% 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
Property Damage						
	Building	588.40	42.84	4.51	4.31	640.05
	Content	277.12	0.00	0.00	0.00	277.12
	Inventory	0.00	0.00	0.00	0.00	0.00
	Subtotal	**865.52**	**42.84**	**4.51**	**4.31**	**917.18**
Business Interruption Loss						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	6.86	0.14	0.00	0.02	7.02
	Rental	10.39	0.00	0.00	0.00	10.39
	Wage	0.00	0.00	0.00	0.00	0.00
	Subtotal	**17.25**	**0.14**	**0.00**	**0.02**	**17.41**
Total						
	Total	**882.77**	**42.98**	**4.51**	**4.33**	**934.58**

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	9,983	689,795	520,647	1,210,442
Total	**9,983**	**689,795**	**520,647**	**1,210,442**
Study Region Total	**9,983**	**689,795**	**520,647**	**1,210,442**

Hazus-MH: Hurricane Event Report

Region Name: Mt Kisco Hurricane

Hurricane Scenario: Probabilistic 100-year Return Period

Print Date: Wednesday, February 27, 2013

Table of Contents

General Description of the Region

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Building Inventory

General Building Stock

Hazus estimates that there are 2,925 buildings in the region which have an aggregate total replacement value of 1,210 million (2006 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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Occupancy	Exposure ($1000)	Percent of Tot
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Industrial	45,062	3.7%
Agricultural	4,137	0.3%
Religious	25,488	2.1%
Government	5,895	0.5%
Education	11,693	1.0%
Total	**1,210,442**	**100.0%**

Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 210 beds. There are 3 schools, 1 fire stations, 1 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 6 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 : 100 - year Event

	None		Minor		Moderate		Severe		Destruction	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	29	98.88	0	1.02	0	0.09	0	0.02	0	0.00
Commercial	371	98.94	4	1.00	0	0.07	0	0.00	0	0.00
Education	13	98.99	0	1.00	0	0.01	0	0.00	0	0.00
Government	9	98.96	0	1.03	0	0.01	0	0.00	0	0.00
Industrial	86	98.91	1	1.05	0	0.03	0	0.00	0	0.00
Religion	20	99.12	0	0.86	0	0.02	0	0.00	0	0.00
Residential	2,353	98.37	34	1.40	5	0.22	0	0.00	0	0.00
Total	**2,880**		**39**		**6**		**0**		**0**	

Table 3: Expected Building Damage by Building Type : 100 - year Event

Building	None		Minor		Moderate		Severe		Destruction	
Type	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	91	98.72	1	1.27	0	0.01	0	0.00	0	0.00
Masonry	583	97.26	14	2.26	3	0.48	0	0.01	0	0.00
MH	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	256	98.90	3	1.03	0	0.07	0	0.00	0	0.00
Wood	1,956	99.14	16	0.82	1	0.04	0	0.00	0	0.00

Essential Facility Damage

Before the hurricane, the region had 210 hospital beds available for use. On the day of the hurricane, the model estimates that 210 hospital beds (only 100.00%) are available for use. After one week, 100.00% of the beds will be in service. By 30 days, 100.00% will be operational.

Table 4: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**Probability of at Least Moderate Damage > 50%**	**Probability of Complete Damage > 50%**	**Expected Loss of Use < 1 day**
Fire Stations	1	0	0	1
Hospitals	1	1	0	1
Police Stations	1	0	0	1
Schools	3	0	0	3

Induced Hurricane Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the hurricane. The model breaks the debris into four general categories: a) Brick/Wood, b) Reinforced Concrete/Steel, c) Eligible Tree Debris, and d) Other Tree Debris. 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 896 tons of debris will be generated. Of the total amount, 234 tons (26%) is Other Tree Debris. Of the remaining 662 tons, Brick/Wood comprises 45% of the total, Reinforced Concrete/Steel comprises of 0% of the total, with the remainder being Eligible Tree Debris. If the building debris tonnage is converted to an estimated number of truckloads, it will require 12 truckloads (@25 tons/truck) to remove the building debris generated by the hurricane. The number of Eligible Tree Debris truckloads will depend on how the 365 tons of Eligible Tree Debris are collected and processed. The volume of tree debris generally ranges from about 4 cubic yards per ton for chipped or compacted tree debris to about 10 cubic yards per ton for bulkier, uncompacted debris.

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 9,983) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the hurricane is 3.6 million dollars, which represents 0.30 % 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 4 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 95% 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
Property Damage						
	Building	2,443.09	139.38	9.96	13.09	2,605.53
	Content	918.79	0.00	0.00	0.00	918.79
	Inventory	0.00	0.00	0.00	0.00	0.00
	Subtotal	**3,361.88**	**139.38**	**9.96**	**13.09**	**3,524.32**
Business Interruption Loss						
	Income	0.00	0.00	0.00	0.00	0.00
	Relocation	38.08	1.91	0.08	0.08	40.15
	Rental	50.71	0.00	0.00	0.00	50.71
	Wage	0.00	0.00	0.00	0.00	0.00
	Subtotal	**88.79**	**1.91**	**0.08**	**0.08**	**90.86**
Total						
	Total	**3,450.67**	**141.30**	**10.04**	**13.17**	**3,615.18**

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	9,983	689,795	520,647	1,210,442
Total	**9,983**	**689,795**	**520,647**	**1,210,442**
Study Region Total	**9,983**	**689,795**	**520,647**	**1,210,442**

3.2 Earthquake Event Report

3.2.1 Historical Model Event Report

3.2.2 Probabilistic Model Event Report

(100 Year Return Period)

(500 Year Return Period)

(1000 Year Return Period)

Hazus-MH: Earthquake Event Report

Region Name: Mt Kisco Earthquake

Earthquake Scenario: HistoricalNY4582

Print Date: February 26, 2013

Totals only reflect data for those census tracts/blocks included in the user's study region.

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 earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

Table of Contents

General Description of the Region

Hazus is a regional earthquake 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 earthquake 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 earthquakes and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was 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 3.12 square miles and contains 2 census tracts. There are over 3 thousand households in the region which has a total population of 9,983 people (2002 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 2 thousand buildings in the region with a total building replacement value (excluding contents) of 1,210 (millions of dollars). Approximately 82.00 % of the buildings (and 57.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 381 and 0 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 2 thousand buildings in the region which have an aggregate total replacement value of 1,210 (millions of dollars) . Appendix B provides a general distribution of the building value by State and County.

In terms of building construction types found in the region, wood frame construction makes up 67% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 210 beds. There are 3 schools, 1 fire stations, 1 police stations and 0 emergency operation facilities. With respect to high potential loss facilities (HPL), there are 0 dams identified within the region. Of these, 0 of the dams are classified as 'high hazard'. The inventory also includes 0 hazardous material sites, 0 military installations and 0 nuclear power plants.

Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 381.00 (millions of dollars). This inventory includes over 40 kilometers of highways, 9 bridges, 107 kilometers of pipes.

Table 1: Transportation System Lifeline Inventory

System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	9	80.90
	Segments	10	271.30
	Tunnels	0	0.00
		Subtotal	**352.20**
Railways	Bridges	0	0.00
	Facilities	0	0.00
	Segments	1	27.60
	Tunnels	0	0.00
		Subtotal	**27.60**
Light Rail	Bridges	0	0.00
	Facilities	0	0.00
	Segments	0	0.00
	Tunnels	0	0.00
		Subtotal	**0.00**
Bus	Facilities	1	1.30
		Subtotal	**1.30**
Ferry	Facilities	0	0.00
		Subtotal	**0.00**
Port	Facilities	0	0.00
		Subtotal	**0.00**
Airport	Facilities	0	0.00
	Runways	0	0.00
		Subtotal	**0.00**
		Total	**381.10**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	1.10
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**1.10**
Waste Water	Distribution Lines	NA	0.60
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**0.60**
Natural Gas	Distribution Lines	NA	0.40
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**0.40**
Oil Systems	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**0.00**
Electrical Power	Facilities	0	0.00
		Subtotal	**0.00**
Communication	Facilities	1	0.10
		Subtotal	**0.10**
		Total	**2.30**

Earthquake Scenario

Hazus uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.

Scenario Name	HistoricalNY4582
Type of Earthquake	Historical
Fault Name	NA
Historical Epicenter ID #	4582
Probabilistic Return Period	NA
Longitude of Epicenter	-74.31
Latitude of Epicenter	44.03
Earthquake Magnitude	5.20
Depth (Km)	10.00
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	Central & East US (CEUS 2008)

Building Damage

Hazus estimates that about 0 buildings will be at least moderately damaged. This is over 0.00 % of the buildings in the region. There are an estimated 0 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	29	0.99	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	375	12.82	0	0.00	0	0.00	0	0.00	0	0.00
Education	13	0.44	0	0.00	0	0.00	0	0.00	0	0.00
Government	9	0.31	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	87	2.97	0	0.00	0	0.00	0	0.00	0	0.00
Other Residential	711	24.31	0	0.00	0	0.00	0	0.00	0	0.00
Religion	20	0.68	0	0.00	0	0.00	0	0.00	0	0.00
Single Family	1,681	57.47	0	0.00	0	0.00	0	0.00	0	0.00
Total	**2,925**		**0**		**0**		**0**		**0**	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	1,973	67.46	0	0.00	0	0.00	0	0.00	0	0.00
Steel	259	8.85	0	0.00	0	0.00	0	0.00	0	0.00
Concrete	77	2.63	0	0.00	0	0.00	0	0.00	0	0.00
Precast	16	0.54	0	0.00	0	0.00	0	0.00	0	0.00
RM	104	3.55	0	0.00	0	0.00	0	0.00	0	0.00
URM	497	16.98	0	0.00	0	0.00	0	0.00	0	0.00
MH	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Total	**2,925**		**0**		**0**		**0**		**0**	

*Note:

RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 210 hospital beds available for use. On the day of the earthquake, the model estimates that only 208 hospital beds (100.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 100.00% of the beds will be back in service. By 30 days, 100.00% will be operational.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**At Least Moderate Damage > 50%**	**Complete Damage > 50%**	**With Functionality > 50% on day 1**
Hospitals	1	0	0	1
Schools	3	0	0	3
EOCs	0	0	0	0
PoliceStations	1	0	0	1
FireStations	1	0	0	1

Transportation and Utility Lifeline Damage

Table 6 provides damage estimates for the transportation system.

Table 6: Expected Damage to the Transportation Systems

System	Component	Number of Locations				
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	10	0	0	10	10
	Bridges	9	0	0	9	9
	Tunnels	0	0	0	0	0
Railways	Segments	1	0	0	1	1
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	1	0	0	1	1
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	0	0	0	0	0
	Runways	0	0	0	0	0

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	0	0	0	0	0
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	0	0	0	0	0
Communication	1	0	0	1	1

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (kms)	Number of Leaks	Number of Breaks
Potable Water	54	0	0
Waste Water	32	0	0
Natural Gas	22	0	0
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	3,993	0	0	0	0	0
Electric Power		0	0	0	0	0

Induced Earthquake Damage

Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. 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 0.00 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 0.00% of the total, with the remainder being Reinforced Concrete/Steel. If the 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 earthquake.

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake 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 earthquake. Of these, 0 people (out of a total population of 9,983) will seek temporary shelter in public shelters.

Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

· Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
· Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
· Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
· Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	0	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Other-Residential	0	0	0	0
	Single Family	0	0	0	0
	Total	**0**	**0**	**0**	**0**
2 PM	Commercial	0	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Other-Residential	0	0	0	0
	Single Family	0	0	0	0
	Total	**0**	**0**	**0**	**0**
5 PM	Commercial	0	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Other-Residential	0	0	0	0
	Single Family	0	0	0	0
	Total	**0**	**0**	**0**	**0**

Economic Loss

The total economic loss estimated for the earthquake is 0.00 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building 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 earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 0.00 (millions of 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 11 below provides a summary of the losses associated with the building damage.

Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.00	0.00	0.00	0.00	0.00	0.00
	Capital-Related	0.00	0.00	0.00	0.00	0.00	0.00
	Rental	0.00	0.00	0.00	0.00	0.00	0.00
	Relocation	0.00	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Capital Stock Losses							
	Structural	0.00	0.00	0.00	0.00	0.00	0.00
	Non_Structural	0.00	0.00	0.00	0.00	0.00	0.00
	Content	0.00	0.00	0.00	0.00	0.00	0.00
	Inventory	0.00	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Hazus estimates the long-term economic impacts to the region for 15 years after the earthquake. The model quantifies this information in terms of income and employment changes within the region. Table 14 presents the results of the region for the given earthquake.

Table 12: Transportation System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	271.34	$0.00	0.00
	Bridges	80.87	$0.00	0.00
	Tunnels	0.00	$0.00	0.00
	Subtotal	**352.20**	**0.00**	
Railways	Segments	27.61	$0.00	0.00
	Bridges	0.00	$0.00	0.00
	Tunnels	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Subtotal	**27.60**	**0.00**	
Light Rail	Segments	0.00	$0.00	0.00
	Bridges	0.00	$0.00	0.00
	Tunnels	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Bus	Facilities	1.29	$0.00	0.00
	Subtotal	**1.30**	**0.00**	
Ferry	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Port	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Airport	Facilities	0.00	$0.00	0.00
	Runways	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
	Total	**381.10**	**0.00**	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Distribution Lines	1.10	$0.00	0.00
	Subtotal	**1.08**	**$0.00**	
Waste Water	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Distribution Lines	0.60	$0.00	0.00
	Subtotal	**0.65**	**$0.00**	
Natural Gas	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Distribution Lines	0.40	$0.00	0.00
	Subtotal	**0.43**	**$0.00**	
Oil Systems	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**$0.00**	
Electrical Power	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**$0.00**	
Communication	Facilities	0.10	$0.00	0.00
	Subtotal	**0.12**	**$0.00**	
	Total	**2.28**	**$0.00**	

Table 14. Indirect Economic Impact with outside aid

(Employment as # of people and Income in millions of $)

LOSS		Total	%

Appendix A: County Listing for the Region

Westchester,NY

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
New York					
	Westchester	9,983	689	520	1,210
Total State		**9,983**	**689**	**520**	**1,210**
Total Region		**9,983**	**689**	**520**	**1,210**

Hazus-MH: Earthquake Event Report

Region Name: Mt Kisco Earthquake

Earthquake Scenario: Probabilistic-100yr

Print Date: February 26, 2013

Totals only reflect data for those census tracts/blocks included in the user's study region.

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There are an estimated 2 thousand buildings in the region with a total building replacement value (excluding contents) of 1,210 (millions of dollars). Approximately 82.00 % of the buildings (and 57.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 381 and 0 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 2 thousand buildings in the region which have an aggregate total replacement value of 1,210 (millions of dollars) . Appendix B provides a general distribution of the building value by State and County.

In terms of building construction types found in the region, wood frame construction makes up 67% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 210 beds. There are 3 schools, 1 fire stations, 1 police stations and 0 emergency operation facilities. With respect to high potential loss facilities (HPL), there are 0 dams identified within the region. Of these, 0 of the dams are classified as 'high hazard'. The inventory also includes 0 hazardous material sites, 0 military installations and 0 nuclear power plants.

Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 381.00 (millions of dollars). This inventory includes over 40 kilometers of highways, 9 bridges, 107 kilometers of pipes.

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System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
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	Segments	10	271.30
	Tunnels	0	0.00
		Subtotal	**352.20**
Railways	Bridges	0	0.00
	Facilities	0	0.00
	Segments	1	27.60
	Tunnels	0	0.00
		Subtotal	**27.60**
Light Rail	Bridges	0	0.00
	Facilities	0	0.00
	Segments	0	0.00
	Tunnels	0	0.00
		Subtotal	**0.00**
Bus	Facilities	1	1.30
		Subtotal	**1.30**
Ferry	Facilities	0	0.00
		Subtotal	**0.00**
Port	Facilities	0	0.00
		Subtotal	**0.00**
Airport	Facilities	0	0.00
	Runways	0	0.00
		Subtotal	**0.00**
		Total	**381.10**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	1.10
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**1.10**
Waste Water	Distribution Lines	NA	0.60
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**0.60**
Natural Gas	Distribution Lines	NA	0.40
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**0.40**
Oil Systems	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**0.00**
Electrical Power	Facilities	0	0.00
		Subtotal	**0.00**
Communication	Facilities	1	0.10
		Subtotal	**0.10**
		Total	**2.30**

Earthquake Scenario

Hazus uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.

Scenario Name	Probabilistic-100yr
Type of Earthquake	Probabilistic
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	100.00
Longitude of Epicenter	NA
Latitude of Epicenter	NA
Earthquake Magnitude	5.00
Depth (Km)	NA
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	NA

Building Damage

Hazus estimates that about 0 buildings will be at least moderately damaged. This is over 0.00 % of the buildings in the region. There are an estimated 0 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	29	0.99	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	375	12.82	0	0.00	0	0.00	0	0.00	0	0.00
Education	13	0.44	0	0.00	0	0.00	0	0.00	0	0.00
Government	9	0.31	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	87	2.97	0	0.00	0	0.00	0	0.00	0	0.00
Other Residential	711	24.31	0	0.00	0	0.00	0	0.00	0	0.00
Religion	20	0.68	0	0.00	0	0.00	0	0.00	0	0.00
Single Family	1,681	57.47	0	0.00	0	0.00	0	0.00	0	0.00
Total	**2,925**		**0**		**0**		**0**		**0**	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	1,973	67.46	0	0.00	0	0.00	0	0.00	0	0.00
Steel	259	8.85	0	0.00	0	0.00	0	0.00	0	0.00
Concrete	77	2.63	0	0.00	0	0.00	0	0.00	0	0.00
Precast	16	0.54	0	0.00	0	0.00	0	0.00	0	0.00
RM	104	3.55	0	0.00	0	0.00	0	0.00	0	0.00
URM	497	16.98	0	0.00	0	0.00	0	0.00	0	0.00
MH	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Total	**2,925**		**0**		**0**		**0**		**0**	

*Note:

RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 210 hospital beds available for use. On the day of the earthquake, the model estimates that only 207 hospital beds (99.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 100.00% of the beds will be back in service. By 30 days, 100.00% will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	1	0	0	1
Schools	3	0	0	3
EOCs	0	0	0	0
PoliceStations	1	0	0	1
FireStations	1	0	0	1

Transportation and Utility Lifeline Damage

Table 6 provides damage estimates for the transportation system.

Table 6: Expected Damage to the Transportation Systems

System	Component	Number of Locations				
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	10	0	0	10	10
	Bridges	9	0	0	9	9
	Tunnels	0	0	0	0	0
Railways	Segments	1	0	0	1	1
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	1	0	0	1	1
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	0	0	0	0	0
	Runways	0	0	0	0	0

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	0	0	0	0	0
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	0	0	0	0	0
Communication	1	0	0	1	1

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (kms)	Number of Leaks	Number of Breaks
Potable Water	54	0	0
Waste Water	32	0	0
Natural Gas	22	0	0
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	3,993	0	0	0	0	0
Electric Power		0	0	0	0	0

Induced Earthquake Damage

Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region’s total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. 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 0.00 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 0.00% of the total, with the remainder being Reinforced Concrete/Steel. If the 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 earthquake.

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake 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 earthquake. Of these, 0 people (out of a total population of 9,983) will seek temporary shelter in public shelters.

Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	0	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Other-Residential	0	0	0	0
	Single Family	0	0	0	0
	Total	**0**	**0**	**0**	**0**
2 PM	Commercial	0	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Other-Residential	0	0	0	0
	Single Family	0	0	0	0
	Total	**0**	**0**	**0**	**0**
5 PM	Commercial	0	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Other-Residential	0	0	0	0
	Single Family	0	0	0	0
	Total	**0**	**0**	**0**	**0**

Economic Loss

The total economic loss estimated for the earthquake is 0.00 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building 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 earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 0.00 (millions of 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 11 below provides a summary of the losses associated with the building damage.

Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.00	0.00	0.00	0.00	0.00	0.00
	Capital-Related	0.00	0.00	0.00	0.00	0.00	0.00
	Rental	0.00	0.00	0.00	0.00	0.00	0.00
	Relocation	0.00	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Capital Stock Losses							
	Structural	0.00	0.00	0.00	0.00	0.00	0.00
	Non_Structural	0.00	0.00	0.00	0.00	0.00	0.00
	Content	0.00	0.00	0.00	0.00	0.00	0.00
	Inventory	0.00	0.00	0.00	0.00	0.00	0.00
	Subtotal	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
	Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Hazus estimates the long-term economic impacts to the region for 15 years after the earthquake. The model quantifies this information in terms of income and employment changes within the region. Table 14 presents the results of the region for the given earthquake.

Table 12: Transportation System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	271.34	$0.00	0.00
	Bridges	80.87	$0.00	0.00
	Tunnels	0.00	$0.00	0.00
	Subtotal	**352.20**	**0.00**	
Railways	Segments	27.61	$0.00	0.00
	Bridges	0.00	$0.00	0.00
	Tunnels	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Subtotal	**27.60**	**0.00**	
Light Rail	Segments	0.00	$0.00	0.00
	Bridges	0.00	$0.00	0.00
	Tunnels	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Bus	Facilities	1.29	$0.00	0.02
	Subtotal	**1.30**	**0.00**	
Ferry	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Port	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Airport	Facilities	0.00	$0.00	0.00
	Runways	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
	Total	**381.10**	**0.00**	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Distribution Lines	1.10	$0.00	0.00
	Subtotal	**1.08**	**$0.00**	
Waste Water	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Distribution Lines	0.60	$0.00	0.00
	Subtotal	**0.65**	**$0.00**	
Natural Gas	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Distribution Lines	0.40	$0.00	0.00
	Subtotal	**0.43**	**$0.00**	
Oil Systems	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**$0.00**	
Electrical Power	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**$0.00**	
Communication	Facilities	0.10	$0.00	0.00
	Subtotal	**0.12**	**$0.00**	
	Total	**2.28**	**$0.00**	

Table 14. Indirect Economic Impact with outside aid

(Employment as # of people and Income in millions of $)

LOSS		Total	%

Appendix A: County Listing for the Region

Westchester,NY

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
New York					
	Westchester	9,983	689	520	1,210
Total State		**9,983**	**689**	**520**	**1,210**
Total Region		**9,983**	**689**	**520**	**1,210**

Hazus-MH: Earthquake Event Report

Region Name: Mt Kisco Earthquake

Earthquake Scenario: Probabilistic-500yr

Print Date: February 26, 2013

Totals only reflect data for those census tracts/blocks included in the user's study region.

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 earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

Table of Contents

General Description of the Region

Hazus is a regional earthquake 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 earthquake 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 earthquakes and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was 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 3.12 square miles and contains 2 census tracts. There are over 3 thousand households in the region which has a total population of 9,983 people (2002 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 2 thousand buildings in the region with a total building replacement value (excluding contents) of 1,210 (millions of dollars). Approximately 82.00 % of the buildings (and 57.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 381 and 0 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 2 thousand buildings in the region which have an aggregate total replacement value of 1,210 (millions of dollars) . Appendix B provides a general distribution of the building value by State and County.

In terms of building construction types found in the region, wood frame construction makes up 67% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 210 beds. There are 3 schools, 1 fire stations, 1 police stations and 0 emergency operation facilities. With respect to high potential loss facilities (HPL), there are 0 dams identified within the region. Of these, 0 of the dams are classified as 'high hazard'. The inventory also includes 0 hazardous material sites, 0 military installations and 0 nuclear power plants.

Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 381.00 (millions of dollars). This inventory includes over 40 kilometers of highways, 9 bridges, 107 kilometers of pipes.

Table 1: Transportation System Lifeline Inventory

System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	9	80.90
	Segments	10	271.30
	Tunnels	0	0.00
		Subtotal	**352.20**
Railways	Bridges	0	0.00
	Facilities	0	0.00
	Segments	1	27.60
	Tunnels	0	0.00
		Subtotal	**27.60**
Light Rail	Bridges	0	0.00
	Facilities	0	0.00
	Segments	0	0.00
	Tunnels	0	0.00
		Subtotal	**0.00**
Bus	Facilities	1	1.30
		Subtotal	**1.30**
Ferry	Facilities	0	0.00
		Subtotal	**0.00**
Port	Facilities	0	0.00
		Subtotal	**0.00**
Airport	Facilities	0	0.00
	Runways	0	0.00
		Subtotal	**0.00**
		Total	**381.10**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	1.10
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**1.10**
Waste Water	Distribution Lines	NA	0.60
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**0.60**
Natural Gas	Distribution Lines	NA	0.40
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**0.40**
Oil Systems	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**0.00**
Electrical Power	Facilities	0	0.00
		Subtotal	**0.00**
Communication	Facilities	1	0.10
		Subtotal	**0.10**
		Total	**2.30**

Earthquake Scenario

Hazus uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.

Scenario Name	Probabilistic-500yr
Type of Earthquake	Probabilistic
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	500.00
Longitude of Epicenter	NA
Latitude of Epicenter	NA
Earthquake Magnitude	5.00
Depth (Km)	NA
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	NA

Building Damage

Hazus estimates that about 30 buildings will be at least moderately damaged. This is over 1.00 % of the buildings in the region. There are an estimated 0 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	27	0.99	1	1.07	0	1.22	0	1.28	0	0.85
Commercial	353	12.67	16	14.61	5	20.16	1	21.79	0	18.35
Education	12	0.44	1	0.47	0	0.62	0	0.61	0	0.68
Government	9	0.31	0	0.32	0	0.41	0	0.37	0	0.36
Industrial	82	2.95	3	3.21	1	4.47	0	4.33	0	3.63
Other Residential	676	24.25	27	24.97	7	27.44	1	28.93	0	29.99
Religion	19	0.68	1	0.79	0	1.07	0	1.24	0	1.33
Single Family	1,608	57.73	59	54.55	12	44.60	1	41.45	0	44.80
Total	**2,786**		**108**		**27**		**3**		**0**	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	1,906	68.42	59	54.74	7	27.49	0	11.36	0	0.00
Steel	245	8.81	10	8.92	3	12.46	0	9.99	0	4.88
Concrete	73	2.63	3	2.43	1	2.78	0	1.07	0	0.46
Precast	15	0.53	1	0.60	0	1.53	0	2.43	0	0.17
RM	99	3.55	3	2.90	2	6.14	0	6.65	0	0.00
URM	448	16.07	33	30.41	14	49.61	2	68.51	0	94.49
MH	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Total	**2,786**		**108**		**27**		**3**		**0**	

*Note:

RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 210 hospital beds available for use. On the day of the earthquake, the model estimates that only 178 hospital beds (85.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 94.00% of the beds will be back in service. By 30 days, 99.00% will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	1	0	0	1
Schools	3	0	0	3
EOCs	0	0	0	0
PoliceStations	1	0	0	1
FireStations	1	0	0	1

Transportation and Utility Lifeline Damage

Table 6 provides damage estimates for the transportation system.

Table 6: Expected Damage to the Transportation Systems

System	Component	Number of Locations				
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	10	0	0	10	10
	Bridges	9	0	0	9	9
	Tunnels	0	0	0	0	0
Railways	Segments	1	0	0	1	1
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	1	0	0	1	1
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	0	0	0	0	0
	Runways	0	0	0	0	0

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	0	0	0	0	0
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	0	0	0	0	0
Communication	1	0	0	1	1

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (kms)	Number of Leaks	Number of Breaks
Potable Water	54	0	0
Waste Water	32	0	0
Natural Gas	22	0	0
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	3,993	0	0	0	0	0
Electric Power		0	0	0	0	0

Induced Earthquake Damage

Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. 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 0.00 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 71.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 40 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 3 households to be displaced due to the earthquake. Of these, 1 people (out of a total population of 9,983) will seek temporary shelter in public shelters.

Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	0	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Other-Residential	0	0	0	0
	Single Family	0	0	0	0
	Total	**1**	**0**	**0**	**0**
2 PM	Commercial	1	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Other-Residential	0	0	0	0
	Single Family	0	0	0	0
	Total	**1**	**0**	**0**	**0**
5 PM	Commercial	1	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Other-Residential	0	0	0	0
	Single Family	0	0	0	0
	Total	**1**	**0**	**0**	**0**

Economic Loss

The total economic loss estimated for the earthquake is 4.47 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building 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 earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 4.42 (millions of dollars); 29 % 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 38 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.00	0.01	0.39	0.00	0.01	0.41
	Capital-Related	0.00	0.00	0.26	0.00	0.00	0.26
	Rental	0.02	0.08	0.15	0.00	0.00	0.25
	Relocation	0.07	0.05	0.21	0.01	0.02	0.37
	Subtotal	**0.08**	**0.14**	**1.01**	**0.02**	**0.04**	**1.29**
Capital Stock Losses							
	Structural	0.17	0.11	0.26	0.02	0.03	0.60
	Non_Structural	0.49	0.47	0.74	0.08	0.08	1.86
	Content	0.11	0.10	0.38	0.05	0.04	0.67
	Inventory	0.00	0.00	0.01	0.01	0.00	0.01
	Subtotal	**0.78**	**0.67**	**1.39**	**0.16**	**0.14**	**3.14**
	Total	**0.86**	**0.81**	**2.40**	**0.18**	**0.18**	**4.42**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Hazus estimates the long-term economic impacts to the region for 15 years after the earthquake. The model quantifies this information in terms of income and employment changes within the region. Table 14 presents the results of the region for the given earthquake.

Table 12: Transportation System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	271.34	$0.00	0.00
	Bridges	80.87	$0.01	0.01
	Tunnels	0.00	$0.00	0.00
	Subtotal	**352.20**	**0.00**	
Railways	Segments	27.61	$0.00	0.00
	Bridges	0.00	$0.00	0.00
	Tunnels	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Subtotal	**27.60**	**0.00**	
Light Rail	Segments	0.00	$0.00	0.00
	Bridges	0.00	$0.00	0.00
	Tunnels	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Bus	Facilities	1.29	$0.03	2.50
	Subtotal	**1.30**	**0.00**	
Ferry	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Port	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Airport	Facilities	0.00	$0.00	0.00
	Runways	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
	Total	**381.10**	**0.00**	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Distribution Lines	1.10	$0.00	0.06
	Subtotal	**1.08**	**$0.00**	
Waste Water	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Distribution Lines	0.60	$0.00	0.05
	Subtotal	**0.65**	**$0.00**	
Natural Gas	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Distribution Lines	0.40	$0.00	0.02
	Subtotal	**0.43**	**$0.00**	
Oil Systems	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**$0.00**	
Electrical Power	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**$0.00**	
Communication	Facilities	0.10	$0.00	0.34
	Subtotal	**0.12**	**$0.00**	
	Total	**2.28**	**$0.00**	

Table 14. Indirect Economic Impact with outside aid

(Employment as # of people and Income in millions of $)

LOSS		Total	%

Appendix A: County Listing for the Region

Westchester,NY

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
New York					
	Westchester	9,983	689	520	1,210
Total State		**9,983**	**689**	**520**	**1,210**
Total Region		**9,983**	**689**	**520**	**1,210**

Hazus-MH: Earthquake Event Report

Region Name: Mt Kisco Earthquake

Earthquake Scenario: Probabilistic-1000yr

Print Date: February 26, 2013

Totals only reflect data for those census tracts/blocks included in the user's study region.

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 earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

Table of Contents

General Description of the Region

Hazus is a regional earthquake 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 earthquake 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 earthquakes and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was 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 3.12 square miles and contains 2 census tracts. There are over 3 thousand households in the region which has a total population of 9,983 people (2002 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 2 thousand buildings in the region with a total building replacement value (excluding contents) of 1,210 (millions of dollars). Approximately 82.00 % of the buildings (and 57.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 381 and 0 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 2 thousand buildings in the region which have an aggregate total replacement value of 1,210 (millions of dollars) . Appendix B provides a general distribution of the building value by State and County.

In terms of building construction types found in the region, wood frame construction makes up 67% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 210 beds. There are 3 schools, 1 fire stations, 1 police stations and 0 emergency operation facilities. With respect to high potential loss facilities (HPL), there are 0 dams identified within the region. Of these, 0 of the dams are classified as 'high hazard'. The inventory also includes 0 hazardous material sites, 0 military installations and 0 nuclear power plants.

Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 381.00 (millions of dollars). This inventory includes over 40 kilometers of highways, 9 bridges, 107 kilometers of pipes.

Table 1: Transportation System Lifeline Inventory

System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	9	80.90
	Segments	10	271.30
	Tunnels	0	0.00
		Subtotal	**352.20**
Railways	Bridges	0	0.00
	Facilities	0	0.00
	Segments	1	27.60
	Tunnels	0	0.00
		Subtotal	**27.60**
Light Rail	Bridges	0	0.00
	Facilities	0	0.00
	Segments	0	0.00
	Tunnels	0	0.00
		Subtotal	**0.00**
Bus	Facilities	1	1.30
		Subtotal	**1.30**
Ferry	Facilities	0	0.00
		Subtotal	**0.00**
Port	Facilities	0	0.00
		Subtotal	**0.00**
Airport	Facilities	0	0.00
	Runways	0	0.00
		Subtotal	**0.00**
		Total	**381.10**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	1.10
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**1.10**
Waste Water	Distribution Lines	NA	0.60
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**0.60**
Natural Gas	Distribution Lines	NA	0.40
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**0.40**
Oil Systems	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**0.00**
Electrical Power	Facilities	0	0.00
		Subtotal	**0.00**
Communication	Facilities	1	0.10
		Subtotal	**0.10**
		Total	**2.30**

Earthquake Scenario

Hazus uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.

Scenario Name	Probabilistic-1000yr
Type of Earthquake	Probabilistic
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	1,000.00
Longitude of Epicenter	NA
Latitude of Epicenter	NA
Earthquake Magnitude	5.00
Depth (Km)	NA
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	NA

Building Damage

Hazus estimates that about 96 buildings will be at least moderately damaged. This is over 3.00 % of the buildings in the region. There are an estimated 1 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	25	0.97	3	1.08	1	1.28	0	1.47	0	0.98
Commercial	319	12.42	37	13.83	17	20.18	3	23.59	0	19.61
Education	11	0.44	1	0.46	1	0.65	0	0.64	0	0.71
Government	8	0.30	1	0.31	0	0.46	0	0.43	0	0.41
Industrial	74	2.89	8	3.09	4	4.77	1	5.02	0	4.19
Other Residential	621	24.21	64	24.38	22	26.47	3	27.82	0	29.11
Religion	17	0.67	2	0.72	1	0.97	0	1.17	0	1.26
Single Family	1,490	58.09	148	56.14	38	45.23	5	39.85	0	43.74
Total	**2,564**		**264**		**84**		**12**		**1**	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	1,780	69.41	162	61.39	29	35.20	2	14.77	0	5.16
Steel	222	8.64	23	8.84	12	14.59	2	14.15	0	8.76
Concrete	66	2.56	7	2.73	4	4.23	0	2.39	0	1.62
Precast	13	0.51	1	0.50	1	1.27	0	2.24	0	0.32
RM	92	3.58	7	2.50	5	5.50	1	6.97	0	0.29
URM	392	15.30	64	24.04	33	39.21	7	59.48	1	83.84
MH	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Total	**2,564**		**264**		**84**		**12**		**1**	

*Note:
RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 210 hospital beds available for use. On the day of the earthquake, the model estimates that only 151 hospital beds (72.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 87.00% of the beds will be back in service. By 30 days, 97.00% will be operational.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	**Total**	**At Least Moderate Damage > 50%**	**Complete Damage > 50%**	**With Functionality > 50% on day 1**
Hospitals	1	0	0	1
Schools	3	0	0	3
EOCs	0	0	0	0
PoliceStations	1	0	0	1
FireStations	1	0	0	1

Transportation and Utility Lifeline Damage

Table 6 provides damage estimates for the transportation system.

Table 6: Expected Damage to the Transportation Systems

System	Component	Number of Locations				
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	10	0	0	10	10
	Bridges	9	0	0	9	9
	Tunnels	0	0	0	0	0
Railways	Segments	1	0	0	1	1
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	1	0	0	1	1
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	0	0	0	0	0
	Runways	0	0	0	0	0

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	0	0	0	0	0
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	0	0	0	0	0
Communication	1	0	0	1	1

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (kms)	Number of Leaks	Number of Breaks
Potable Water	54	0	0
Waste Water	32	0	0
Natural Gas	22	0	0
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	3,993	0	0	0	0	0
Electric Power		0	0	0	0	0

Induced Earthquake Damage

Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. 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 0.00 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 64.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 160 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 11 households to be displaced due to the earthquake. Of these, 7 people (out of a total population of 9,983) will seek temporary shelter in public shelters.

Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

· Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
· Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
· Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
· Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	0	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Other-Residential	1	0	0	0
	Single Family	1	0	0	0
	Total	**2**	**0**	**0**	**0**
2 PM	Commercial	3	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Other-Residential	0	0	0	0
	Single Family	0	0	0	0
	Total	**4**	**1**	**0**	**0**
5 PM	Commercial	2	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Other-Residential	1	0	0	0
	Single Family	0	0	0	0
	Total	**3**	**0**	**0**	**0**

Economic Loss

The total economic loss estimated for the earthquake is 16.71 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building 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 earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 16.51 (millions of dollars); 25 % 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 38 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.00	0.02	1.29	0.01	0.03	1.35
	Capital-Related	0.00	0.01	0.85	0.01	0.01	0.87
	Rental	0.06	0.23	0.46	0.01	0.01	0.76
	Relocation	0.21	0.17	0.70	0.04	0.08	1.20
	Subtotal	**0.27**	**0.43**	**3.30**	**0.06**	**0.12**	**4.18**
Capital Stock Losses							
	Structural	0.53	0.33	0.83	0.08	0.10	1.87
	Non_Structural	1.87	1.85	2.90	0.32	0.30	7.24
	Content	0.59	0.49	1.71	0.21	0.17	3.16
	Inventory	0.00	0.00	0.03	0.03	0.00	0.06
	Subtotal	**2.98**	**2.67**	**5.47**	**0.64**	**0.56**	**12.33**
	Total	**3.25**	**3.10**	**8.77**	**0.71**	**0.68**	**16.51**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Hazus estimates the long-term economic impacts to the region for 15 years after the earthquake. The model quantifies this information in terms of income and employment changes within the region. Table 14 presents the results of the region for the given earthquake.

Table 12: Transportation System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	271.34	$0.00	0.00
	Bridges	80.87	$0.10	0.12
	Tunnels	0.00	$0.00	0.00
	Subtotal	**352.20**	**0.10**	
Railways	Segments	27.61	$0.00	0.00
	Bridges	0.00	$0.00	0.00
	Tunnels	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Subtotal	**27.60**	**0.00**	
Light Rail	Segments	0.00	$0.00	0.00
	Bridges	0.00	$0.00	0.00
	Tunnels	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Bus	Facilities	1.29	$0.09	7.00
	Subtotal	**1.30**	**0.10**	
Ferry	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Port	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
Airport	Facilities	0.00	$0.00	0.00
	Runways	0.00	$0.00	0.00
	Subtotal	**0.00**	**0.00**	
	Total	**381.10**	**0.20**	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Distribution Lines	1.10	$0.00	0.18
	Subtotal	**1.08**	**$0.00**	
Waste Water	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Distribution Lines	0.60	$0.00	0.15
	Subtotal	**0.65**	**$0.00**	
Natural Gas	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Distribution Lines	0.40	$0.00	0.07
	Subtotal	**0.43**	**$0.00**	
Oil Systems	Pipelines	0.00	$0.00	0.00
	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**$0.00**	
Electrical Power	Facilities	0.00	$0.00	0.00
	Subtotal	**0.00**	**$0.00**	
Communication	Facilities	0.10	$0.00	2.37
	Subtotal	**0.12**	**$0.00**	
	Total	**2.28**	**$0.01**	

Table 14. Indirect Economic Impact with outside aid

(Employment as # of people and Income in millions of $)

LOSS		Total	%

Appendix A: County Listing for the Region

Westchester,NY

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
New York					
	Westchester	9,983	689	520	1,210
Total State		**9,983**	**689**	**520**	**1,210**
Total Region		**9,983**	**689**	**520**	**1,210**

3.3 Flood Event Report

3.3.1 Probabilistic Model Event Report

(100 Year Return Period)

(500 Year Return Period)

Hazus-MH: Flood Event Report

Region Name: Mt Kisco flood

Flood Scenario: MtKiscoRiverineCase-whole

Print Date: Wednesday, February 27, 2013

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

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

Table of Contents

General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). 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 flood loss estimates provided in this report were based on a region that included 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 square miles and contains 116 census blocks. The region contains over 4 thousand households and has a total population of 9,983 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 2,925 buildings in the region with a total building replacement value (excluding contents) of 1,210 million dollars (2006 dollars). Approximately 81.78% of the buildings (and 56.99% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 2,925 buildings in the region which have an aggregate total replacement value of 1,210 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure ($1000)	Percent of Total
Residential	689,795	57.0%
Commercial	428,372	35.4%
Industrial	45,062	3.7%
Agricultural	4,137	0.3%
Religion	25,488	2.1%
Government	5,895	0.5%
Education	11,693	1.0%
Total	**1,210,442**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	430,193	58.0%
Commercial	252,609	34.1%
Industrial	31,403	4.2%
Agricultural	2,040	0.3%
Religion	14,320	1.9%
Government	3,118	0.4%
Education	7,763	1.0%
Total	**741,446**	**100.00%**

Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 210 beds.
There are 3 schools, 1 fire station, 1 police station and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	Mt Kisco flood
Scenario Name:	MtKiscoRiverineCase-whole
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 46 buildings will be at least moderately damaged. This is over 12% of the total number of buildings in the scenario. There are an estimated 2 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	4	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	3	7.14	7	16.67	14	33.33	16	38.10	2	4.76
Total	**0**		**7**		**7**		**14**		**16**		**2**	

Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	0	0.00	1	20.00	1	20.00	2	40.00	1	20.00	0	0.00
Steel	0	0.00	1	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	4	10.26	6	15.38	12	30.77	15	38.46	2	5.13

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 210 hospital beds available for use. On the day of the scenario flood event, the model estimates that 210 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	1	1	0	1
Hospitals	1	0	0	0
Police Stations	1	0	0	0
Schools	3	1	0	1

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

Analysis has not been performed for this Scenario.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 309 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 785 people (out of a total population of 9,983) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 42.26 million dollars, which represents 5.70 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building 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 flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 41.93 million dollars. 1% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 31.02% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	8.36	4.77	1.09	0.37	14.59
	Content	4.74	17.35	2.13	2.50	26.71
	Inventory	0.00	0.31	0.30	0.02	0.62
	Subtotal	**13.10**	**22.42**	**3.52**	**2.89**	**41.93**
Business Interruption						
	Income	0.00	0.07	0.00	0.00	0.07
	Relocation	0.01	0.02	0.00	0.00	0.03
	Rental Income	0.00	0.01	0.00	0.00	0.01
	Wage	0.00	0.11	0.00	0.12	0.23
	Subtotal	**0.01**	**0.20**	**0.00**	**0.12**	**0.34**
ALL	**Total**	**13.11**	**22.63**	**3.52**	**3.01**	**42.26**

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	9,983	689,795	520,647	1,210,442
Total	**9,983**	**689,795**	**520,647**	**1,210,442**
Total Study Region	**9,983**	**689,795**	**520,647**	**1,210,442**

Hazus-MH: Flood Event Report

Region Name: Mt Kisco flood

Flood Scenario: MtKiscoRiverineCase-whole

Print Date: Wednesday, February 27, 2013

Disclaimer:

Totals only reflect data for those census tracts/blocks included in the user's study region.

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

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The flood loss estimates provided in this report were based on a region that included 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 square miles and contains 116 census blocks. The region contains over 4 thousand households and has a total population of 9,983 people (2000 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 2,925 buildings in the region with a total building replacement value (excluding contents) of 1,210 million dollars (2006 dollars). Approximately 81.78% of the buildings (and 56.99% of the building value) are associated with residential housing.

Building Inventory

General Building Stock

Hazus estimates that there are 2,925 buildings in the region which have an aggregate total replacement value of 1,210 million (2006 dollars). Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

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Occupancy	Exposure ($1000)	Percent of Total
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Industrial	45,062	3.7%
Agricultural	4,137	0.3%
Religion	25,488	2.1%
Government	5,895	0.5%
Education	11,693	1.0%
Total	**1,210,442**	**100.00%**

Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure ($1000)	Percent of Total
Residential	430,193	58.0%
Commercial	252,609	34.1%
Industrial	31,403	4.2%
Agricultural	2,040	0.3%
Religion	14,320	1.9%
Government	3,118	0.4%
Education	7,763	1.0%
Total	**741,446**	**100.00%**

Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 210 beds.
There are 3 schools, 1 fire station, 1 police station and no emergency operation centers.

Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	Mt Kisco flood
Scenario Name:	MtKiscoRiverineCase-whole
Return Period Analyzed:	500
Analysis Options Analyzed:	No What-Ifs

Building Damage

General Building Stock Damage

Hazus estimates that about 66 buildings will be at least moderately damaged. This is over 12% of the total number of buildings in the scenario. There are an estimated 7 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	1-10		11-20		21-30		31-40		41-50		Substantially	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	4	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	3	4.84	9	14.52	18	29.03	25	40.32	7	11.29
Total	**0**		**7**		**9**		**18**		**25**		**7**	

Table 4: Expected Building Damage by Building Type

	1-10		11-20		21-30		31-40		41-50		Substantially	
Building Type	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	0	0.00	1	16.67	1	16.67	1	16.67	3	50.00	0	0.00
Steel	0	0.00	1	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	4	7.41	7	12.96	14	25.93	22	40.74	7	12.96

Essential Facility Damage

Before the flood analyzed in this scenario, the region had 210 hospital beds available for use. On the day of the scenario flood event, the model estimates that 210 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

		# Facilities		
Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Fire Stations	1	1	0	1
Hospitals	1	0	0	0
Police Stations	1	0	0	0
Schools	3	1	0	1

If this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

Analysis has not been performed for this Scenario.

Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 398 households will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 1,024 people (out of a total population of 9,983) will seek temporary shelter in public shelters.

Economic Loss

The total economic loss estimated for the flood is 65.56 million dollars, which represents 8.84 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building 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 flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 65.11 million dollars. 1% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 33.71% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.

Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	14.13	7.24	1.67	0.52	23.56
	Content	7.96	25.77	3.45	3.37	40.55
	Inventory	0.00	0.50	0.47	0.03	1.00
	Subtotal	**22.09**	**33.52**	**5.60**	**3.91**	**65.11**
Business Interruption						
	Income	0.00	0.11	0.00	0.00	0.11
	Relocation	0.01	0.03	0.00	0.00	0.04
	Rental Income	0.01	0.01	0.00	0.00	0.02
	Wage	0.00	0.15	0.00	0.14	0.29
	Subtotal	**0.02**	**0.30**	**0.00**	**0.14**	**0.45**
ALL	**Total**	**22.10**	**33.81**	**5.60**	**4.05**	**65.56**

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	9,983	689,795	520,647	1,210,442
Total	**9,983**	**689,795**	**520,647**	**1,210,442**
Total Study Region	**9,983**	**689,795**	**520,647**	**1,210,442**

Appendix 4.
Westchester County Flood Mitigation Data Collection 2012

WESTCHESTER COUNTY FLOOD MITIGATION PROGRAM
DATA COLLECTION 2012

Westchester County is preparing a Reconnaissance Plan to locate and describe areas of flood or stormwater management problems, existing stormwater management facilities and proposed or potential improvements that could reduce flooding and flood damage. To begin this work, local data is needed.

Maps have been prepared that show the streets, buildings, watercourses, wetlands, floodplains and 10-foot contours in your community. Please outline on these maps the boundaries of areas of significant or repeated flooding. Please be as accurate as possible. Designate each flood area with a unique number or letter and then complete the attached form – one form for each flood area identified. Your police and fire departments may have valuable information that can be included in your response.

If you are have or are aware of photos or videos of any storm event, please note that on this form where indicated.

For assistance or if you have questions, please contact Robert Doscher, County Department of Planning, at 995.4423 or by email at rrd1@westchestergov.com.

MUNICIPAL CONTACT INFORMATION

(This section will be completed by the County prior to distribution based on available information.)

Name and Title of Contact Person: James Palmer – Village Manager

Phone: (914) 864-0001 Email: jpalmer@mountkisco.org

Date: 11/27/12

Please update the above contact information as appropriate

Name and Title of Contact Person: ____________________

Phone: ____________________ Email: ____________________

WATERSHED INFORMATION

(This section will be completed by the County prior to distribution based on available information.)

Municipality: Village/ Town of Mount Kisco

Major Drainage Basin Name: Croton Reservoir

Major Streams and Waterbodies: Kisco River, Branch Brook

WESTCHESTER COUNTY FLOOD MITIGATION PROGRAM

DATA COLLECTION 2012

Identified Flood Prone Areas

Map Area ID: "A"

General Location: Shoppers Park & Lieto Dr

GENERAL FLOOD INFORMATION

In March/April 2007, significant rainfall during two storms caused widespread flooding in Westchester County, resulting in transportation corridor obstructions, threats to public safety and property damage. Subsequent storms through 2011's Tropical Storm Lee and Hurricane Irene caused similar impacts and risks. Please provide a general description of flooding in the above location over the last ten years.

Flooding of this location is now at least an annual event. This area represents the core of Mount Kisco's business district and flooding impacts a dense area of retail businesses and commercial office space.

Flooding Characteristics:

x Standing Water
x Rushing Water
x Sewage in Floodwaters
x Large Debris in Floodwaters
x Other: Underground electric circuitry compromised

Located within a FEMA designated Special Flood Hazard Area? x Yes ☐ No

Where did the flood waters originate? (Check all that apply.)

x Stream, brook, pond, etc.
☐ Clogged/inoperable storm drain
☐ Run-off from an adjacent property
x Run-off from street
x Groundwater entering through the floor
x Other: Due to existing elevations and drainage, floodwaters flow in reverse and exacerbate existing flooding

Did the sanitary sewer back-up as a result of the flooding? x Yes ☐ No

What did the flood conditions impact? (Check all that apply.)

x Street:
x Private Yards: No yards, but private property
☐ Driveways: N/A
☐ Private Garages: N/A
x Basements:
x First Floor:
x Other: Store Merchandise, Office supplies, ATMs, Parking Lots, Pay Stations, Police Dept., Justice Court, Fire Houses & apparatus

Within the last ten years, how many times has this area experienced flooding?

☐ 1-2 ☐ 3-4 ☐ 5-6 ☐ 7-8 ☐ 9-10 ☐ 10-15 x 15+

Area begins to flood after approximately 3 inches of rain. ☐ unknown
Streets become impassable after approximately 4 inches of rain. ☐ unknown
Building basements are flooded after approximately 4 inches of rain. ☐ unknown
Building first floors are flooded after approximately 5 inches of rain. ☐ unknown

SPECIFIC FLOOD EVENT INFORMATION

Please complete the following information for the storm that has caused the worst flooding in this area within the past ten years. (You may complete additional forms for more than one storm if appropriate.)

Storm Name and Date: Hurricane Irene & Tropical Storm Lee

Brief Description of Flooding and Source of Problem: Core downtown flooded – Shoppers Park, Municipal parking lot and businesses. South Moger Avenue, Municipal parking lot, Businesses and street flooded. Fire houses, Justice Court, Police Dept. flooded.

Approximate Average Depth of Flooding: 6-10 inches

Approximate Duration of Flooding (in hours or days): 3-5 hours (after rain event ceased)

Flooding Characteristics: x Standing Water x Rushing Water

x Sewage in Floodwaters x Large Debris in Floodwaters

x Other: Underground electric circuitry damaged

Please complete the following information for the storm that has caused the worst flooding in the area within the past ten years. (You may complete additional forms for more than one storm if appropriate.)

Number of residential units damaged: 0 **** Amount ($): 0

Number of commercial properties damaged: 60 (100 fronts) Amount ($): 2,500,000

Number of properties suffering repetitive damage: 60 (100 fronts) Amount ($): 2,500,000

Damage to utilities: Electricity, phones, cable, gas lines

Damage to public infrastructure: Parking lots, curbing, sidewalks, bridges, drainage, lighting, pay stations, Police Dept., Fire Dept, Fire apparatus

PHOTOS OR VIDEOS OF FLOOD CONDITIONS

Are photos or videos available of flood conditions at this location? x Yes ☐ No

If so, please provide them to the County on CD or DVD or advise us how they may be reviewed.

FLOOD AREA DESCRIPTION

Zoning District(s): CB-1, CN, CB-2, PD

Number of Single Family Buildings: 10 Approximate Value: $6,000,000

Number of Multi-Family Buildings: 10 Approximate Value: $10,000,000

Total Number of Residential Dwelling Units: 40

Number of Commercial Properties: 45 Approximate Value: $90,000,000

Critical infrastructure or facilities: ☐ schools ☐ hospitals ☐ group homes x sewer lines x major roads x other: Police Dept., Fire Dept., Municipal Building and Library become inaccessible

Is habitable space permitted at grade for this area? ☐ Yes x No (FIRST LEVELS RETAIL/ COMMERCIAL)

Is habitable space permitted below grade for this area? ☐ Yes x No (OFFICES/ RETAIL BELOW GRADE)

Is there evidence of habitable space below the base flood elevation? ☐ Yes ☐ No (UNKNOWN)

Are there instances of hazardous material storage within the area of flooding? Examples follow:

☐ Gasoline Stations ☐ Automotive Repair/Body Shops

☐ Paint Shops X Dry Cleaners

☐ Industrial Uses ☐ Outdoor Storage

☐ Other:

Has flooding in the area been studied: X Yes ☐ No If Yes, please provide study titles and dates:

2003 Army Corps of Engineers Study

**** ABOVE: Second level residences over 1st floor commercial. No damages, but impacted by compromised access to apartments.

WESTCHESTER COUNTY FLOOD MITIGATION PROGRAM
DATA COLLECTION 2012
Identified Flood Prone Areas

Map Area ID: B
General Location: Brook Street

GENERAL FLOOD INFORMATION

In March/April 2007, significant rainfall during two storms caused widespread flooding in Westchester County, resulting in transportation corridor obstructions, threats to public safety and property damage. Subsequent storms through 2011's Tropical Storm Lee and Hurricane Irene caused similar impacts and risks. Please provide a general description of flooding in the above location over the last ten years.
Street and backyard flooding. Brook has limited capacity and cannot handle the amount of surrounding impervious surfaces

Flooding Characteristics:

- x Standing Water
- x Rushing Water
- ☐ Sewage in Floodwaters
- ☐ Large Debris in Floodwaters
- ☐ Other: ______

Located within a FEMA designated Special Flood Hazard Area? x Yes ☐ No

Where did the flood waters originate? (Check all that apply.)

- ☐ Stream, brook, pond, etc.
- ☐ Clogged/inoperable storm drain
- x Run-off from an adjacent property
- x Run-off from street
- x Groundwater entering through the floor
- ☐ Other: ______

Did the sanitary sewer back-up as a result of the flooding? ☐ Yes x No

What did the flood conditions impact? (Check all that apply.)

- x Street: ______
- x Private Yards: ______
- x Driveways: ______
- x Private Garages: ______
- x Basements: ______
- x First Floor: ______
- x Other: Sheds

Within the last ten years, how many times has this area experienced flooding?

☐ 1-2 ☐ 3-4 ☐ 5-6 ☐ 7-8 ☐ 9-10 ☐ 10-15 x 15+

Area begins to flood after approximately 2 inches of rain. ☐ unknown
Streets become impassable after approximately 3 inches of rain. ☐ unknown
Building basements are flooded after approximately 3 inches of rain. ☐ unknown
Building first floors are flooded after approximately 5 inches of rain. ☐ unknown

SPECIFIC FLOOD EVENT INFORMATION

Please complete the following information for the storm that has caused the worst flooding in this area within the past ten years. (You may complete additional forms for more than one storm if appropriate.)

Storm Name and Date: Hurricane Irene & Tropical Storm Lee

Brief Description of Flooding and Source of Problem: Street and residents sit at bottom of hillside. Roadways, driveways, garages, and sheds are flooded

Approximate Average Depth of Flooding: 4.5 inches

Approximate Duration of Flooding (in hours or days): 2-4 hours (after rain event ceased)

Flooding Characteristics: x Standing Water x Rushing Water

☐ Sewage in Floodwaters ☐ Large Debris in Floodwaters

☐ Other: ________

Please complete the following information for the storm that has caused the worst flooding in the area within the past ten years. (You may complete additional forms for more than one storm if appropriate.)

Number of residential units damaged: 20 Amount ($): $2,000,000

Number of commercial properties damaged: 0 Amount ($): ________

Number of properties suffering repetitive damage: 20 Amount ($): $2,000,000

Damage to utilities: N/A

Damage to public infrastructure: Curbs, Drainage, Roadways

PHOTOS OR VIDEOS OF FLOOD CONDITIONS

Are photos or videos available of flood conditions at this location? x Yes ☐ No

If so, please provide them to the County on CD or DVD or advise us how they may be reviewed.

FLOOD AREA DESCRIPTION

Zoning District(s): RS-6

Number of Single Family Buildings: 20 Approximate Value: $13,000,000

Number of Multi-Family Buildings: 0 Approximate Value: 0

Total Number of Residential Dwelling Units: 20

Number of Commercial Properties: 0 Approximate Value: 0

Critical infrastructure or facilities: ☐ schools ☐ hospitals ☐ group homes x sewer lines

☐ major roads x other: Water lines

Is habitable space permitted at grade for this area? x Yes ☐ No

Is habitable space permitted below grade for this area? x Yes ☐ No

Is there evidence of habitable space below the base flood elevation? ☐ Yes ☐ No (UNKNOWN)

Are there instances of hazardous material storage within the area of flooding? Examples follow:

☐ Gasoline Stations ☐ Automotive Repair/Body Shops

☐ Paint Shops ☐ Dry Cleaners

☐ Industrial Uses ☐ Outdoor Storage

☐ Other: ________

Has flooding in the area been studied: x Yes ☐ No If Yes, please provide study titles and dates:

2012, Limited municipal engineer review, including limited hydrology analysis.

WESTCHESTER COUNTY FLOOD MITIGATION PROGRAM
DATA COLLECTION 2012
Identified Flood Prone Areas

Map Area ID: C
General Location: North Bedford Road

GENERAL FLOOD INFORMATION

In March/April 2007, significant rainfall during two storms caused widespread flooding in Westchester County, resulting in transportation corridor obstructions, threats to public safety and property damage. Subsequent storms through 2011's Tropical Storm Lee and Hurricane Irene caused similar impacts and risks. Please provide a general description of flooding in the above location over the last ten years.

Major roadway flooded and becomes impassible for emergency vehicles and for public use. This is a hazard to public safety.

Flooding Characteristics:

x Standing Water
x Rushing Water
☐ Sewage in Floodwaters
☐ Large Debris in Floodwaters
☐ Other:

Located within a FEMA designated Special Flood Hazard Area? x Yes ☐ No

Where did the flood waters originate? (Check all that apply.)

x Stream, brook, pond, etc.
☐ Clogged/inoperable storm drain
x Run-off from an adjacent property
x Run-off from street
x Groundwater entering through the floor
☐ Other:

Did the sanitary sewer back-up as a result of the flooding? ☐ Yes x No

What did the flood conditions impact? (Check all that apply.)

x Street:
☐ Private Yards:
☐ Driveways:
☐ Private Garages:
☐ Basements:
☐ First Floor:
x Other: Major roadway (Route 117)

Within the last ten years, how many times has this area experienced flooding?

☐ 1-2 ☐ 3-4 x 5-6 ☐ 7-8 ☐ 9-10 ☐ 10-15 ☐ 15+

Area begins to flood after approximately 4 inches of rain. ☐ unknown
Streets become impassable after approximately 5 inches of rain. ☐ unknown
Building basements are flooded after approximately N/A inches of rain. ☐ unknown
Building first floors are flooded after approximately N/A inches of rain. ☐ unknown

SPECIFIC FLOOD EVENT INFORMATION

Please complete the following information for the storm that has caused the worst flooding in this area within the past ten years. (You may complete additional forms for more than one storm if appropriate.)

Storm Name and Date: Hurricane Irene & Tropical Storm Lee

Brief Description of Flooding and Source of Problem: Roadway flooded and impassible for public use and for emergency vehicle use.

Approximate Average Depth of Flooding: 4 inches

Approximate Duration of Flooding (in hours or days): 2-4 hours (after rain event ceased)

Flooding Characteristics: x Standing Water x Rushing Water

☐ Sewage in Floodwaters ☐ Large Debris in Floodwaters

☐ Other: __________

Please complete the following information for the storm that has caused the worst flooding in the area within the past ten years. (You may complete additional forms for more than one storm if appropriate.)

Number of residential units damaged: 0 Amount ($): 0

Number of commercial properties damaged: 0 Amount ($): 0

Number of properties suffering repetitive damage: 0 Amount ($): 0

Damage to utilities: none

Damage to public infrastructure: Roadway, Curbing, Drainage -- $2,000,000

PHOTOS OR VIDEOS OF FLOOD CONDITIONS

Are photos or videos available of flood conditions at this location? ☐ Yes x No

If so, please provide them to the County on CD or DVD or advise us how they may be reviewed.

FLOOD AREA DESCRIPTION

Zoning District(s): PD

Number of Single Family Buildings: 0 Approximate Value: 0

Number of Multi-Family Buildings: 0 Approximate Value: 0

Total Number of Residential Dwelling Units: 0

Number of Commercial Properties: 0 Approximate Value: 0

Critical infrastructure or facilities: ☐ schools ☐ hospitals ☐ group homes ☐ sewer lines

x major roads ☐ other: Route 117

Is habitable space permitted at grade for this area? ☐ Yes x No

Is habitable space permitted below grade for this area? ☐ Yes x No

Is there evidence of habitable space below the base flood elevation? ☐ Yes x No

Are there instances of hazardous material storage within the area of flooding? Examples follow:

☐ Gasoline Stations ☐ Automotive Repair/Body Shops

☐ Paint Shops ☐ Dry Cleaners

☐ Industrial Uses ☐ Outdoor Storage

☐ Other: __________

Has flooding in the area been studied: x Yes No If Yes, please provide study titles and dates:

2003 – Army Corps. Of Engineers – as it pertains to flooding in the downtown area.

WESTCHESTER COUNTY FLOOD MITIGATION PROGRAM
DATA COLLECTION 2012
Identified Flood Prone Areas

Map Area ID: D
General Location: Leonard Park

GENERAL FLOOD INFORMATION

In March/April 2007, significant rainfall during two storms caused widespread flooding in Westchester County, resulting in transportation corridor obstructions, threats to public safety and property damage. Subsequent storms through 2011's Tropical Storm Lee and Hurricane Irene caused similar impacts and risks. Please provide a general description of flooding in the above location over the last ten years.
Entire Park and ball fields flooded up through tennis courts, basketball courts, roadways, and parking lots. Basement to pool facility where filtration and pumping equipment is located floods.

Flooding Characteristics:
- x Standing Water
- x Rushing Water
- ☐ Sewage in Floodwaters
- x Large Debris in Floodwaters
- ☐ Other:

Located within a FEMA designated Special Flood Hazard Area? x Yes ☐ No

Where did the flood waters originate? (Check all that apply.)
- x Stream, brook, pond, etc.
- x Clogged/inoperable storm drain
- x Run-off from an adjacent property
- x Run-off from street
- x Groundwater entering through the floor
- x Other: Large impervious surface that drains into brook – Mount Kisco Medical Group and parking lots

Did the sanitary sewer back-up as a result of the flooding? x Yes ☐ No

What did the flood conditions impact? (Check all that apply.)
- x Street:
- ☐ Private Yards: N/A – Public Park
- ☐ Driveways: N/A – Public Park
- ☐ Private Garages: N/A – Public Park
- x Basements:
- ☐ First Floor:
- x Other: Ball fields, tennis courts, play grounds, maintenance garage, sewage pump station, basketball courts, roadways

Within the last ten years, how many times has this area experienced flooding?
☐ 1-2 ☐ 3-4 ☐ 5-6 ☐ 7-8 ☐ 9-10 ☐ 10-15 x 15+

Area begins to flood after approximately 3 inches of rain. ☐ unknown
Streets become impassable after approximately 4 inches of rain. ☐ unknown
Building basements are flooded after approximately 4 inches of rain. ☐ unknown
Building first floors are flooded after approximately 4 inches of rain. ☐ unknown

SPECIFIC FLOOD EVENT INFORMATION

Please complete the following information for the storm that has caused the worst flooding in this area within the past ten years. (You may complete additional forms for more than one storm if appropriate.)

Storm Name and Date: Hurricane Irene & Tropical Storm Lee

Brief Description of Flooding and Source of Problem: Wallace Pond and the park brook flood getting much of the runoff coming from Route 172 and the Mount Kisco Medical Group Complex and parking lots. The flooding encompasses the entire park from the tennis courts abutting Route 117 to the Memorial Pool Complex, and stretching up towards the pond at the front of the park. Tennis courts completely submerged, 3 feet of water in baseball and soccer fields, playgrounds flooded also with feet of water

Approximate Average Depth of Flooding: 3 feet

Approximate Duration of Flooding (in hours or days): 3-4 Days

Flooding Characteristics: x Standing Water x Rushing Water
x Sewage in Floodwaters x Large Debris in Floodwaters
☐ Other: ______

Please complete the following information for the storm that has caused the worst flooding in the area within the past ten years. (You may complete additional forms for more than one storm if appropriate.)

Number of residential units damaged: 0 Amount ($): 0
Number of commercial properties damaged: 0 Amount ($): 0
Number of properties suffering repetitive damage: 0 Amount ($): 0
Damage to utilities: Electric, Phone
Damage to public infrastructure: Roadways, parking lots, fencing, drainage, recreation equipment - $30,000

PHOTOS OR VIDEOS OF FLOOD CONDITIONS

Are photos or videos available of flood conditions at this location? x Yes ☐ No

If so, please provide them to the County on CD or DVD or advise us how they may be reviewed.

FLOOD AREA DESCRIPTION

Zoning District(s): PD
Number of Single Family Buildings: 0 Approximate Value: 0
Number of Multi-Family Buildings: 0 Approximate Value: 0
Total Number of Residential Dwelling Units: 0
Number of Commercial Properties: 0 Approximate Value: 0
Critical infrastructure or facilities: ☐ schools ☐ hospitals ☐ group homes ☐ sewer lines
☐ major roads x other: Municipal park infrastructure and equipment

Is habitable space permitted at grade for this area? ☐ Yes x No
Is habitable space permitted below grade for this area? ☐ Yes x No
Is there evidence of habitable space below the base flood elevation? ☐ Yes x No
Are there instances of hazardous material storage within the area of flooding? Examples follow:
☐ Gasoline Stations ☐ Automotive Repair/Body Shops
☐ Paint Shops ☐ Dry Cleaners
☐ Industrial Uses ☐ Outdoor Storage
x Other: Maintenance Garage

Has flooding in the area been studied: x Yes No If Yes, please provide study titles and dates:

2003 – Army Corps. Of Engineers – as it pertains to flooding in the downtown area.

WESTCHESTER COUNTY FLOOD MITIGATION PROGRAM
DATA COLLECTION 2012
Identified Flood Prone Areas

Map Area ID: E
General Location: Lexington Avenue (between Radio Circle and Kisco Avenue)

GENERAL FLOOD INFORMATION

In March/April 2007, significant rainfall during two storms caused widespread flooding in Westchester County, resulting in transportation corridor obstructions, threats to public safety and property damage. Subsequent storms through 2011's Tropical Storm Lee and Hurricane Irene caused similar impacts and risks. Please provide a general description of flooding in the above location over the last ten years.

Flooding in low-lying area along Kisco River. Combination of retail and residential properties.

Flooding Characteristics:

x Standing Water
x Rushing Water
x Sewage in Floodwaters
☐ Large Debris in Floodwaters
☐ Other: ______

Located within a FEMA designated Special Flood Hazard Area? x Yes ☐ No

Where did the flood waters originate? (Check all that apply.)

x Stream, brook, pond, etc.
x Clogged/inoperable storm drain
x Run-off from an adjacent property
x Run-off from street
x Groundwater entering through the floor
☐ Other: ______

Did the sanitary sewer back-up as a result of the flooding? x Yes ☐ No

What did the flood conditions impact? (Check all that apply.)

x Street: ______
x Private Yards: ______
x Driveways: ______
x Private Garages: ______
x Basements: ______
x First Floor: ______
☐ Other: ______

Within the last ten years, how many times has this area experienced flooding?

☐ 1-2 ☐ 3-4 ☐ 5-6 ☐ 7-8 ☐ 9-10 x 10-15 ☐ 15+

Area begins to flood after approximately 3 inches of rain. ☐ unknown
Streets become impassable after approximately 4 inches of rain. ☐ unknown
Building basements are flooded after approximately 3 inches of rain. ☐ unknown
Building first floors are flooded after approximately 6 inches of rain. ☐ unknown

SPECIFIC FLOOD EVENT INFORMATION

Please complete the following information for the storm that has caused the worst flooding in this area within the past ten years. (You may complete additional forms for more than one storm if appropriate.)

Storm Name and Date: Hurricane Irene & Tropical Storm Lee

Brief Description of Flooding and Source of Problem: The low-lying area of Lexington Avenue is flooded in the streets and sidewalks. Basements and first levels flood as well.

Approximate Average Depth of Flooding: 4 inches

Approximate Duration of Flooding (in hours or days): 2-4 hours (after rain event ceased)

Flooding Characteristics: x Standing Water x Rushing Water

x Sewage in Floodwaters x Large Debris in Floodwaters

☐ Other: ____

Please complete the following information for the storm that has caused the worst flooding in the area within the past ten years. (You may complete additional forms for more than one storm if appropriate.)

Number of residential units damaged: 10 Amount ($): $1,000,000

Number of commercial properties damaged: 5 Amount ($): $1,000,000

Number of properties suffering repetitive damage: 15 Amount ($): $2,000,000

Damage to utilities: Gas lines

Damage to public infrastructure: Water lines, sewer lines, roads, curbing, drainage

PHOTOS OR VIDEOS OF FLOOD CONDITIONS

Are photos or videos available of flood conditions at this location? ☐ Yes x No

If so, please provide them to the County on CD or DVD or advise us how they may be reviewed.

FLOOD AREA DESCRIPTION

Zoning District(s): CL, CN

Number of Single Family Buildings: 3 Approximate Value: $2,000,000

Number of Multi-Family Buildings: 7 Approximate Value: $6,000,000

Total Number of Residential Dwelling Units: 25

Number of Commercial Properties: 10 Approximate Value: $10,000,000

Critical infrastructure or facilities: ☐ schools ☐ hospitals ☐ group homes x sewer lines

x major roads x other: Water lines

Is habitable space permitted at grade for this area? x Yes ☐ No

Is habitable space permitted below grade for this area? x Yes ☐ No

Is there evidence of habitable space below the base flood elevation? ☐ Yes ☐ No UNKNOWN

Are there instances of hazardous material storage within the area of flooding? Examples follow:

☐ Gasoline Stations ☐ Automotive Repair/Body Shops

☐ Paint Shops ☐ Dry Cleaners

☐ Industrial Uses ☐ Outdoor Storage

x Other: Hardware store

Has flooding in the area been studied: x Yes No If Yes, please provide study titles and dates:

2003 – Army Corps. Of Engineers – as it pertains to flooding in the downtown area.

WESTCHESTER COUNTY FLOOD MITIGATION PROGRAM
DATA COLLECTION 2012
Identified Flood Prone Areas

Map Area ID: F
General Location: Lower Carpenter Avenue

GENERAL FLOOD INFORMATION

In March/April 2007, significant rainfall during two storms caused widespread flooding in Westchester County, resulting in transportation corridor obstructions, threats to public safety and property damage. Subsequent storms through 2011's Tropical Storm Lee and Hurricane Irene caused similar impacts and risks. Please provide a general description of flooding in the above location over the last ten years.

Flooding begins near Senior Center parking lot. Flooding will spread up to Senior Center, ball field, walking park, and Mount Kisco Housing Authority (affordable housing units).

Flooding Characteristics:

- x Standing Water
- x Rushing Water
- ☐ Sewage in Floodwaters
- ☐ Large Debris in Floodwaters
- ☐ Other:

Located within a FEMA designated Special Flood Hazard Area? x Yes ☐ No

Where did the flood waters originate? (Check all that apply.)

- x Stream, brook, pond, etc.
- ☐ Clogged/inoperable storm drain
- x Run-off from an adjacent property
- x Run-off from street
- x Groundwater entering through the floor
- ☐ Other:

Did the sanitary sewer back-up as a result of the flooding? ☐ Yes x No

What did the flood conditions impact? (Check all that apply.)

- x Street:
- x Private Yards:
- x Driveways:
- ☐ Private Garages:
- ☐ Basements: N/A, no basements in Senior Center or Housing Units
- x First Floor:
- ☐ Other:

Within the last ten years, how many times has this area experienced flooding?

☐ 1-2 ☐ 3-4 x 5-6 ☐ 7-8 ☐ 9-10 ☐ 10-15 ☐ 15+

Area begins to flood after approximately 4 inches of rain. ☐ unknown
Streets become impassable after approximately 4 inches of rain. ☐ unknown
Building basements are flooded after approximately N/A inches of rain. ☐ unknown
Building first floors are flooded after approximately 6 inches of rain. ☐ unknown

SPECIFIC FLOOD EVENT INFORMATION

Please complete the following information for the storm that has caused the worst flooding in this area within the past ten years. (You may complete additional forms for more than one storm if appropriate.)

Storm Name and Date: Hurricane Irene & Tropical Storm Lee
Brief Description of Flooding and Source of Problem: Branch Brook floods, along with the water coming from Kisco Avenue and North Bedford Road. The Senior Center parking lot, ball field, playground, walking park are entirely flooded. The Senior Center and numerous housing units saw water coming into the first floor of the buildings.
Approximate Average Depth of Flooding: 1 foot
Approximate Duration of Flooding (in hours or days): 1-2 Days
Flooding Characteristics: x Standing Water x Rushing Water
☐ Sewage in Floodwaters ☐ Large Debris in Floodwaters
☐ Other: ______

Please complete the following information for the storm that has caused the worst flooding in the area within the past ten years. (You may complete additional forms for more than one storm if appropriate.)
Number of residential units damaged: 15 Amount ($): 500,000
Number of commercial properties damaged: 0 Amount ($): 0
Number of properties suffering repetitive damage: 15 Amount ($): 500,000
Damage to utilities: Electric, phones, cable, gas
Damage to public infrastructure: Parking lot, ball field, playground, Senior Center -- $10,000

PHOTOS OR VIDEOS OF FLOOD CONDITIONS

Are photos or videos available of flood conditions at this location? ☐ Yes x No
If so, please provide them to the County on CD or DVD or advise us how they may be reviewed.

FLOOD AREA DESCRIPTION

Zoning District(s): RM-29, RM-10, CL, PD
Number of Single Family Buildings: 0 Approximate Value: 0
Number of Multi-Family Buildings: 25 Approximate Value: $2,000,000
Total Number of Residential Dwelling Units: 75
Number of Commercial Properties: 0 Approximate Value: 0
Critical infrastructure or facilities: ☐ schools ☐ hospitals ☐ group homes x sewer lines
☐ major roads x other: water lines, gas lines

Is habitable space permitted at grade for this area? xYes ☐ No
Is habitable space permitted below grade for this area? ☐ Yes x No
Is there evidence of habitable space below the base flood elevation? ☐ Yes x No
Are there instances of hazardous material storage within the area of flooding? Examples follow:
☐ Gasoline Stations ☐ Automotive Repair/Body Shops
☐ Paint Shops ☐ Dry Cleaners
☐ Industrial Uses ☐ Outdoor Storage
☐ Other: ______

Has flooding in the area been studied: x Yes No If Yes, please provide study titles and dates:

2003 – Army Corps. Of Engineers – as it pertains to flooding in the downtown area.

WESTCHESTER COUNTY FLOOD MITIGATION PROGRAM

DATA COLLECTION 2012

Identified Flood Prone Areas

Map Area ID: G

General Location: Saw Mill Club Area

GENERAL FLOOD INFORMATION

In March/April 2007, significant rainfall during two storms caused widespread flooding in Westchester County, resulting in transportation corridor obstructions, threats to public safety and property damage. Subsequent storms through 2011's Tropical Storm Lee and Hurricane Irene caused similar impacts and risks. Please provide a general description of flooding in the above location over the last ten years.

Flooding has resulted in road closures and damages to businesses, including a health club in this commercial zone.

Flooding Characteristics:

- x Standing Water
- x Rushing Water
- ☐ Sewage in Floodwaters
- x Large Debris in Floodwaters
- ☐ Other:

Located within a FEMA designated Special Flood Hazard Area? x Yes ☐ No

Where did the flood waters originate? (Check all that apply.)

- x Stream, brook, pond, etc.
- ☐ Clogged/inoperable storm drain
- x Run-off from an adjacent property
- x Run-off from street
- x Groundwater entering through the floor
- ☐ Other:

Did the sanitary sewer back-up as a result of the flooding? x Yes No

What did the flood conditions impact? (Check all that apply.)

- x Street:
- x Private Yards:
- x Driveways:
- x Private Garages:
- x Basements:
- x First Floor:
- x Other: Indoor sports facility, outdoor pool and recreation facility

Within the last ten years, how many times has this area experienced flooding?

☐ 1-2 ☐ 3-4 ☐ 5-6 ☐ 7-8 ☐ 9-10 ☐ 10-15 x 15+

Area begins to flood after approximately 3 inches of rain. ☐ unknown

Streets become impassable after approximately 4 inches of rain. ☐ unknown

Building basements are flooded after approximately 4 inches of rain. ☐ unknown

Building first floors are flooded after approximately 5 inches of rain. ☐ unknown

SPECIFIC FLOOD EVENT INFORMATION

Please complete the following information for the storm that has caused the worst flooding in this area within the past ten years. (You may complete additional forms for more than one storm if appropriate.)

Storm Name and Date: Hurricane Irene & Tropical Storm Lee

Brief Description of Flooding and Source of Problem: End of Kensico Drive flooded along with another section of Kensico Drive; along with business parking lots and private recreation facilities.

Approximate Average Depth of Flooding: 4-6 inches

Approximate Duration of Flooding (in hours or days): 3-5 hours

Flooding Characteristics: x Standing Water x Rushing Water

x Sewage in Floodwaters x Large Debris in Floodwaters

☐ Other:

Please complete the following information for the storm that has caused the worst flooding in the area within the past ten years. (You may complete additional forms for more than one storm if appropriate.)

Number of residential units damaged: 0 Amount ($): 0

Number of commercial properties damaged: 5 Amount ($): 750,000

Number of properties suffering repetitive damage: 5 Amount ($): 750,000

Damage to utilities: Electric, phones, cable, gas

Damage to public infrastructure: Storm drains, curbing, street lighting

PHOTOS OR VIDEOS OF FLOOD CONDITIONS

Are photos or videos available of flood conditions at this location? ☐ Yes x No

If so, please provide them to the County on CD or DVD or advise us how they may be reviewed.

FLOOD AREA DESCRIPTION

Zoning District(s): GC

Number of Single Family Buildings: 0 Approximate Value: 0

Number of Multi-Family Buildings: 0 Approximate Value: 0

Total Number of Residential Dwelling Units: 0

Number of Commercial Properties: 15 Approximate Value: $100,000,000

Critical infrastructure or facilities: ☐ schools ☐ hospitals ☐ group homes x sewer lines ☐ major roads x other: water lines, gas lines

Is habitable space permitted at grade for this area? xYes ☐ No

Is habitable space permitted below grade for this area? ☐ Yes x No

Is there evidence of habitable space below the base flood elevation? ☐ Yes x No

Are there instances of hazardous material storage within the area of flooding? Examples follow:

☐ Gasoline Stations x Automotive Repair/Body Shops

☐ Paint Shops ☐ Dry Cleaners

☐ Industrial Uses x Outdoor Storage

x Other: Propane facility, auto dealership

Has flooding in the area been studied: x Yes ☐ No If Yes, please provide study titles and dates:

2003 – Army Corps. Of Engineers – as it pertains to flooding in the downtown area.

WESTCHESTER COUNTY FLOOD MITIGATION PROGRAM

DATA COLLECTION 2012

Identified Flood Prone Areas

Map Area ID: H

General Location: Rear of Kisco Ave. near Preston Way

GENERAL FLOOD INFORMATION

In March/April 2007, significant rainfall during two storms caused widespread flooding in Westchester County, resulting in transportation corridor obstructions, threats to public safety and property damage. Subsequent storms through 2011's Tropical Storm Lee and Hurricane Irene caused similar impacts and risks. Please provide a general description of flooding in the above location over the last ten years.

This general commercial district area is a gateway to the Village and floods annually. Floods largely occur as a result of flooding from other locations.

Flooding Characteristics:

x Standing Water
x Rushing Water
x Sewage in Floodwaters
☐ Large Debris in Floodwaters
x Other: Underground Utilities

Located within a FEMA designated Special Flood Hazard Area? ☐ Yes x No

Where did the flood waters originate? (Check all that apply.)

x Stream, brook, pond, etc.
☐ Clogged/inoperable storm drain
x Run-off from an adjacent property
x Run-off from street
☐ Groundwater entering through the floor
☐ Other:

Did the sanitary sewer back-up as a result of the flooding? ☐ Yes x No

What did the flood conditions impact? (Check all that apply.)

x Street:
x Private Yards:
x Driveways:
x Private Garages:
☐ Basements:
x First Floor:
☐ Other:

Within the last ten years, how many times has this area experienced flooding?

☐ 1-2 ☐ 3-4 ☐ 5-6 ☐ 7-8 ☐ 9-10 x 10-15 ☐ 15+

Area begins to flood after approximately 4 inches of rain. ☐ unknown
Streets become impassable after approximately 4 inches of rain. ☐ unknown
Building basements are flooded after approximately N/A inches of rain. ☐ unknown
Building first floors are flooded after approximately 6 inches of rain. ☐ unknown

SPECIFIC FLOOD EVENT INFORMATION

Please complete the following information for the storm that has caused the worst flooding in this area within the past ten years. (You may complete additional forms for more than one storm if appropriate.)

Storm Name and Date: Hurricane Irene & Tropical Storm Lee

Brief Description of Flooding and Source of Problem: The backing up of Branch Brook, in addition to the runoff coming off of Captain Merritt's Hill area caused flooding of Kisco Avenue.

Approximate Average Depth of Flooding: 6-10 inches

Approximate Duration of Flooding (in hours or days): 3-5 hours

Flooding Characteristics: x Standing Water x Rushing Water

☐ Sewage in Floodwaters ☐ Large Debris in Floodwaters

☐ Other: __________

Please complete the following information for the storm that has caused the worst flooding in the area within the past ten years. (You may complete additional forms for more than one storm if appropriate.)

Number of residential units damaged: 0 Amount ($): 0

Number of commercial properties damaged: 5 Amount ($): 750,000

Number of properties suffering repetitive damage: 5 Amount ($): 750,000

Damage to utilities: Electric, phones, cable, gas

Damage to public infrastructure: Storm drains, curbing, street lighting, water lines, sewer lines

PHOTOS OR VIDEOS OF FLOOD CONDITIONS

Are photos or videos available of flood conditions at this location? ☐ Yes x No

If so, please provide them to the County on CD or DVD or advise us how they may be reviewed.

FLOOD AREA DESCRIPTION

Zoning District(s): GC

Number of Single Family Buildings: 0 Approximate Value: 0

Number of Multi-Family Buildings: 0 Approximate Value: 0

Total Number of Residential Dwelling Units: 0

Number of Commercial Properties: 10 Approximate Value: $60,000,000

Critical infrastructure or facilities: ☐ schools ☐ hospitals ☐ group homes x sewer lines x major roads x other: water lines, gas lines

Is habitable space permitted at grade for this area? x Yes ☐ No

Is habitable space permitted below grade for this area? ☐ Yes x No

Is there evidence of habitable space below the base flood elevation? ☐ Yes x No

Are there instances of hazardous material storage within the area of flooding? Examples follow:

☐ Gasoline Stations x Automotive Repair/Body Shops

x Paint Shops x Dry Cleaners

x Industrial Uses x Outdoor Storage

x Other: Auto supply, mixed retail uses, hardware store

Has flooding in the area been studied: x Yes ☐ No If Yes, please provide study titles and dates:

2003 – Army Corps. Of Engineers – as it pertains to flooding in the downtown area.