

VILLAGE OF SLEEPY HOLLOW

FINAL

Multi-Hazard Mitigation Plan



Submitted to:

VILLAGE OF SLEEPY HOLLOW

28 Beekman Avenue

Sleepy Hollow, NY 10591

Prepared by:

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1200 Veterans Memorial Highway

Hauppauge, New York 11788

September 2014

VILLAGE OF SLEEPY HOLLOW, NEW YORK

Multi-Hazard Mitigation Plan

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The Village of Sleepy Hollow



Submitted by:

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Engineering – Planning – Construction Management

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TABLE OF CONTENTS

| <u>Section</u> | <u>Title</u> | <u>Page</u> |
|-----------------------|---|--------------------|
| 1.0 | Introduction..... | 1-1 |
| 1.1 | Overview..... | 1-1 |
| 1.1.1 | Village Boundaries and Location..... | 1-1 |
| 1.1.2 | Village Demographics | 1-1 |
| 1.1.3 | Village Land Use | 1-3 |
| 1.1.4 | Major Features | 1-3 |
| 1.1.5 | Village History..... | 1-6 |
| 1.2 | Purpose and Scope | 1-7 |
| 1.3 | Authority..... | 1-11 |
| 2.0 | Public Participation and Planning Process | 2-1 |
| 2.1 | Multi-Hazard Mitigation Planning Committee..... | 2-1 |
| 2.2 | Agency Contacts and Coordination | 2-2 |
| 2.3 | Public Outreach..... | 2-3 |
| 2.4 | Multi-Jurisdictional Participation | 2-5 |
| 2.5 | Consultant Responsibilities..... | 2-6 |
| 2.6 | Field Investigations and Other Meetings | 2-6 |
| 2.7 | Final Plan Review, Adoption, and Acceptance Process | 2-7 |
| 3.0 | Risk Assessment | 3-1 |
| 3.1 | Introduction..... | 3-1 |
| 3.2 | Hazard Identification | 3-2 |
| 3.2.1 | Hazardous Weather Phenomena (Storms) | 3-2 |
| 3.2.1.1 | Hurricanes..... | 3-2 |
| 3.2.1.2 | Tropical Storms..... | 3-5 |
| 3.2.2.3 | Northeasters (Nor'easters or Extratropical Storms)... | 3-6 |
| 3.2.2.4 | Tornados | 3-7 |
| 3.2.2.5 | Windstorms..... | 3-11 |
| 3.2.2.6 | Thunder Storms..... | 3-14 |
| 3.2.2.7 | Hail & Ice Storms | 3-14 |
| 3.2.2.8 | Floods, Flash Floods, Stormwater & Sea Level Rise | 3-16 |
| 3.2.2.9 | Severe Winter Storms (Blizzards) | 3-23 |
| 3.2.2.10 | Droughts & Heat Waves | 3-25 |
| 3.2.2.11 | Wildfires | 3-28 |
| 3.2.2 | Geologic Hazards..... | 3-29 |
| 3.2.2.1 | Earthquakes..... | 3-29 |
| 3.2.2.2 | Mass Movement, Slope Failure, & Subsidence | 3-35 |
| 3.2.2.3 | Expansive Soils..... | 3-40 |
| 3.2.3 | Technological or Man-Caused Incidents | 3-41 |
| 3.2.3.1 | Train Derailments, Plane Crashes, Shipping Accidents, & Nuclear and Other Hazardous Materials Releases | 3-41 |
| 3.2.3.2 | Building Fires and Explosions | 3-44 |

| <u>Section</u> | <u>Title</u> | <u>Page</u> |
|----------------|--|-------------|
| | 3.2.3.3 Dam Failures..... | 3-46 |
| | 3.2.3.4 Bridge Collapses..... | 3-50 |
| | 3.2.3.5 Water, Sewer, & Other Utility Disruptions | 3-51 |
| | 3.2.3.6 Terrorism and Civil Disturbances..... | 3-53 |
| | 3.2.3.7 Epidemic..... | 3-55 |
| 3.3 | Risk Evaluation and Ranking | 3-57 |
| | 3.3.2 History of Storm and Other Hazardous Events in the Sleepy Hollow/ Westchester County Area | 3-57 |
| | 3.3.3 Presidential Disaster and Emergency Declarations for Westchester County..... | 3-58 |
| | 3.3.4 MHMP Committee Hazards Rankings | 3-59 |
| | 3.3.5 Inventory of Community Assets and Critical Infrastructure.... | 3-60 |
| | 3.3.6 Vulnerable Populations | 3-71 |
| | 3.3.7 Repetitive Loss Properties | 3-72 |
| | 3.3.8 HAZUS-MH Multi-Hazard Loss Estimation..... | 3-73 |
| | 3.3.8.1 Hurricanes..... | 3-73 |
| | 3.3.8.2 Flooding (Pocantico & Hudson Rivers)..... | 3-75 |
| | 3.3.8.3 Earthquakes..... | 3-76 |
| | 3.3.9 Multi-Jurisdictional Risk Assessment..... | 3-80 |
| | 3.3.10 Estimation of Potential Losses from Hazards..... | 3-80 |
| 4.0 | General Preparedness and Capabilities Inventory | 4-1 |
| | 4.1 Emergency and Hazard Mitigation and Response Plans | 4-1 |
| | 4.2 Village Codes..... | 4-5 |
| | 4.3 Village Departments | 4-9 |
| | 4.4 Emergency Services..... | 4-10 |
| | 4.4.1 Police Department..... | 4-10 |
| | 4.4.2 Fire Department | 4-10 |
| | 4.4.3 Ambulance Corps..... | 4-11 |
| | 4.4.4 Emergency Communications..... | 4-12 |
| | 4.4.5 Plan Implementation Capabilities..... | 4-12 |
| | 4.5 National Flood Insurance Compliance..... | 4-13 |
| 5.0 | Hazard Mitigation Strategies | 5-1 |
| | 5.1 Development of Goals, Objectives, & Hazard Mitigation Actions | 5-1 |
| | 5.2 Goals and Objectives | 5-3 |
| | 5.3 Development and Prioritization of Multi-Hazard Prevention and Mitigation Actions | 5-5 |
| | 5.4 Multi-Hazard Prevention and Mitigation Actions | 5-7 |
| 6.0 | Available Funding and Hazard Mitigation Stakeholders..... | 6-1 |
| | 6.1 Funding..... | 6-1 |
| | 6.2 Stakeholders..... | 6-1 |

| <u>Section</u> | <u>Title</u> | <u>Page</u> |
|-----------------------|--|--------------------|
| 7.0 | Plan Maintenance Process..... | 7-1 |
| 7.1 | Plan Adoption | 7-1 |
| 7.2 | Implementation | 7-1 |
| 7.3 | Monitoring and Evaluation of Plan Implementation | 7-2 |
| 7.4 | Incorporation into Existing Planning Mechanisms..... | 7-3 |
| 7.5 | Continued Public Involvement | 7-4 |
| 7.6 | Plan Updates | 7-4 |
| 8.0 | Bibliography | 8-1 |

LIST OF TABLES

| <u>Table No.</u> | <u>Title</u> | <u>Page</u> |
|-------------------------|--|--------------------|
| 2-1 | Planning Process Summary..... | 2-8 |
| 3-1 | Saffir-Simpson Scale for Hurricane Classification..... | 3-2 |
| 3-2 | Fujita Tornado Wind Speed/Damage Scale..... | 3-8 |
| 3-3 | Enhanced Fujita Tornado Scale | 3-9 |
| 3-4 | Beaufort Wind Scale..... | 3-12 |
| 3-5 | Hail Size Classification..... | 3-15 |
| 3-6 | Modified Mercalli Earthquake Intensity Scale Observable Results and Effects | 3-31 |
| 3-7 | Committee-Based Hazard Probabilities Rankings..... | 3-60 |
| 3-8 | Inventory of Village Assets and Critical Infrastructure..... | 3-62 |
| 3-9 | Summary of Total Estimated Economic Loss from 50-, 100-, and 200-Year Hurricanes & a Category 3 Hurricane | 3-74 |
| 3-10 | Summary of Total Estimated Economic Loss: 100-Year Flood Recurrence for Pocantico River Only | 3-75 |
| 3-11 | Summary of Total Estimated Economic Loss: 100-Year Flood Recurrence for Hudson River Only | 3-76 |
| 3-12 | HAZUS-MH Earthquake Loss Estimation for Westchester County ... | 3-77 |
| 3-13 | HAZUS-MH Annualized Loss Estimation and Ranking Results for Westchester County, NY | 3-78 |
| 4-1 | Emergency and Hazard Mitigation and Response Plans | 4-2 |
| 5-1 | Action Plan..... | 5-20 |
| 6-1 | Possible Funding Sources for Multi-Hazard Mitigation Projects..... | 6-2 |
| 6-2 | Multi-Hazard Mitigation Plan Stakeholders | 6-9 |

LIST OF FIGURES

| <u>Figure No.</u> | <u>Title</u> | <u>Page</u> |
|--------------------------|---|--------------------|
| 1-1 | Aerial Photograph of Village | 1-2 |
| 1-2 | Land Use | 1-5 |
| 3-1 | Hurricane Storm Surge Inundation (SLOSH) Map | 3-4 |
| 3-2 | Tornado Risk Areas in the Continental United States | 3-10 |
| 3-3 | Wind Zones in the United States | 3-13 |
| 3-4 | Flood Zones and Water Features | 3-20 |
| 3-5 | Annual Snowfall for New York 1979-2009..... | 3-25 |
| 3-6 | Heat Index | 3-27 |
| 3-7 | Natural Fires by Town and City for New York State | 3-29 |
| 3-8 | Peak Ground Acceleration (PGA) Percent Seismic Hazard Map | 3-35 |
| 3-9 | Topography Map..... | 3-38 |
| 3-10 | Landslide Incidence for New York State..... | 3-39 |
| 3-11 | Pocantico Dam Failure Inundation Map Dry Weather | 3-48 |
| 3-12 | Pocantico Dam Failure Inundation Map Wet Weather | 3-49 |
| 3-13 | Potential Threats and Hazards | 3-56 |
| 3-14 | Community Assets and Critical Infrastructure | 3-70 |
| 3-15 | Annualized Earthquake Loss by County, NY..... | 3-79 |
| 3-16 | Annualized Earthquake Loss Per Capita..... | 3-79 |
| 3-17 | Economic Losses from Hazard Events, 1960-2009 by County | 3-81 |

APPENDICES

| <u>Appendix</u> | <u>Title</u> |
|------------------------|---|
| A | Public Participation and Planning Process Documentation A-1 ...Board of Trustees Resolutions A-2 ...Public Notices A-3 ...Meeting Agendas A-4 ...Meeting Summaries and Letters Received A-5 ...FEMA Comments A-6...Field Notes A-7...Grant Application |
| B | Historical Storm & Hazards Events, 1960-2009, for Westchester County, NY: Sorted by Hazard Type |
| C | Major Presidential Disaster Declarations and Presidential Emergency Declarations, 1965-2007, for Westchester County, NY |
| D | HAZUS-MH Loss Estimation Data: Hurricane Scenarios |
| E | HAZUS-MH Loss Estimation Data: Flooding Scenarios E-1Pocantico River E-2....Hudson River |
| F | Resolution Adopting the Village of Sleepy Hollow Multi-Hazard Mitigation Plan (Resolution No. 08/120/2014) |

1.0 INTRODUCTION

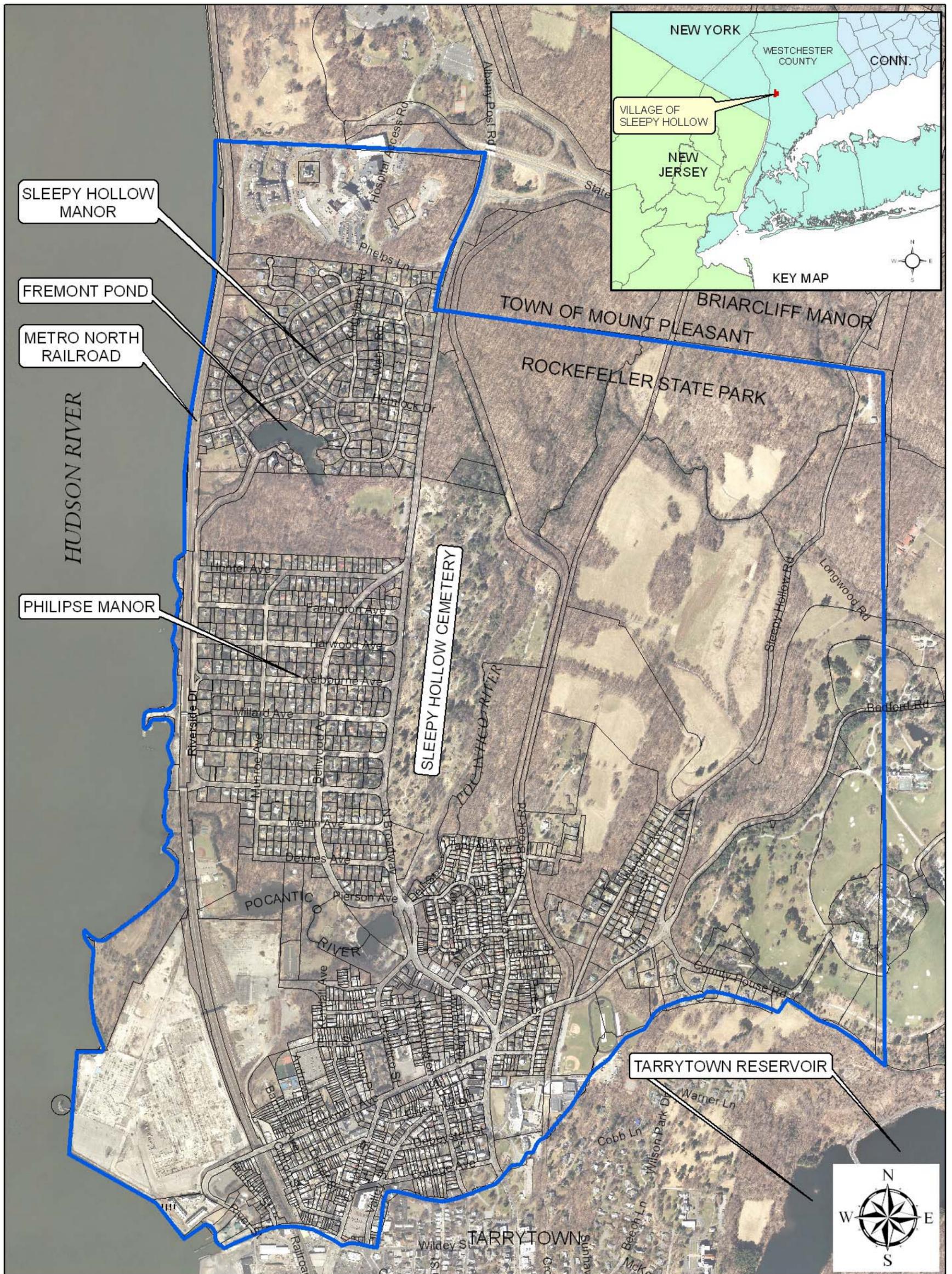
1.1 Overview

1.1.1 Village Boundaries and Location

The Village of Sleepy Hollow is a small incorporated village located along the east shore of the Hudson River in the Town of Mount Pleasant, Westchester County, NY, approximately 30 miles north of midtown Manhattan. The Village is bounded on the north and east by unincorporated sections of the Town of Mount Pleasant and to the south by the Village of Tarrytown. It consists of a total of 1,445 acres or 2.26 square miles of land and 2.8 square miles of underwater land (Hudson River). Figure 1 is an aerial photograph showing the Village's land boundaries, existing development patterns, street network, and location within Westchester County.

1.1.2 Village Demographics

The population of the Village in 2010 was 9,870, an increase of 658 or seven percent from 2000 when the population was 9,212. The population density of the Village in 2010 was 4,368 persons per square mile. The Village had a total of 3,253 households in 2000 and 3,462 households in 2010, indicating an increase of 209 households or six percent. The average household size in 2010 was 2.85 and a total of 66 percent of the housing units were renter-occupied and 44 percent were owner-occupied (US Census Bureau, 2000 and 2010). The unemployment rate in 2010 was 5.8 percent. Sleepy Hollow is an ethnically diverse Village including a large Hispanic or Latino community comprising approximately 51 percent of the Village's population and a large white non-Hispanic or Latino community.



Westchester County
New York

Geographic Information Systems

Cashin Associates, P.C.

Legend
 VILLAGE OF SLEEPY HOLLOW BOUNDARY

0 500 1,000 1,500 2,000 Feet

FIGURE 1-1
VILLAGE OF SLEEPY HOLLOW
MULTI-HAZARD
MITIGATION PLAN
AERIAL PHOTOGRAPH
OF VILLAGE

1.1.3 Village Land Use

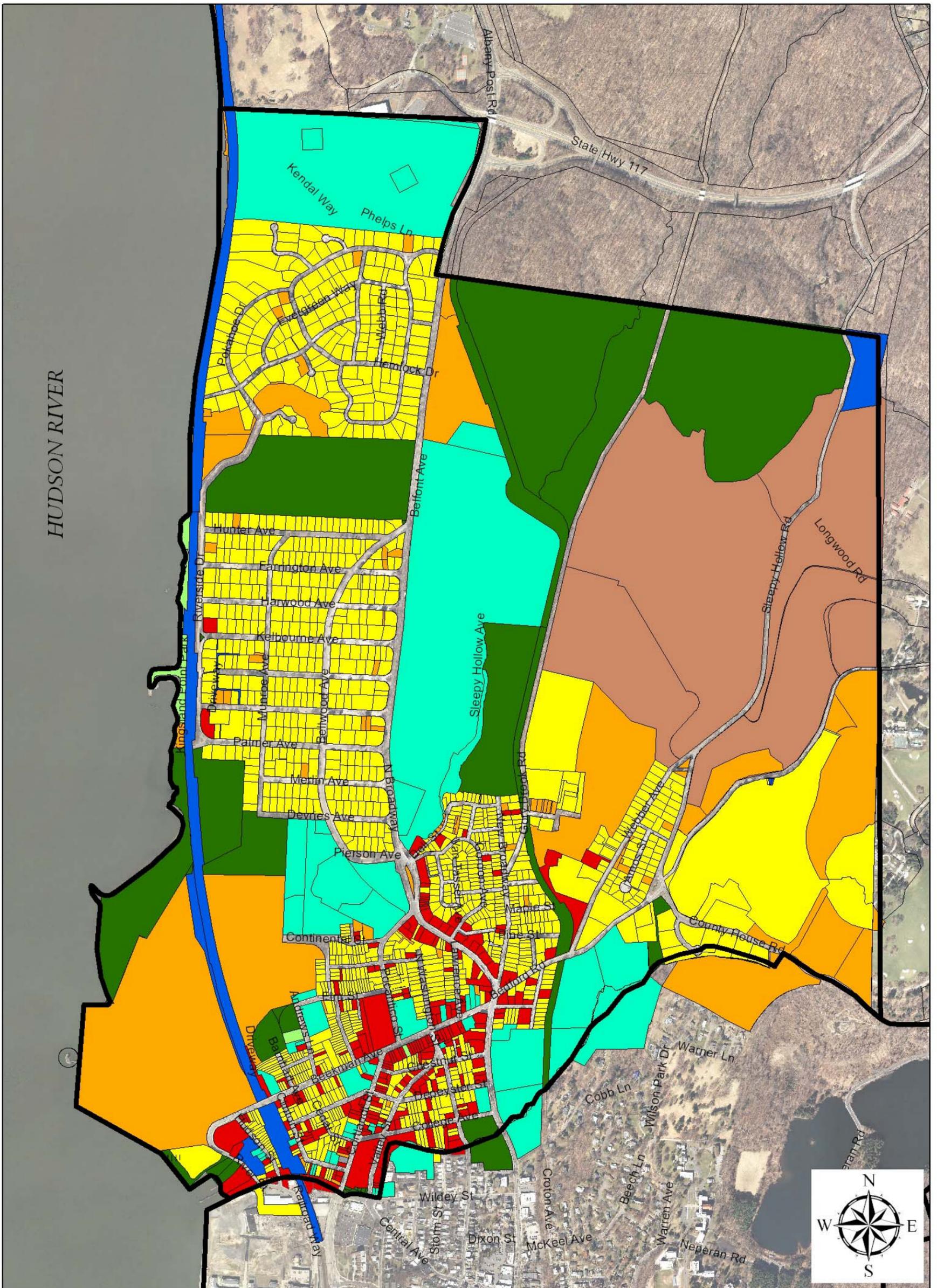
Land use in the Village consists primarily of a mix of single and multi-family residences, including senior and assisted living facilities, small businesses, offices, schools, a hospital, churches, Village Hall, and other public or institutional uses, a railroad and train station, and state, county, and Village parkland and conservation areas. The western half of the village is generally densely developed with a mix of single-family and multi-family dwellings, small businesses and institutional uses with little opportunity for additional growth with a couple exceptions. The eastern half of the Village consists primarily of low density residential development, parklands, and other undeveloped land and has greater potential for future development.

In regard to the western half of the Village: A large mixed-use multi-family residential/business development is currently proposed on a vacant 99-acre tract of land formerly known as the “GM (General Motors) property” in the southwest section of the Village along the Hudson River. This development could dramatically increase the population and overall development density of the community. In addition, a 60-unit residential development known as the “River’s Edge” is currently under construction at the former Castle Oil site. The redevelopment will include a small kiosk for a water-related purpose (i.e., kayak rental), a public river walk and pier, rip rap will be placed along the river, and some needed drainage improvements will be provided along River Street. The grade at the location will be raised above FEMA’s newly updated special flood hazard area. Figure 2 depicts land use patterns in the community.

1.1.4 Major Features

The Village contains 124.5 acres of land within FEMA’s 100-year flood zone and 35.3 acres of land within the 500-year flood zone. A total of 294.5 acres in Sleepy Hollow have slopes of 15 to 25 percent and 159.6 acres have slopes greater than 25 percent. Areas within floodplains are primarily parkland, conservation areas, or other low development areas (Rockefeller State Park, Douglas Park, Devries Park, and Kingsland

Point Park), community service land, including the Sleepy Hollow Cemetery and Philipsburg Manor historic site, vacant land, including a large tract of property comprising the former General Motors (GM) plant site and smaller undeveloped lots. Areas of steep slopes are mostly vacant or already developed residentially



Westchester County
New York

Geographic Information Systems

Cashin Associates, P.C.
ENGINEERING, PLANNING, & CONSTRUCTION MANAGEMENT

Legend

| | |
|-----------------------------------|---|
| VILLAGE OF SLEEPY HOLLOW BOUNDARY | RECREATIONAL AND ENTERTAINMENT |
| LANDUSE | COMMUNITY SERVICE |
| AGRICULTURAL | INDUSTRIAL |
| RESIDENTIAL | PUBLIC SERVICES |
| VACANT | WLD, FORESTED, CONSERVATION, AND PUBLIC LANDS |
| COMMERCIAL | |

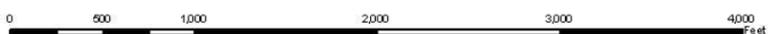


FIGURE 1-2
VILLAGE OF
SLEEPY HOLLOW
MULTI-HAZARD
MITIGATION PLAN
LAND USE

The Hudson River is a tidally influenced body of water and is subject to shipping and recreational boating traffic as well as hurricane storm surges, flooding, and occasional strong winds. The Pocantico River flows through the Village, generally from northeast to southwest, before discharging into the Hudson at Kingsland Point County Park, north of the former GM site. Several small streams also exist in the Village, including but not limited to Gorey Brook and Andres Brook. Fremont Pond is a small freshwater surface water body located in the northwestern section of the Village between the neighborhoods of Sleepy Hollow Manor and Philipse Manor which drains to the west into the Hudson. The Pocantico Lake Dam is located approximately 0.8 of a mile to the northeast of the Village in the Town of Mount Pleasant and the Indian Point Nuclear power plant is located approximately 12.6 miles to the north in the Village of Buchanan. The Tappan Zee Bridge is located approximately 0.7 miles south of the Village and the Metro North Railroad passes through the Village along the banks of the Hudson in western Sleepy Hollow. The Village utilizes public water and sewer facilities, and contains a number of small bridges/culverts and several high-rise buildings. It also contains a scenic highway (Route 9), a hospital, and a number of historic landmarks.

1.1.5 Village History

The Village was originally known as “Beekmantown” and later called “North Tarrytown” until December 10, 1996 when it was officially renamed “The Village of Sleepy Hollow” to commemorate former resident and renowned author, Washington Irving, who created the famous fictional story: “The Legend of Sleepy Hollow.”

During the Eighteenth Century, the primary land use in the Village was agriculture. The Village remained a predominantly agrarian community until the 1840’s when the Croton Aqueduct was built and the Metro North Railroad was constructed along the Hudson River, marking the beginning of the transition from an agrarian society to an industrial one. During the late nineteenth century, mills and manufacturing facilities were constructed along the Pocantico and Hudson River waterfronts, attracting immigrant workers to the area. In 1899, the Mobile Company of America occupied what is now

known as the GM site along the Hudson waterfront, followed by the Maxwell-Briscoe Company which manufactured the “Maxwell” (an early automobile) at the site in 1904. In 1915, a General Motors plant was constructed, as well as employee housing for area workers, resulting in the development of the south side of the Village. Shoe and battery manufacturing were also major industries that became established in the area. As suburbanization spread from New York City, more affluent residential development occurred on larger lots in Philipse Manor to the north, and millionaires like Anson Phelps, Ambrose Kingsland and John D. Rockefeller constructed beautiful mansions in the Village, some of which are, currently open to the public.

Automobile manufacturing remained the foundation of the local economy for most of the 20th Century and was the largest single employer in the Village until 1996, when GM ceased operations in what was known as one of GM’s oldest plants. In its day, as many as 5,000 workers were employed at the plant; however, during World War II, when the plant was producing wings, canopies and other assemblies for the Navy’s “Avenger” airplanes, employment levels reached nearly 12,000.

The assembly lines were a major employer of immigrants to the United States. The GM plant attracted a Cuban community and other minority groups to the area in the mid-1960s with the promise of good jobs and an opportunity for achieving the American dream; however, the closing of the plant in 1996, resulted in the loss of many jobs and a major impact on the local economy.

Today, Sleepy Hollow’s small-town charm and proximity to Manhattan has attracted residents and visitors alike, to enjoy a variety of outdoor recreational opportunities, historic landmarks, and natural scenic vistas.

1.2 Purpose and Scope

The Village of Sleepy Hollow Multi-Hazard Mitigation Plan (MHMP) inventories and assesses existing conditions within the Village, identifies natural and man-made hazards

that can threaten life and property, and analyzes the Village's vulnerability to these hazards and its general preparedness for responding and recovering to a variety of potential disasters. A program of goals, objectives, and a multi-hazard mitigation strategy action plan are provided.

The planning process included four MHMP committee meetings (one which preceded the hiring of the Village consultants), three public meetings, including one informational meeting and one public hearing, field inventories, comprehensive data collection and review, and outreach to the general public and various federal, state, and local agencies, offices, organizations, special districts, and first responders. Written comment periods were also provided to promote public input and draft materials were made readily available for public review and comment. The Village Board, Administrator, Grant Development Director, Clerk, Building Inspector, Department of Public Works General Foreman, Police Chief, Police Lieutenant, Chief of EMS, and First Assistant Chief of the fire department were actively involved in the planning process and provided essential information. The plan outlines a future implementation, monitoring, and evaluation process and provides a framework for ongoing public participation. The MHMP strives to:

- 1) reduce the potential for injury and loss of life, decrease social and psychological effects, and minimize structural losses and other economic impacts from natural, technological, and human-caused hazards that may occur in the Village in the future;
- 2) guide future executive, legislative, and administrative actions taken by the Village so that they will be balanced with the need for effective multi-hazard mitigation efforts that minimize the extent of potential losses and damages;
- 3) direct future Village multi-hazard mitigation programs and policies based on level of risk and vulnerabilities, so as to ensure an appropriate level of preparedness and effective and efficient mitigation response and recovery;

- 4) Demonstrate a commitment to reducing the effects of natural, technological/man-made disasters while becoming eligible to receive hazard mitigation and flood prevention grant funding.
- 5) Reduce the overall costs to the Village from multi-hazard disaster preparedness, response, and recovery actions through judicious preemptive planning.
- 6) Protect the Village from natural, technological, and human-caused hazards that could further affect the economic health of the community which includes a declining lower-income, ethnically-diverse, inner Village neighborhood with aging infrastructure, so as to promote overall economic prosperity and sustainability.
- 7) Provide comprehensive public outreach and promote participation by diverse stakeholders in the hazard mitigation process.

The MHMP identifies, recommends, encourages, and supports the implementation of activities aimed at preventing or lessening the severity of flooding, fires, storm damage, and many other potential incidents that could occur in the Village. Such incidents threaten the safety of the public and can result in significant costs to residents, business owners, and public facilities and resources (e.g., impacts to community infrastructure, taxes, etc.). Such economic losses are incurred through the need for repair and restoration of property, buildings, capital infrastructure, and environmental resources from damages caused by hurricanes, flooding, winter storms, tornadoes, fires, hazardous materials releases, power and telecommunication failures, and other hazardous events. Proactive planning also helps in averting or alleviating the effects of business disruptions, loss of employment, and impacted utilities, transportation systems, and essential community functions and activities.

The Plan was prepared on behalf of the Village of Sleepy Hollow and has been guided by Village staff and officials, a special planning committee established by the Village, the general public, local organizations and stakeholders, and federal, state, and county agency representatives. The Multi-Hazard Mitigation Planning Committee (MHMPC) provided essential information in the development of goals, objectives, recommendations, and existing conditions inventories. The committee was a critical resource for providing local knowledge and practical experience in emergency preparedness, response, recovery, and day-to-day Village functions. The inventory of existing conditions and community assets and vulnerabilities included a Village-wide field survey of the community, review of available plans, studies, and data, consideration of existing plans and regulations, interaction with various involved agencies, officials, and experts in the hazard mitigation field, and related activities. The MHMPC was also asked to assist in the development, evaluation, and prioritization of the draft recommendations of this report, so as to ensure that the Village's future efforts to address problems relating to multi-hazard mitigation are consistent with the community's needs, goals, and objectives. Information collected during MHMPC and public meetings have been incorporated into the Plan, either as part of its main text, features depicted on maps, or in the committee meeting notes.

The implementation of the tasks and strategies that advance the multi-hazard mitigation goals and initiatives outlined in this Plan, when combined with the Village's current level of emergency preparedness and its ongoing policies and initiatives, improves the Village's natural and technological/man-made hazard mitigation awareness, preparedness, response, and recovery capabilities. Moreover, the implementation of the tasks and strategies which effectuate the hazard mitigation policies included in this plan, when combined with the Village's current management capabilities, its fire, ambulance, and police department activities, available mutual aid, and the Village's pending and proposed future projects and policies, will not only advance the Village's overall mitigation strategy, but will also serve to augment the protection of the community and its essential infrastructure and assets from future disasters.

All of the MHMP initiatives are dependent upon the availability of funding. Therefore, this plan recognizes the importance of identifying and ultimately obtaining funding to support implementation of activities that finance the MHMP initiatives identified. The MHMP outlines potential funding opportunities and how those opportunities can be applied to specific projects identified as important to the goal of disaster preparedness. The Plan also outlines the implementation and update and evaluation of the plan and the coordination with the grant administrator that will be necessary in obtaining and administering funding for prioritized projects.

The acceptance of the MHMP by the State Office of Emergency Management (SOEM) and Federal Emergency Management Agency (FEMA) and the adoption of the Plan by the Village Trustees are intended to satisfy the Disaster Mitigation Act of 2000 and the National Flood Insurance Program. Approval and adoption of the Plan will also make the Village eligible to participate in and receive funding from the Flood Mitigation Assistance (FMA) program and Hazard Mitigation Grant Program (HMGP) and various other programs that have been identified.

The actions necessary to implement the initiatives outlined in this Plan may be eligible for funding through a variety of programs outlined in Section 5 (“Hazard Mitigation Strategies: Possible Funding Sources”) and 6 (“Action Plan”).

1.3 Authority

The planning process for the MHMP was first initiated in March of 2012 when representatives of the Village and local first responders met to discuss potential threats to the community. By May of 2012, the Village Board of Trustees authorized the issuance of a request for proposal to prospective consultants to assist in the preparation of the MHMP. A Request for Proposal was circulated by the Village on May 30, 2012 and preparation of the MHMP, with assistance from its consultants, Cashin Associates, P.C., was officially authorized by the Village of Sleepy Hollow’s Board of Trustees by Resolution 08/92/2012 dated August 14, 2012. Funding for the project was provided

through a grant from the Federal Emergency Management Agency (FEMA) which was administered at the state level by the New York State Office of Emergency Management (SOME). In November of 2012, the official planning process and plan development began.

By Resolution 01/13/2013 adopted January 22, 2013, the Village Board of Trustees formally established the MHMPC. The membership of this committee provided diverse representation, each individual was knowledgeable about the community and/or experienced in the provision of emergency services. The activities of the MHMPC were overseen by the Village Administrator with assistance from project consultants.

Article 2-B of the New York State Executive Law encourages hazard mitigation planning and project implementation at the local level. Portions of Section 23 (*Local Comprehensive Emergency Management Plans*) authorize local communities to prepare plans addressing disaster prevention and mitigation, among other activities, while Section 28 (*Post-Disaster Recovery Planning*) requires the preparation of local recovery and redevelopment plans following a State Emergency Declaration. Other State supporting legislation includes the State Waterfront Revitalization and Coastal Resources Act, Floodplain Management Program, Environmental Quality Review Act, Tidal Wetlands Act, and Freshwater Wetlands Act.

This MHMP is required by the Disaster Mitigation Act of 2000 and the National Flood Insurance Program in order to be eligible to receive future hazard mitigation and flood prevention grant funding. The Plan is further authorized through the federal Robert T. Stafford Disaster Relief and Emergency Assistance Act (P.L. 93-288, as amended), Section 409 of the National Flood Insurance Reform (NFIR) Act of 1994, Subtitle C (*Ratings and Incentives for Community Flood Management Programs*), and Subtitle D (*Mitigation of Flood Risks and New York State's General Municipal Law*).

This MHMP is consistent with:

- the NFIP, in which the Village of Sleepy Hollow participates, and is in good standing with;
- the National Mitigation Strategy - Partnerships for Building Safer Communities;
- New York State's State Hazard Mitigation Plan and the Requirements of Subpart M, 44 CFR 206.405 and 206.406;
- the Requirements of Federal Guidelines required by FEMA to be met in preparing such plans; and
- the National Mitigation Strategy, which develops a national approach to mitigating economic losses caused by all types of disasters, and provides reference for multi-hazard identification and risk assessment.

This MHMP is considered to be consistent with the Village's Local Waterfront Revitalization Program and does not conflict with existing local emergency management and response plans. As with the recommendations developed for this Plan, the actions that implement the recommendations of the MHMP should be consistent with the Village's LWRP, Stormwater Management Plan, local emergency management and response plans, as well as its laws and policies.

The Plan is reflective of the Village's desire to protect the health and safety of the community and prevent future losses and damage to public and private property and infrastructure throughout its jurisdiction, regardless of whether the property is covered by flood and other general risk insurance. Finally, implementation and future update of this Plan should be undertaken with an understanding of the Village's previously adopted plans to ensure policy consistency and coordination of strategies, in order to prevent unnecessary redundancy and inconsistent or self-defeating actions.

2.0 PUBLIC PARTICIPATION AND PLANNING PROCESS

The public participation and planning process for the MHMP was as follows.

2.1 Multi-Hazard Mitigation Planning Committee

By resolution dated January 22, 2013, the Village Board of Trustees officially established the Multi-Hazard Mitigation Planning Committee (MHMPC). The Committee consisted of Village staff and local first responders who work and live in the area and have specific knowledge about the community and its hazard mitigation needs. Members of the MHMPC included:

- Anthony Giaccio, Village Administrator
- Sean McCarthy, Village Building Inspector
- Gregory Camp, Chief of Police
- Anthony Bueti, Lt. of Police
- Edgar Brennen, Chief of EMS
- Patrick Haggerty, Assistant Fire Chief
- Richard Gross, General Foreman of DPW
- Michael Brusseau, Community & Environmental Planner, Cashin Associates
- Kimberly Somers, Environmental Scientist, Cashin Associates

A copy of the Village Board of Trustees resolution officially creating the committee is provided in Appendix A.

In addition to the above, invitations were sent to Phelps Hospital, The School District of the Tarrytowns, Westchester County Emergency Services, The Town of Mount Pleasant, Historic Hudson Valley, Sleepy Hollow Cemetery, and Religious of the Sacred Heart of Mary Life Center. Representatives from the Hospital, School District, and Religious of the Sacred Heart of Mary Life Center attended one of the committee meetings.

The MHMPC met three times during the course of the planning process and provided invaluable input relating to: the identification of past hazardous events and emergency

situations; potential natural and human caused or technological hazards; existing Village conditions; vulnerable populations, facilities, and locations within the Village; the agencies, organizations and other stakeholders involved in multi-hazard preparedness, response and recovery; current emergency response capabilities; and the development of hazard mitigation goals and implementation strategies. A meeting between Village staff (Village administrator, DPW general foreman, building inspector, grant development director) and emergency response personnel (fire, police, and EMS) was also held in March of 2012, prior to the hiring of the consultants for the project. At this meeting, the group discussed a number of hazard mitigation issues. A summary of discussion items and information and ideas collected during the three committee meetings conducted by the consultants and the one conducted by the Village are provided in the meeting agendas and meeting minutes prepared for these meetings (See Appendix A). Once the full Draft Plan was completed, copies were sent to the Committee and later the Village Board for comments. The Draft Plan was then submitted for public review and committee members were invited to attend the public hearings for additional comments and input.

2.2 Agency Contacts and Coordination

The consultants for the project also obtained critical information by reaching out and coordinating with various individuals experienced in risk assessment and hazard mitigation. Contacts included:

- Paul Hoole, FEMA Hazard Planning Mitigation Division, Region 2
- Jim Ryan, NYS Office of Homeland Security & Emergency Services
- Mary Colvin, FEMA Region Homeland Security
- Eric Berman, FEMA, Mitigation Division
- Brian Shuman, FEMA, Mitigation Division
- Thomas Song, FEMA, Risk Analysis Division
- Sam Wear, Westchester County Geographic Information Systems
- Connor Lynch, Westchester County Geographic Information Systems
- Don Canestrari, NYSDEC Dam Safety
- Andy Jones, SOEM, Fire Services
- Dave Dematteo, SOEM Planning
- Chief Caputo, Westchester County Emergency Services
- Phyllis, Westchester County EMS
- Mindy Brugger, Phelps Hospital, Emergency Management
- Insurance Services Office, Inc.

- Anthony Giaccio, Village Administrator
- Sean McCarthy, Village Building Inspector
- Gregory Camp, Chief of Police
- Anthony Bueti, Lieutenant of Police
- Edgar Brennen, Chief of EMS
- Patrick Haggerty, Assistant Fire Chief
- Richard Gross, General Foreman of DPW
- Paula McCarthy, Village Clerk
- Fiona Hodgson, Village Grant Development Director

In addition to reaching out to the above individuals numerous available written resources were reviewed. A complete list of written resources examined during the preparation of this MHMP is provided in the “Bibliography” section of this document. These documents provided a wealth of information that is indispensable to hazard prevention, mitigation, and disaster recovery efforts. Village officials, staff, first responders, and the general public are urged to review these resources as applicable to enhance their understanding of disaster related issues and effects, resources that are available, the agencies that are involved in preparing for and responding to different disasters, existing laws and planning policies, and available funding sources.

2.3 Public Outreach

In addition to the four MHMPC meetings, meetings between Village officials and the consultants, one public informational meeting and one public hearing were held.

The first public meeting was a public informational meeting held at Village Hall on January 22, 2013. The meeting was advertised on the Village’s official website, through the Village’s email notification system which includes about 600 registered receivers, an online newspaper (*The Tarrytown-Sleepy Hollow Patch*) and the local newspaper, the *Journal News*, in accordance with the Village’s standard operating procedures for public meetings. Meeting notices go out at least 10 business days prior to the holding of a meeting. Invitations to attend the meeting were also sent to Phelps Hospital, the School District of the Tarrytowns, The Town of Mount Pleasant, and the Westchester County Emergency Management Office.

A representative from Cashin Associates (Village consultants for the plan) provided a 10 to 15 minute presentation explaining the purpose, scope, content, procedures, and general timeline for the Multi-Hazard Mitigation Plan and the consulting firm's background, experience, and qualifications for the job. The Village Board was asked if they had any questions and the meeting was opened up for comments and questions from the public. The meeting was video taped and the video was posted on the Village's official website for public review. The public and interested and involved agencies and organizations were urged to submit written comments and a 30-day written comment period was provided so that persons not in attendance or who would prefer to submit written comments would have an opportunity to do so.

The agendas, the four committee meeting summaries, draft goals, objectives, and recommendations and some of the maps depicting important Village information were also posted on the Village's website for public review and commentary before the full preliminary draft plan was submitted for consideration at the first scheduled public hearing. A copy of the Village webpage containing the above materials is provided in Appendix A.

The first public hearing for the preliminary draft Plan was held on July 30, 2013 in the Village Hall's public meeting room. The meeting was noticed in the local newspaper and online. The 600 individuals on the Village's contact list were emailed. Invitations to the meeting were also sent to via email to key contact persons from the communities of Ossinig, Briarcliff Manor, Mount Pleasant, Tarrytown, Pleasantville, and Elmsford as well as representatives of Phelps Hospital the School District of the Tarrytowns, RSHM Life Center, and Westchester County Department of Emergency Services. The preliminary draft MHMP was made available for review at the Village Clerk's Office, the Warner Library, and online at the Village's official website. A brief presentation was provided and the meeting was opened up for questions and comments. A written comment period of one month was provided (from the time the MHMP was filed and notices posted to two weeks after the close of the public hearing). An additional week was provided after the close of the written comment period just in case there were late

submissions. The draft Plan was revised accordingly and submitted to SOEM/FEMA for review by the end of August of 2013.

The final draft Plan was revised to reflect the comments of SOEM/FEMA and was made available for review by the public at the Village Clerk's Office, the Warner Library, and online at the Village's official website.

Input received at the public meetings is summarized in Appendix A.

2.4 Multi-Jurisdictional Participation

The study area for the project includes the Village of Sleepy Hollow. The county and other municipalities or districts beyond Village boundaries were not included. The Village did reach out to the Town of Mount Pleasant to ask if they and their villages were interested in developing a joint plan, but the Town was not interested.

The public informational meetings and hearings were advertised in the local newspaper and on the Village website. Invitations were also sent out to officials of the Town of Mount Pleasant, Phelps Hospital, the school district of the Tarrytowns, and the Westchester Office of Emergency Services. As previously noted, the planning committee contained various public officials and staff, as well as representatives from the local police, EMS, and fire departments. Representatives from Phelps Hospital, the school district of the Tarrytowns, and RSHM Life Center also attended one of the committee meetings. The Village sent invitations via email to key contact persons at the following area municipalities to attend the first public hearing (Ossinig, Briarcliff Manor, Mount Pleasant, Tarrytown, Pleasantville, and Elmsford), informed these municipalities how and where the plan could be reviewed and that the Village would accept written comments from them until August 16, 2013.

Cashin Associates also reached out to FEMA, SOEM, Westchester County Emergency Services, NYSDEC and others during the process to obtain important information and various pertinent studies, plans, laws, and reports were reviewed to obtain the expertise

and knowledge of various professionals, experts, and hazards specialists (“Bibliography”).

2.5 Consultant Responsibilities

Cashin Associates was responsible for the overall preparation of the Plan. This included:

- Researching available materials
- Conducting field investigations
- Coordinating MHMPC meetings
- Making presentations at public meetings
- Developing meeting agendas, recording comments, and summarizing all input received
- Reaching out to agencies for information
- Preparing the Plan’s text
- Preparing graphics
- Providing input regarding the planning process, implementation process, development of goals, objectives, recommendations, storm history, hazard risks and probabilities, etc.
- Revising and finalizing the MHMP based on public and agency comments
- Publishing the documents.

2.6 Field Investigations and Other Meetings

On November 14, 2012, Cashin Associates personnel met with the Village Administrator and Grants Development Director to discuss the scope of the project, proposed content of the plan, plan procedures, and identification of data and other materials needed to begin the process. A copy of the notes from this meeting is provided in Appendix A.

The Village Administrator and personnel from Cashin Associates also went on a comprehensive guided tour of the Village on December 6, 2012. Notes and photographs were taken, questions were asked by the Cashin team, and key locations were plotted on an aerial photograph of the community. During the field investigation, capital infrastructure, community assets, emergency services headquarters, high-rise buildings, high risk locations and locations or buildings containing potentially vulnerable populations were identified. Possible preliminary draft recommendations began to be considered. Follow up field investigations by the consultants were conducted on two

other occasions after committee meetings to verify information, answer questions that arose, or collect additional information that was needed. A copy of the notes from the guided field investigation conducted December 6, 2012 is provided in Appendix A.

2.7 Final Plan Review, Adoption, and Acceptance Process

After the Plan was amended to address comments received from the Village, MHMPC, general public, interested agencies, and FEMA/SOEM, the final document was reviewed and officially adopted by the Village. The Plan was then submitted to FEMA for final acceptance and filing. Once the Plan was accepted, it became the official multi-hazard mitigation strategy of the Village of Sleepy Hollow and the implementation process was begun.

Table 2-1 provides a summary of the planning process for the project. Appendix A provides the resolutions and meeting summaries.

Table 2-1

| PLANNING PROCESS SUMMARY | | | |
|---------------------------------|--|---|---|
| Date | Action or Event | Attendees/Participants | Product |
| 3/14/12 | Initial project kick-off meeting is held including Village staff and local emergency responders | Richie Gross (DPW), Shelly Florence (EMS), John Korezelius (Fire Department), Sean McCarthy (Building Inspector), Lt. Anthony Bueti (Police), Anthony Giaccio (Village Administrator), and Fiona Hodgson (Grants) | Meeting minutes/notes containing a list of hazards and related issues and concerns |
| 5/30/12 | Village releases a Request for Proposals to hire consultants to assist in preparing the MHMP | Village Board of Trustees and Village staff | Request for Proposals, responses from consulting firms |
| 8/14/12 | Village Board of Trustees Hires consultants and authorizes the preparation of the Village of Sleepy Hollow Multi-Hazard Mitigation Plan (MHMP) | Village Board of Trustees | Board of Trustees resolution retaining Cashin Associates, P.C. (CA) as MHMP consultants |
| 11/14/12 | Project kick-off meeting between Village representatives and consultants | Village Administrator, Village Grant Development Director, consultants | Preliminary discussion of procedures, data needs, and project administration contact information; data collection and initial agency contacts begin |
| 12/6/12 | Tour of Village/preliminary field inventory | Village Administrator and consultants | Pre-field inventory meeting to discuss procedures, timeline, data needs, and billing process; field identification of critical infrastructure, community assets, natural and technological/ man-caused risks, and vulnerabilities |

| PLANNING PROCESS SUMMARY | | | |
|---------------------------------|---|---|--|
| Date | Action or Event | Attendees/Participants | Product |
| 1/22/13 | Formal creation of MHMP Committee including Village Administrator, Building Inspector, DPW General Foreman, representatives from the police, fire department, and ambulance Corps | Village Board of Trustees | Board of Trustees resolution of approval creating the MHMP Committee |
| 1/15/13 | First MHMP committee meeting | MHMP Committee, consultants | Discussion of project purpose, scope, public outreach procedures, and general timeline; discussion and input regarding overall goals; list of hazards; committee's general assessment of level of threat from hazards; input from committee regarding the Village's ability to respond to hazards (equipment, infrastructure, personnel, training, coordination, procedures, administration, existing plans, policies funding, and regulations). Input from committee regarding village assets and critical infrastructure, specific threats to assets and critical infrastructure |
| 1/15/13 | Field inspection/inventory | Consultants | Notes to assist consultants in preparation of the Plan and graphics |
| 1/22/13 | Public informational meeting | Village Trustees and staff, public, local organizations, interested agencies, nearby jurisdictions, consultants | Meeting minutes/notes containing discussion of project purpose, scope, plan content, public outreach procedures, and general timeline; initial input from the public regarding hazards, critical infrastructure, emergency services, community assets, vulnerable populations and locations, issues and concerns, and questions |

| PLANNING PROCESS SUMMARY | | | |
|---------------------------------|---|---|--|
| Date | Action or Event | Attendees/Participants | Product |
| 1/22/13 | Start of 30-day written comment period | Public and other stakeholders | Acceptance of any written comments from public and other stakeholders |
| 2/5/13 | Second MHMP committee meeting | MHMP Committee, project consultants, representatives from the School District of the Tarrytowns, Phelps Hospital, and Religious of the Sacred Heart of Mary Life Center | Input from committee regarding previous meeting's notes, discussion of assessing suitability of emergency services for serving a community the size of the Village, identification of stakeholders (public, village departments, federal, state, and county agencies, local organizations and citizen, business, environmental groups, etc.); history of actual hazardous events in the Village, probabilities of hazardous events, discussion of goals, objectives, & recommendations |
| 2/26/13 | Third MHMP committee meeting | MHMP Committee, consultants | Review, discussion, and priority ranking of draft recommendations/hazard mitigation strategies; review and discussion of draft maps |
| 2/26/13 | Field inspection/inventory | Consultants | Notes to assist consultants in preparation of the Plan and graphics |
| 3/13/13 | Posted committee meeting agendas, meeting minutes/summaries, draft goals, objectives, and recommendations, and several draft maps | Village staff, consultants, public | Make some preliminary draft materials available to the public for comment before completion of a full first-round draft plan for the first public hearing; promote community participation and commentary |
| 3/13/13 | Submit draft Action Plan to Village Administrator and Grant Director for review | Consultants, Village Administrator and Grant Director | Completed draft Action Plan |
| 4/9/13 | Forward copy of completed Draft Plan to Committee for comment | MHMP Committee | Consultant receives comments from Committee and Draft Plan is modified accordingly |

| PLANNING PROCESS SUMMARY | | | |
|---|--|--|--|
| Date | Action or Event | Attendees/Participants | Product |
| 5/30/13 | Submit first complete draft MHMP to Village Board | Consultants, Village staff, Village Board | Full preliminary draft plan submitted to Village |
| 7/30/13 | First public hearing on draft plan | Village officials, committee, public, and other stakeholders | Meeting minutes/notes documenting comments from Village officials, the public, committee members, and other stakeholders |
| 7/8/13 (posted) 7/30/13 (hearing) 8/13/13 (close of comments) | Extension of public review and written comment period an additional two weeks beyond the hearing date. Total review and comment period for public from time of posting to close of hearing is 40 days. | Public and other stakeholders | Acceptance of any written comments from public and other stakeholders |
| 7/30/13-8/13/13 | Review and incorporate hearing comments into draft plan | Consultants | Revised draft plan |
| 8/23/13 | Submit draft plan to SOEM for SOEM and FEMA review | SOEM and FEMA | Comments from SOEM and FEMA (i.e. "FEMA Crosswalk") |
| 11/14/13 – 11/15/13 | Received comments from SOEM | Village, consultants | Revised draft plan & submitted to FEMA |
| 1/09/2014 | Received comments from FEMA | Village, consultants | Revise draft plan accordingly |
| 2/2014 | Revised draft plan according to comments received from SOME/FEMA | Consultant | Final Plan |
| 8/12/14 | Adoption of Final MHMP by Village | Village Board of Trustees | Final resolution of approval, Final Plan |
| 9/2014 | Submission of Final Plan to SOEM and FEMA | FEMA & SOEM | Process completed, implementation of plan begins |

3.0 RISK ASSESSMENT

3.1 Introduction

There are a variety of potential natural, technological, and human-caused disasters that could occur at any time in the Village of Sleepy Hollow. Environmental factors such as regional climate and local weather patterns, hydrology, geology, soil type, and topography, as well as anthropogenic conditions and characteristics, such as population and development density, land use, locations of structures, type of construction, suitability of critical infrastructure, and level of emergency preparedness can influence the severity of these events and the Village's ability to adequately prepare for and respond to hazardous events. These factors are important as they can affect the:

- level of impact from major storms;
- severity of flooding and erosion;
- potential exposure to hazardous condition and dangerous substances;
- potential for fires;
- number of people who may be injured, become sick or lose their lives;
- extent of damage to property, infrastructure, utilities, and other critical assets;
- disruption of basic services, business activity, employment, and other fiscal and economic impacts;
- extent of environmental degradation; and
- ability to quickly and effectively rebound from a disaster or major hazardous incident.

In order to assess the level of risk and the best approaches for mitigating the effects of potential disasters in the Village, it is important to identify and assess the types of hazards that are possible in the Village, the Village's level of risk and vulnerability, its general preparedness, and ability to mitigate the effects of each possible event. The process of identifying potential hazards in the Village included a review of the history of hazardous events in the region; review of existing plans, studies and reports. Documents reviewed and input requested include but are not limited to: the State's Hazard Mitigation Plan and other previously prepared hazard mitigation plans (e.g., Westchester County Indian Point Emergency Guide 2010-2011; Emergency Action Plan for Pocantico Lake Dam; Water Supply Emergency Plan for the Village of Sleepy Hollow, Phelps Hospital and Tarrytown School District plans, local emergency response plans, hazard mitigation plans prepared by CA in the past, the Sheldus Hazardous Events database for Westchester

County, NY), direct input from the MHMPC, and input received during public meetings and hearings.

3.2 Hazard Identification

The following sections outline the types of hazards that threaten the Village, a history of these events in the area, possible impacts, level of risk to the community, potential damages that could result, and other pertinent information.

3.2.1 Hazardous Weather Phenomena (Storms)

3.2.1.1 *Hurricanes*

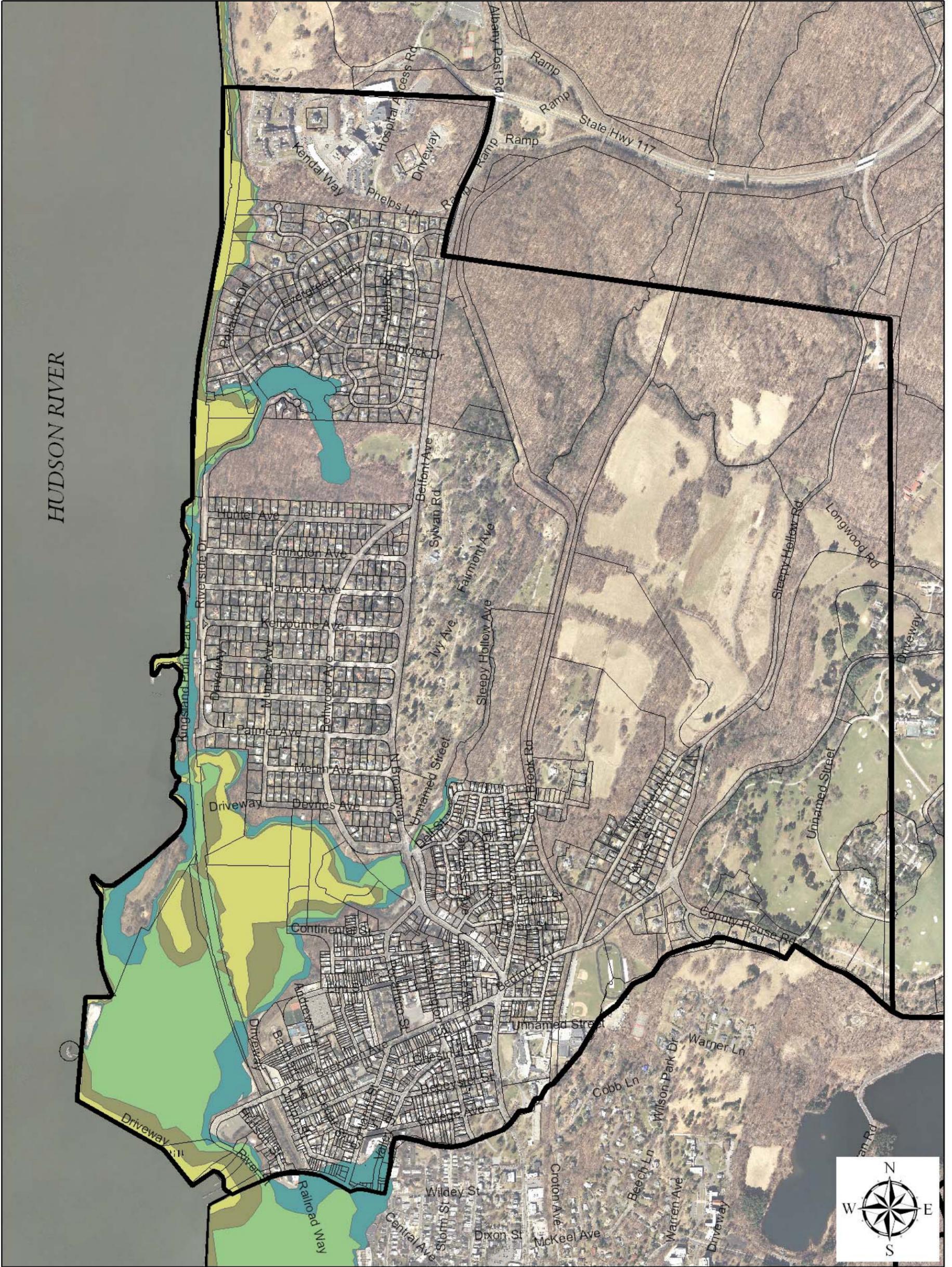
A hurricane can be defined as an intense tropical cyclone generating heavy rains and exhibiting minimum wind speeds of 74 mph which spiral inward in a counterclockwise direction (in the northern hemisphere) toward a central core of low pressure. Southern New York, including Westchester County, has been affected by many hurricanes over the past hundred years. Hurricane strength is typically classified using the Saffir-Simpson hurricane intensity scale which is broken into five distinct classifications. The classifications are based on wind velocity, atmospheric pressure, storm surge heights, and the relative potential damage expected to be incurred from a storm.

Table 3-1

| SAFFIR-SIMPSON SCALE FOR HURRICANE CLASSIFICATION | | | | | | |
|--|---------------------------|-------------------------|-----------------------------|-----------------------------|---------------------------|---------------|
| <i>Strength</i> | <i>Wind Speed (knots)</i> | <i>Wind Speed (mph)</i> | <i>Pressure (millibars)</i> | <i>Pressure (inches Hg)</i> | <i>Storm Surge (feet)</i> | <i>Damage</i> |
| Category 1 | 65-82 | 74-95 | >980 | >28.94 | 4-5 | Minimal |
| Category 2 | 83-95 | 96-110 | 965-979 | 28.50-28.91 | 6-8 | Moderate |
| Category 3 | 96-113 | 111-130 | 945-964 | 27.91-28.47 | 9-12 | Extensive |
| Category 4 | 114-135 | 131-155 | 920-944 | 27.17-27.88 | 13-18 | Extreme |
| Category 5 | >135 | >155 | <919 | <27.16 | >18 | Catastrophic |
| TROPICAL CYCLONE CLASSIFICATION | | | | | | |
| Tropical Depression | | | | 20-34 knots or 23-39 mph | | |
| Tropical Storm | | | | 35-64 knots or 40-73 mph | | |
| Hurricane | | | | 65 + knots or 74 + mph | | |

The three major causes of damage from hurricanes are storm surge, wind damage, and flooding, with storm surges being responsible for the vast majority of human deaths and injuries accounting for as many as 90 percent of the casualties of a hurricane (Mandia). Although Sleepy Hollow is not located along an ocean shoreline, the Hudson River which comprises the western border of the Village is a significant tidally-influenced waterbody that can be affected by storm surge. The lower Pocantico River, which discharges into the Hudson at Devries Park, therefore, is also subject to the effects of tides and storm surges. The National Hurricane Center prepares the Sea, Lake, and Overland Surges from Hurricanes (SLOSH) maps which depict the estimated elevation of storm surges and extent of inundation associated with a particular category hurricane. The maps are developed based on a computer model which takes into consideration storm size, wind velocity, atmospheric pressure, storm track, and forward speed. Figure 3-1 shows the potential extent of storm surge in the Village of Sleepy Hollow based on hurricane category. This map indicates that shoreline areas, particularly in the southwestern portion of the Village and inland along the Pocantico River could be affected by storm surge. These areas contain parkland, the former GM property and existing and proposed residential, business, institutional, and mixed-use (residential/business) developments. The Village's Department of Public Works building and its fuel tanks/pumps would be in jeopardy from storm surge flooding during severe events such as a Category-3 or Category-4 hurricane or a 500-year flood. High winds and flooding could affect other properties and structures throughout the Village depending on elevation, drainage, depth to groundwater, and other factors. Damage to buildings and parklands from high winds and floodwater, disruption to businesses and the Village DPW, severe erosion, and loss of power are just some of the threats a hurricane would have on the Village.

According to the NYS Mitigation Plan (2011), the 100-year peak wind gust probability from a hurricane in the Sleepy Hollow area is 96-98 mph, though higher speeds can occur. In addition to the obvious concerns associated with strong winds, hurricanes sometimes can influence the development of tornadoes as they make landfall. Torrential rainfall associated with hurricanes can cause serious flooding. The Hudson shoreline and low-lying areas with limited slopes adjacent to streams (such as the mouth of the



Legend

-  VILLAGE OF SLEEPY HOLLOW BOUNDARY
- NYS HURRICANE STORM SURGE ZONES**
-  CATEGORY 1
-  CATEGORY 2
-  CATEGORY 3
-  CATEGORY 4



**FIGURE 3-1
VILLAGE OF
SLEEPY HOLLOW
MULTI-HAZARD
MITIGATION PLAN
SLOSH**

Pocantico River and its tributaries) and lakes (Fremont Pond, Pocantico Lake) would be most vulnerable to flooding and possibly stronger winds.

Unlike the dangerous storm surges and strong winds that concentrate along the center of hurricanes, heavy rains can occur in wide bands encompassing hundreds of miles and can affect areas for days — long after the strong winds and storm surges have subsided. Prolonged intense rainfall coupled with a storm surge and unusually high tides are of particular concern (See flood zone map below in flash flooding section).

The level of threat imposed by hurricanes based on input from the MHMP Committee is high. Historical records for Westchester County between 1960 and 2012 include hurricane listings for Hurricane Donna (1960), Hurricane Gloria (1985), Hurricane Bob (1991), Hurricane Floyd (1999, Presidential Disaster Declaration), Hurricane Katrina (2005, Emergency Declaration/evacuation), and Hurricane Sandy (2012). Appendix B provides lists of major weather events that have occurred in Westchester County by type of event for the years 1960-2009. Appendix C provides Presidential Disaster and Emergency Declarations for Westchester County for the years 1965-2007.

3.2.1.2 Tropical Storms

Tropical storms have similar characteristics as hurricanes but have maximum wind speeds of 73 mph or less. The winds of tropical storms (or cyclones) blow in a counterclockwise direction around a centralized “eye” and their velocities are commonly augmented by the speed of the storm’s approach. Due to wind directions, wind and wave setup, changes in barometric pressure, and the resultant storm surge, south facing shorelines tend to bear the brunt of tropical storms, while north facing storms are slightly more protected. Sleepy Hollow’s shoreline along the Hudson faces west. Tropical storms can range in size between 50 and 500 miles across. Tropical storms on record as having impacted Westchester County in the past 50 years include: Tropical Storm Brenda (1960), Tropical Storm Doria (1971), Tropical Storm David (1979), Tropical Storm Hana (2008), and Tropical Storm Irene (2011). The MHMP Committee determined there is a high likelihood for tropical storms to affect the Village.

Tropical storms can cause flooding and would primarily affect areas within FEMA 100-year flood zones, particularly the lower-lying shallow sloped areas along the Hudson and at the mouth of the Pocantico River in the southwest portion of the Village. These areas are primarily parkland or land that has been filled in the past, such as the former GM property. This area includes some development including existing and proposed mixed-use development. Proposed development plans meet the Villages' requirements for protection from the 100-year flood. (See FEMA flood zones provide in the flood section). High winds and rain can also affect other properties throughout the Village.

3.2.2.3 Northeasters (Nor'easters or Extratropical Storms)

Nor'easters are cyclonic storms which occur along the east coast of North America. They are often very large and may be as many as three times the size of a tropical storm. As a result, these storm events can remain active for an extended period of time, and therefore may persist through several tidal cycles depending on the speed of their approach. Nor'easters are characterized by winds which blow in a counterclockwise direction around a center of low barometric pressure. Heavy snow or rain and strong northeasterly winds with gusts that may exceed hurricane force can occur and these conditions may be accompanied by choppy waves in open water areas capable of causing significant erosion and structural damage. While the waters of the Hudson River can become choppy from high winds, the Village is not in a FEMA coastal flood with velocity hazard (wave action) zone. More severe impacts typically occur along ocean shorelines where waves can be quite large and powerful. The speed of the approach of nor'easters is also significant in determining its severity. Storms that stall or are on a slow track have greater influence over wave and wind setup, depending on wind speeds and fetch (the distance over water that the wind blows). Nor'easters occur during the late fall and winter months and when combined with cold temperatures, can develop into severe winter storms or blizzards.

Areas of steep slopes in the Village can become dangerous for travel under snowy and icy conditions and snow removal and temporary snow storage efforts for large storms

such as blizzards can be difficult and costly. Snow and ice can cause downed power lines and isolated or widespread outages. Snowy conditions also can slow emergency response times and make emergency response more dangerous, which is of particular concern since Phelps Hospital is located within Village boundaries. High winds and heavy precipitation can affect the entire Village but could have greater impact in the 100-year flood zone.

Nor'easters are relatively common for large storms in southern New York. The SHELDUS historical storms database does not use the term "nor'easter" to describe any of the storms in the database which is apparently due to classification under other categories (i.e., "heavy rain", "heavy snow", etc.). There were numerous heavy rain and heavy snow events in the SHELDUS database. The MHMP steering committee considered nor'easters to have a high probability of occurrence in the Village.

3.2.2.4 Tornadoes

Severe tornadoes are the most violent storms on earth. A tornado is a storm event characterized by a very intense funnel-shaped column of spiraling air which extends from a convective cloud to the earth's surface. Tornadoes develop from a clash of high- and low-pressure weather systems, have very short durations when compared to other types of storms, and develop relatively quickly thereby allowing little warning and time for preparation. They may occur anywhere in the United States where warm-moist and cool-dry air collides. Along the east coast of the United States, they are most commonly associated with hurricanes and thunderstorms.

Large, fiercely destructive tornadoes such as those that occur along the infamous "Tornado Alley" (i.e., Texas, Oklahoma, Kansas, Nebraska, and Iowa) and other central states are rare in the northeastern United States. Nevertheless, devastating twisters have occasionally occurred in the northeast such as one that developed in Worcester, Massachusetts in 1953, just 150 miles away, killing 90 people (NOAA 2002). New York has had its share of tornadoes as well. According to the NYS Division of Homeland Security and Emergency Services, between 1950 and 2009, New York State had a total of

376 tornadoes resulting in 21 deaths, 307 injuries, roughly \$820,000 in crop damages, and \$422,000,000 in property damages. Moreover, SHELDUS (2009) lists five small- to -moderate-intensity tornadoes that killed, injured and/or caused property damage in Westchester County between 1950 and 2009 (1971, 1974, 1977, 1991 and 2006). In 2006, a tornado crossed the Hudson River and passed directly through the Village of Sleepy Hollow causing damage to St. Theresa’s Church and the W.L. Morse Elementary School and causing other miscellaneous minor damage. One local tornado (the F2 in 2006) caused injuries to six individuals and another (1991) caused a death along its track. The total estimated combined property damage in the County from the five tornadoes is \$11,697,806.

Tornadoes are classified according to the Fujita Scale. The scale was revised in 2007 and is now known as the “Enhanced Fujita Scale”. The Enhanced Fujita Scale provides improved estimates of the intensity of tornadoes based on a better understanding of the phenomena. It considers estimated wind speeds, post-storm damage, and other data. The Fujita scale (for historic storms) and Enhanced Fujita scale (for post 2007 storms) are provided below.

Table 3-2

| FUJITA TORNADO WIND SPEED DAMAGE SCALE | | | |
|---|--|----------------------------|---|
| <i>Class</i> | <i>Wind Speed in miles per hour</i> | <i>Damage Class</i> | <i>Potential Damage</i> |
| F0 | 72 | Light | Damage to chimneys, TV antennas, and signs; breaks branches off trees; pushes over shallow-rooted trees; old trees that are hollow inside break or fall |
| F1 | 73-112 | Moderate | Peels shingles off roofs; windows broken; mobile homes moved or overturned; trees on soft ground uprooted; some trees snapped; moving autos pushed off the road |
| F2 | 113-157 | Considerable | Roofs torn off frame houses leaving strong upright walls standing; weak structure or outbuildings demolished; railroad boxcars pushed over; large trees snapped or uprooted; light object missiles generated; cars blown off highway; block structures and walls badly damaged |
| F3 | 158-206 | Severe | Roofs and some walls torn off well constructed frame houses; some rural buildings completely demolished or flattened; trains overturned; steel framed hanger-warehouse type- structures torn; cars lifted off ground and may roll some distance; most trees in a forest uprooted, snapped, or leveled; block structures often leveled |

| | | | |
|----|---------|-------------|--|
| F4 | 207-260 | Devastating | Well constructed frame houses leveled, leaving piles of debris; structures with weak foundation lifted, torn, and blown off some distance; trees debarked by small flying objects; sandy soil eroded and gravel blows in high winds; cars thrown some distance or rolled a considerable distance |
| F5 | 260-319 | Incredible | Strong frame houses lifted clear off foundation and carried considerable distance; steel reinforced concrete structures badly damaged; automobile-sized missiles fly a distance of 100 yards or more; trees debarked completely |

Source: National Weather Service 2002

The Enhanced Fujita Scale uses 8 levels of damage to 28 damage indicators (i.e., various land uses and building construction, heights of buildings, trees affected, etc.). The following scale gives a general summary description of the potential damage of each class tornado based on the damage levels and indicators.

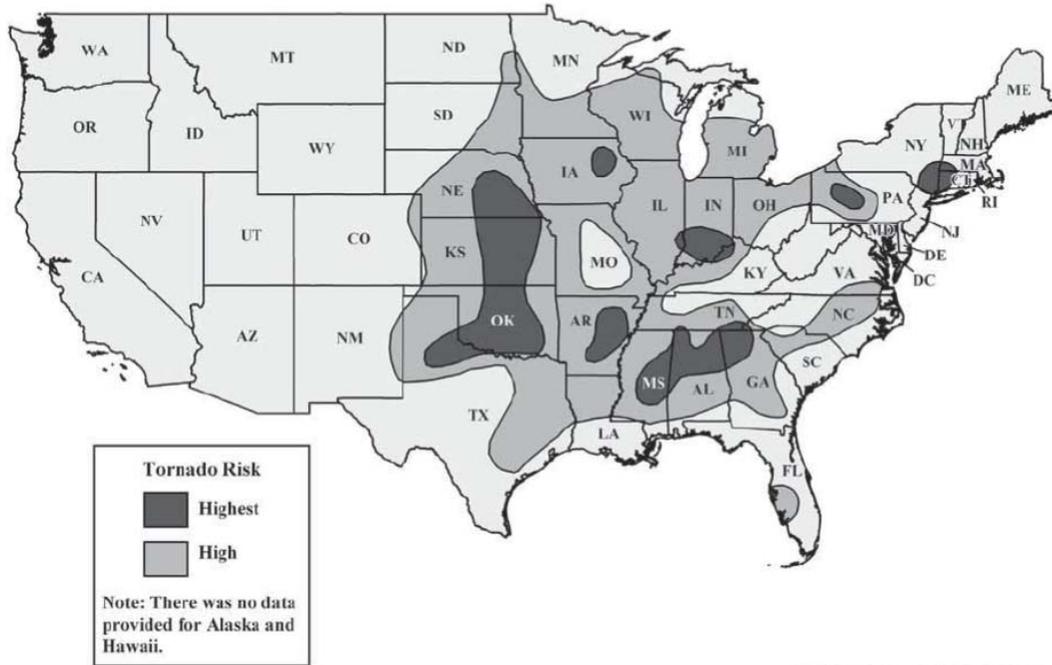
Table 3-3

| OPERATIONAL ENHANCED FUJITA TORNADO SCALE | | | |
|--|-------------------------------------|---------------------|---|
| <i>Class</i> | <i>Wind Speed in miles per hour</i> | <i>Damage Class</i> | <i>Potential Damage</i> |
| EF0 | 65-85 | Light | Damage to chimneys; broken tree branches; some shingles taken off roofs; shallow-rooted trees toppled |
| EF1 | 86-110 | Moderate | Peels shingles off roofs; windows broken; mobile homes pushed off foundations; chunks of asphalt ripped off driveways; broken windows; autos blown off the roads |
| EF2 | 111-135 | Considerable | Roofs torn off frame houses; demolished mobile homes; overturning of boxcars; uprooting of large trees |
| EF3 | 136-165 | Severe | Roofs and some walls torn off well constructed frame houses; uprooting trees; and lifting cars off the ground and throwing them |
| EF4 | 166-200 | Devastating | Well constructed frame houses leveled; cars can be thrown; large missiles generated |
| EF5 | 200+ | Incredible | Strong frame houses lifted clear off foundation and carried considerable distance; automobile-sized missiles fly a considerable distance; trees debarked; neighborhood unrecognizable |

Source: National Weather Service 2008

Figure 3-2 illustrates the risk of tornado occurrence in Westchester County as being classified as high, though other resources indicate a low-to-moderate risk. NYS Standard Multi-Hazard Mitigation Plan (NYS Department of Homeland Security and Emergency Services, 2011). The MHMP Committee considers the probability of tornadoes in the Village to be low or infrequent.

Figure 3-2
Tornado Risk Areas in the Continental United States



These data underscore the risk of a tornado in the area, though the intensity of tornadoes, based on available information, appears to be relatively low. The uncertainty of where and when a tornado may touch down makes hazard mitigation efforts quite difficult. Most tornado fatalities occur as a result of flying or falling debris. Homes, businesses, and other buildings and structures that are anchored and/or constructed to withstand severe winds from hurricanes may have a better chance of surviving a tornado. Nevertheless, it should be noted, that the wind dynamics and other related forces exerted by tornadoes are different from those of hurricanes, thereby making comparison of forces difficult.

A tornado could touchdown anywhere in the Village and could impact buildings by tearing roofs off, breaking windows, flinging debris, or destroying entire buildings. It could also damage or destroy automobiles, and aboveground utilities, tear down trees, and threaten lives.

3.2.2.5 Windstorms

Winds are of course very important and destructive components of storms. This is particularly true of winds associated with hurricanes, tornadoes, nor'easters, and tropical storms. There are four basic characteristics of winds that determine their potential to cause damage: 1) wind speed, 2) prevailing wind direction, 3) wind shifts, and 4) the wind's general behavioral characteristics (e.g., gusts and squalls, rotating movement as with tornadoes, etc.). Wind speed and direction are commonly understood and no further explanation is needed. Gusts and squalls are sudden increases in wind velocity that are distinguished by their duration and intensity. Squalls are considered to be those events which are stronger and longer lasting than gusts. Wind shifts differ from wind direction in that they involve a marked change in direction of at least 45 degrees and last no longer than fifteen minutes per shift. Wind shifts can be brought on by thunderstorms, breezes over the ocean or large bodies of water such as the Hudson River, the passing of a front or from winds that blow down significant slopes (katabatic winds).

Wind can exert a variety of forces on structures and natural features depending on the wind's angle of approach and height above ground, and the structural character or design of the physical feature (e.g., curved surfaces, pitched surfaces, etc.). Wind forces may include: uplift (vertical), suctional (pressure-differential), and torsional (twisting) forces (Pilkey *et al.* 1998). The amount of force striking a surface during a storm can be substantial. A 50 mile per hour (mph) wind striking a flat surface exerts a pressure of 10 pounds per square foot (psf). For each doubling of wind speed there is a corresponding four-fold increase in pressure. Therefore, a 100 mph wind exerts a pressure of 40 psf. If a side of a building has the dimensions of 16 feet by 40 feet (640 square feet), the total pressure on the side of the building is 25,600 pounds (13 tons) of force (Pilkey *et al.* 1998). From this calculation, it becomes apparent that proper building design, materials, and construction play a critical role in protecting human life and preventing or mitigating property damage in the face of excessively strong winds.

Fetch is an important concept relating to the generation and intensity of winds. It is defined as the area over which a wind of a fairly consistent speed and duration blows over an unobstructed surface of a waterbody to create waves or wind setup. Long fetches and strong unrelenting (long duration) winds create high seas that contribute to storm surges. The open waters of the Hudson River are expected to contribute to this phenomenon, and in general, winds would be expected to be strongest near the open waters of the Hudson when winds are blowing from west to east.

Wind force is classified using the Beaufort Force (Beaufort Number) and is categorized into various groupings collectively referred to as the “Beaufort Wind Scale”. The wind scale is based on wind velocity and provides a verbal descriptor expressing the general nature and the visible effects of the wind. The Beaufort Wind Scale is provided below:

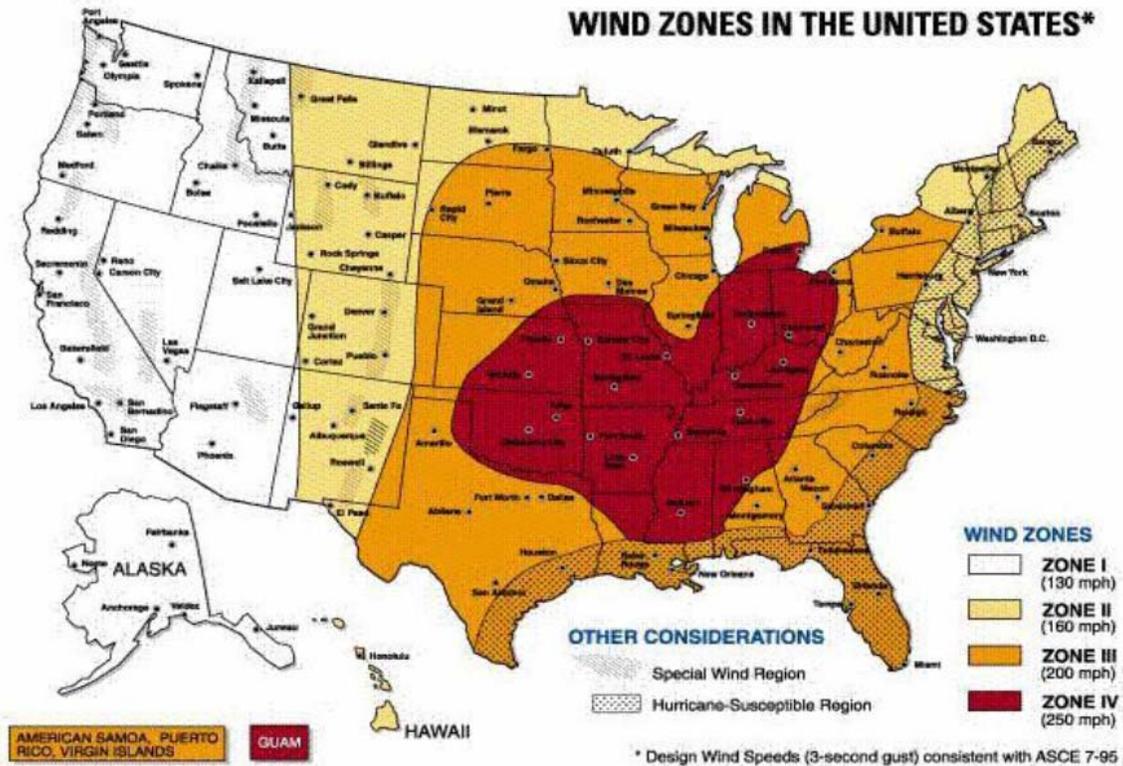
Table 3-4

| BEAUFORT WIND SCALE | | | | |
|----------------------------|----------------------|--------------|------------------------|--|
| Beaufort Number | Wind Velocity | | Wind Descriptor | Effects Observed |
| | MPH | Knots | | |
| Force 0 | <1 | <1 | Calm | Smoke rises vertically |
| Force 1 | 1-3 | 1-3 | Light Air | Wind moves smoke but not wind vanes |
| Force 2 | 4-7 | 4-6 | Light Breeze | Wind felt on face; leaves rustle; wind vane moves |
| Force 3 | 8-12 | 7-10 | Gentle Breeze | Leaves and small twigs in constant motion; wind extends light flag |
| Force 4 | 13-18 | 11-16 | Moderate Breeze | Dust and loose paper raised; small branches moved |
| Force 5 | 19-24 | 17-21 | Fresh Breeze | Small trees with leaves begin to sway |
| Force 6 | 25-31 | 22-27 | Strong Breeze | Large branches in motion; telephone wires whistle |
| Force 7 | 32-38 | 28-33 | Near Gale | Whole trees in motion; resistance felt walking against wind |
| Force 8 | 39-46 | 34-40 | Gale | Twigs broken off trees; wind generally impedes progress when walking |
| Force 9 | 47-54 | 41-47 | Strong Gale | Slight structural damage occurs (chimney pots and slate removed) |
| Force 10 | 55-63 | 48-55 | Storm | Trees uprooted |
| Force 11 | 64-73 | 56-63 | Violent Storm | Storm rarely experienced inland; accompanied by significant damage |

| BEAUFORT WIND SCALE | | | | |
|---------------------|---------------|-------|-----------------|--|
| Beaufort Number | Wind Velocity | | Wind Descriptor | Effects Observed |
| | MPH | Knots | | |
| Force 12 | 74+ | 64+ | Hurricane | (See: Saffir-Simpson Hurricane Scale for the description of the five categories of hurricanes) |

Figure 3-3 provided by the NYS Division of Homeland Security and Emergency Services (2011) shows wind zones in the United States developed by the Army Corps of engineers based on 40 years of tornado data and 100 years of hurricane data. Westchester County falls within Zone II/Hurricane Susceptible Region (160 mph).

Figure 3-3



The level of risk from winds is associated with the risk of hurricanes, tornadoes, nor'easters, and tropical storms.

3.2.2.6 Thunder Storms

Thunder storms are relatively short-term weather events which are, or may be, characterized by thunder, lightning, rain, gusty and turbulent winds, including moderate to intense up- and down-drafts, hail, icy conditions, and occasionally, tornadoes. Flash floods and a temporary loss of electricity to homes and businesses may also be associated with these weather events and lightning strikes have been known to damage buildings, split trees, start fires, and injure or kill people. Thunderstorms and loss of power is considered by the MHMP Committee as being a relatively common occurrence in the Village of Sleepy Hollow. Evidence for the relatively high occurrence of thunder storms in Westchester County is provided by the SHELDUSTM weather database which lists a total of 102 “severe thunderstorms”, “thunderstorms” or “lightning” storms resulting in either a death, injury or documented damages between 1960 and 2009. Thunder storms are particularly common in southern New York during the hot and humid summer months and, while they tend to be less severe than hurricanes and tornadoes, they do cause death, injury, and property damage. The effects of thunderstorms would be expected to be distributed throughout the Village with the greatest potential for flooding occurring within the 100-year flood zone as shown on the flood zone maps.

3.2.2.7 Hail & Ice Storms

Hail can be defined as precipitation in the form of spherical or irregular-shaped pellets of ice larger than 5 millimeters (0.2 inches) in diameter. Hail storms are sometimes associated with severe thunder storms which are common in Westchester County; however, the frequency of hailstorms in the area is relatively low compared to other regions of the country, averaging two-to-three storms per year. Between 1960 and 2009, a total of 15 thunder storms and one rain storm that included hail and involved either a death, injury or documented damages meeting the SHELDUS weather database definitions, occurred in Westchester County. Based on an assessment by the MHMP Committee, hail storms have a moderate chance of occurring in the Village.

Hail stones can vary significantly in size and may range between objects that are smaller than a pea to objects that are as large as softballs. Large hail stones can cause significant damage to buildings, roofs, windows, automobiles, crops and landscaping, but rarely result in loss of life. Nevertheless, a hailstorm that occurred in India in 1988 killed 246 people and 1,600 domesticated animals.

Table 3-5

| HAIL SIZE CLASSIFICATION | |
|---------------------------------|--------------------------|
| Description | Diameter (inches) |
| Pea | 0.25 |
| Marble or Mothball | 0.50 |
| Penny or Dime | 0.75 |
| Nickel | 0.88 |
| Quarter | 1.00 |
| Half Dollar | 1.25 |
| Walnut or Ping Pong Ball | 1.50 |
| Golf ball | 1.75 |
| Hen's Egg | 2.00 |
| Tennis Ball | 2.50 |
| Baseball | 2.75 |
| Tea Cup | 3.00 |
| Grapefruit | 4.00 |
| Softball | 4.50 |

Source: NYS Division of Homeland Security, 2011

Hail and ice storms occurring in Sleepy Hollow can result in slippery road conditions that can cause motor vehicle accidents, endanger pedestrians, property damage, downed power lines and power outages, roof collapses under excessive conditions, personal injury, and development of potholes. Risks from hail stones would occur throughout the Village and would not be focused in any one area; however, patient transport to hospitals and emergency response are of concern if road conditions become dangerous. The accumulation of hail on steeply sloped and narrow winding streets in parts of Sleepy Hollow could exacerbate traffic safety conditions as well.

The best way to prevent the adverse impacts of hail storms is through public education (e.g., parking automobiles in garages), the broadcast of early warnings to take shelter, and proper building construction.

3.2.2.8 Floods, Flash Floods, Stormwater, & Sea Level Rise

Flash floods are of particular concern in terms of floodplain management and hazard mitigation. Flash floods are intense, high velocity, flood events, the severity of which can be quite destructive. Flash floods tend to crest and subside rather quickly, as shown graphically by storm hydrographs, thereby delivering a large quantity of water to streams, stormwater control devices, and discharge points within a short period of time. Once flooding has subsided, however, flatter low-lying areas can remain flooded for days or even weeks. Flash floods may develop as a result of sudden and fierce precipitation events, heavy rains in combination with snow melt, saturated soils and rising groundwater, failure of a water body impoundment such as a dam or man-made water conveyance such as an aqueduct, or the sudden removal of an obstruction, such as a mass of trees, other accumulated debris, and/or ice in a stream channel or lake outlet. These events are of particular concern as they occur with little to moderate warning, thereby potentially catching people off-guard.

The potential impacts of flash flooding/flooding can include those associated with the inundation of property, buildings, and basements by floodwaters; the hydrodynamic force of flowing water on structures and environmental features; the slamming of floating objects into buildings and structures; contamination of drinking water supplies; damage to utilities; dam failures; the washing out of roadways and bridges; and drownings. The urbanization of rural and suburban areas can increase the potential for flash flooding as impervious surfaces such as roads, parking lots, sidewalks and buildings restrict direct groundwater recharge. This is especially problematic when suitable stormwater controls are not in place to accommodate an increased level of runoff associated with the greater proportion of impervious surfaces from streets, sidewalks, parking lots, and buildings in densely developed areas such as the Village's business districts.

Flooding, whether it is the result of a flash flood or a prolonged period of light or moderate rainfall, is often classified based on the particular time interval in which a certain magnitude or stage of flooding is anticipated using historic storm records (e.g., 1-

year rainfall, 10-year rainfall, etc.) or may be categorized based on the amount of rainfall per storm as is often the case when designing stormwater infrastructure (e.g., two-inch storm, five-inch storm, etc.). Flood recurrence intervals can be broken down into any desired period. However, the most commonly used description is the 100-year floodplain established by the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Maps (FIRMs). The 100-year flood concept is based on the elevation and land area predicted to be inundated as a result of the largest storm expected to occur during a 100-year period based on historical weather records, topography, and similar factors. A 100-year storm is formally defined as a storm having a one percent chance of occurring in any given year. There is no guarantee that such a storm will not occur with greater or lesser frequency.

Considerations for review when predicting the frequency and intensity of floods and the flood storage needed to adequately contain floodwaters include: rainfall intensity and duration records, flood frequency/recurrence intervals; watershed area; stream gauging (flood discharge data); lake, floodplain and river channel storage capacity (above base flow); topography, and the type of ground cover or surface roughness.

Inland areas adjacent to freshwater streams, ponds, and wetlands, or in locations that do not have adequate stormwater infrastructure may also be subject to periodic flooding. The Village has several freshwater systems that individually or collectively could pose threats to people and property during a severe flood event. These water bodies include the Hudson River, Pocantico Lake, Pocantico River, Gorey Brook, Andres Brook, other small tributaries and drainage ways, and Fremont Pond.

The Hudson River, a massive tidally influenced river along the western boundary of the Village, has the potential to cause significant flooding and flood damage within its floodplain. Periodic flooding also occurs at the confluence of the Pocantico and Hudson Rivers and is worsened when storms coincide with high tides. Land immediately adjacent to Fremont Pond is also of concern. Fortunately, steep topography along the rivers and Fremont Pond and land preservation efforts by the State, County, and Village

have preserved floodplain storage and functionality and helped to lessen the impacts of flooding in the Village, not to mention protecting the environmental integrity of the area.

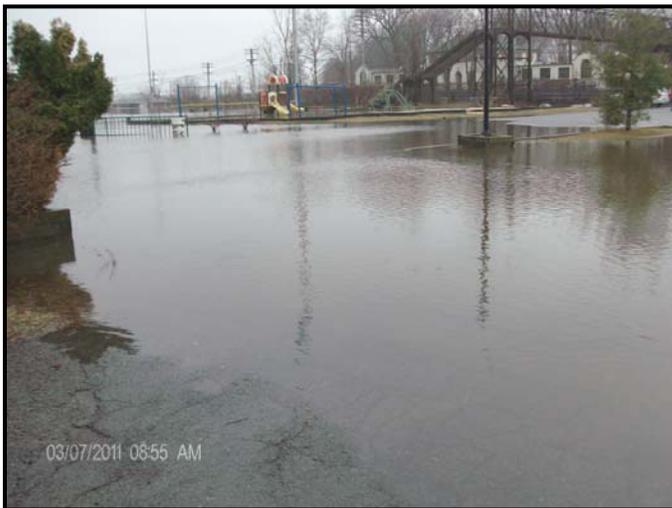
Areas, facilities, and streets at particular risk from flooding in the Village include those located within designated FEMA 100-year flood zones as shown in Figure 3-4 or locations where drainage is poor or groundwater is unusually high. The following specific areas are at risk for flooding:

- Devries Park, supply building;
- Devries Park, erosion of the banks of the Pocantico from heavy flows;
- The bridge at Devries Park;
- Land near the confluence of the Pocantico and Hudson Rivers;
- Land immediately adjacent to Fremont Pond;
- Horans Landing Park, along the Hudson (the Village is currently considering temporary flood barriers here and along the Riverwalk);
- Ichabod's Landing;
- Sleepy Hollow Manor, flooding of basements from stormwater and high groundwater after precipitation events;
- Parts of the former GM property;
- Weber Park area at Dell Street (erosion);
- The bulkhead between the Sleepy Hollow Cemetery and the Pocantico River near Dell Street;
- River bank wall at Kingsland Point County Park (damage from Irene);
- Broadway (Route 9);
- New Broadway;
- Beekman Avenue, near the bridge;
- River Street, including the potential for flooding of the Village DPW property during extreme flood events;¹
- The lower section of Valley Street;

¹ The Village is currently considering temporary flood barriers at Horan's and along the Riverwalk in conjunction with replacing the bulkhead due to flooding in that area during storms. These barriers would also help to protect the DPW property.

- Philipse Manor Beach Club which is at low elevation and juts into the Hudson;
- Areas near Village storm drains that are of insufficient capacity or need maintenance; and
- Underground utilities.

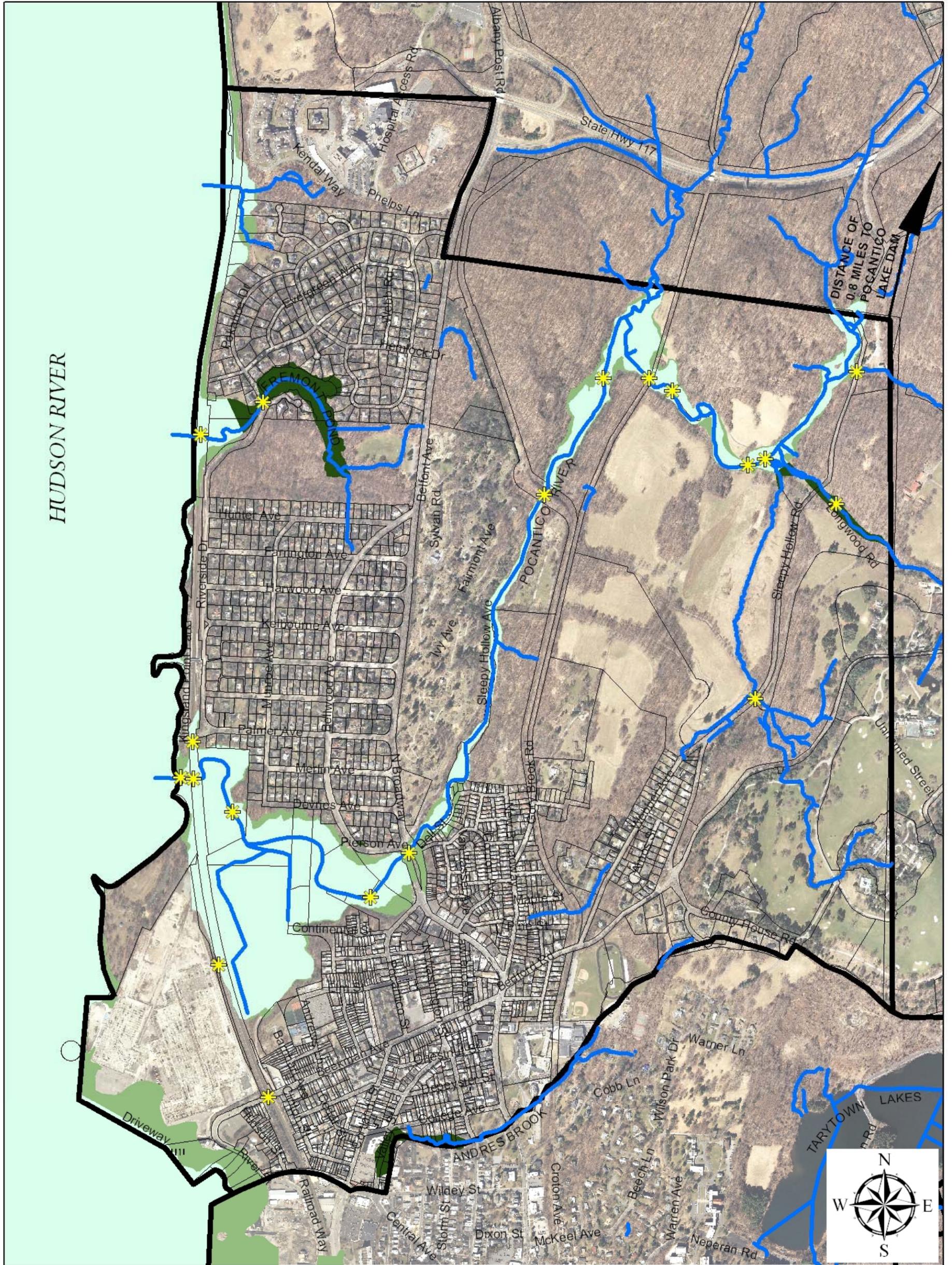
In recent years, flooding also affected the lower level of the Village Police Station, where the phone system, records and evidence are stored. The station is located far outside of any designated flood zones but was still impacted by flooding.



Flooding at Devries Park March 2011



Flooding at Devries Park March 2011



Westchester County
New York

Geographic Information Systems

Cashin Associates, P.C.

Legend

- BRIDGES, CULVERTS AND DAMS
- STREAMS
- VILLAGE OF SLEEPY HOLLOW BOUNDARY
- FEMA ZONE**
- A (100 YEAR FLOOD ZONE)
- AE (100 YEAR FLOOD ZONE W/ BASE FLOOD ELEVATIONS)
- 500 YEAR FLOOD ZONE (0.2 PCT ANNUAL CHANCE FLOOD HAZARD)

0 500 1,000 1,500 2,000 Feet

**FIGURE 3-4
VILLAGE OF
SLEEPY HOLLOW
MULTI-HAZARD
MITIGATION PLAN
FLOOD ZONES
AND WATER FEATURES**

If sea level continues to rise over the next century as predicted by many scientists, the flooding in low-lying areas, particularly, the southwest section of the Village, including former wetlands and areas that were filled along the Hudson (e.g., GM property) could experience more frequent and more intense flooding.

According to the SHELDUS weather database, there were 36 storm events in Westchester County between 1960 and 2009 that involved flooding and resulted in either a fatality, injury or documented property damages as defined by SHELDUS. Moreover, there were five documented Presidential flood disaster declarations in the County between 1960 and 2009 (SHELDUS, 2009) and Westchester County has been classified as the fourth most vulnerable to flood loss out of all of New York's counties (NYS Division of Homeland Security and Emergency Services, 2011). The MHMP Committee ranked the risk of flooding in the Village as "high".

Climatic Factors Contributing to Flooding

There are several long-term climatic or weather phenomena which are either known or hypothesized to affect the occurrence, frequency, and/or general characteristics of storm behavior and the rising of average eustatic sea level which can affect the tidally influenced lower Hudson River. As a result, these events may have an influence over the frequency and severity of storms and the damage they cause.

El Niño

El Niño is an oceanic-atmospheric weather system that develops in the tropical Pacific off the coast of South America which can have a significant effect on global weather patterns. Specifically, the event causes warm equatorial waters to flow southward along the Peruvian and Ecuadorian coastline during February and March of certain years. It is caused by pole-ward motions of air and unusual water temperature patterns in the Pacific Ocean, which cause coastal downwelling, leading to a reversal in the normally cold, northerly-flowing coastal currents. During many *El Niño* storms, rainfall, and other

meteorological phenomena in the western hemisphere are measurably different than during times of non-*El Niño* or *La Niña*. The weather patterns that occur can affect the occurrence of storms and flooding.

Global Warming and Sea Level Rise

The release of chlorofluorocarbons (CFCs), methane (CH₄), carbon dioxide (CO₂), hydrofluorocarbons (HFCs), and sulfur hexafluoride (SF₆) to the atmosphere is believed by many scientists to be responsible for causing a small average increase in global temperatures. This increase in temperature is purported to occur when these anthropogenic emissions mix with naturally occurring CO₂, CH₄, nitrous oxide (N₂O), ozone (O₃), and water vapor, which impedes some of the solar energy that penetrates the earth's atmosphere from being reflected back into space. This retained energy is believed to be responsible for a small increase in average world temperature, which in turn is thought to be increasing the rate at which the earth's polar ice caps are melting and causing a thermal expansion of the ocean. These two factors, together, are believed to be associated with rising eustatic sea levels throughout much of the world. Although rising sea levels have been difficult to estimate, it is generally agreed that the rate of rise is fairly slow.

Some scientists have argued that global warming is borne from a combination of both the greenhouse effect and a normal trend, fluctuation, or adjustment in natural climatic conditions. However, some are not convinced that the emission of greenhouse gasses affects global temperatures whatsoever. Despite the disagreement over the possible causes of global warming and sea level rise, scientific studies have confirmed that sea level is indeed rising in most parts of the world, including the east coast of the United States. This rise in sea level may affect tidally-influenced sections of rivers such as that of the Hudson River which could increasingly exacerbate flooding near the river if sea levels continue to rise.

Those who support the theory of global warming also claim that it may alter global precipitation patterns and result in unusual and erratic weather patterns such as severe storms, droughts, and floods. The rise in sea level is of particular concern since a small rise can translate to considerable shoreline retreat if adjacent areas have low elevation and are not properly safeguarded. In addition to the potential risks to human life from sea level change and the ocean's transgression into currently dry, developed areas, the economic costs of the combined effects of encroaching seas compounded by major storm events could be significant.

3.2.2.9 Severe Winter Storms (Blizzards)

Blizzards are severe snow storms characterized by high winds (exceeding 35 mph), low temperatures, and low visibility due to heavy snowfall and blowing snow which diminishes visibility to a distance of one quarter mile or less for a period of at least three hours. A storm with temperatures at or below 10° Fahrenheit, winds exceeding 45 mph, and visibility reduced to near zero (white-out condition) is considered a severe blizzard. Severe blizzards such as the "Blizzard of 1978" can also cause extensive coastal erosion, and power outages as heavy, snow-laden, wind-blown trees fall across electrical wires. Deep, wet, and drifting snow can be very heavy and can subject old, poorly constructed, and/or structurally compromised buildings to considerable stress which may result in roof collapses. Individuals may also become snowed-in to their homes during heavy snow storms until walkways, driveways, and streets are cleared. This may take several days under the most extreme circumstances and persons who are unhealthy, injured, elderly, or simply in need of food, heat, electricity, medical attention, medication, or other emergency supplies and services may find themselves in dangerous predicaments. These dangers may be even more severe if electricity and telephone communications are severed.

Other hazards related to blizzards may include: frost-bite, hypothermia, high wind-chills, and dampness; potential carbon monoxide poisoning from the back-up of exhaust from snow-blocked chimneys and automobile tail pipes; burial of fire hydrants; automobile accidents on slippery roads, especially in steeply sloped and winding roads as are

common in parts of the Village; being trapped in a stuck vehicle over night; slips and falls on ice, particularly by the elderly who may be more susceptible to injury; and heart attacks from over exertion from snow shoveling, pushing stuck vehicles, or walking long distances in deep snow.

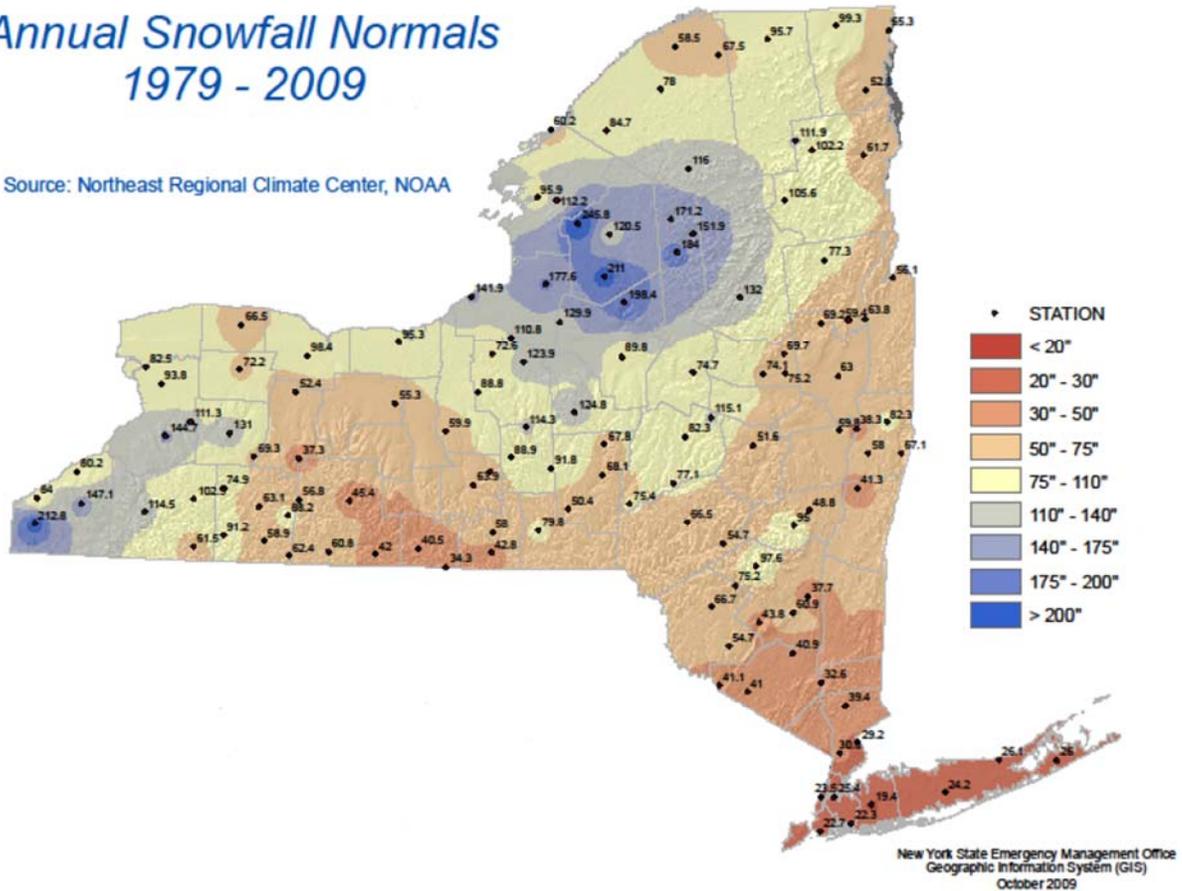
The effects of blizzards and other snow storms would affect the entire Village although area streets and possible increased drifting in open areas such as along the Hudson may have slightly greater impacts where development exists depending on a number of factors.

Figure 3-5 is a map of annual snowfall in New York State. The map indicates that annual snowfall in Westchester County ranging between 30 and 50 inches per year. According to the SHELDUS damages from recorded storm events database for Westchester County, there were a total of three blizzards, 16 heavy snow storms, and 69 other storms that included snow and resulted in either a death, injury and/or recorded property damage as defined by SHELDUS between 1960 and 2009. Two Presidential Emergency Declarations were issued for Westchester County for snow storms between 1960 and August of 2009 (1993 and 2003). The State ranks Westchester County as having a low to moderate vulnerability to snow storms and blizzards and moderate to high vulnerability when compared to other counties in the State (NYS Division of Homeland Security, 2011). The MHMP Committee rated blizzards as having a medium probability of occurrence within the Village.

Figure 3-5

Annual Snowfall Normals 1979 - 2009

Source: Northeast Regional Climate Center, NOAA



3.2.2.10 Droughts & Heat Waves

Drought can occur almost anywhere, although the designation of drought conditions depends on a reduction in a particular region’s typical rainfall. Generally, a drought can be defined as a deficiency of precipitation over an extended period of time, resulting in water shortages. Droughts can affect drinking water supplies, cause restrictions on irrigation, thereby causing landscaping and crops to die, soil erosion, loss of aquatic life in small shallow ponds, a temporary reduction in the quality of life for residents if water rationing is required, and an increase forest fire danger with accompanying insufficient water supplies to fight fires (see also sections on “Wildfires” and “Building Fires and Explosions”).

KyKuit (the Rockefeller Estate) is shown as “agricultural” on the County’s land use map. This is mainly due to the gardens and fine landscaping on the property. Since Sleepy Hollow is not considered a major agricultural community, economic impacts to agricultural resources from drought is not a significant concern. Drought could, however, affect the Village’s water supply. The Village is currently proposing to construct a reserve 1.4 million gallon water storage tank to provide an additional backup supply of water. The additional 1.4 million gallons would increase the Village’s current potable drinking water storage supply of 800,000 gallons to a total of 2.2 million gallons. Phelps Hospital has one water storage tank for fire sprinklers with a capacity of 250,000 gallons, as well as a currently empty wooden 100,000 gallon storage tank for potable water. Use of the potable water tank by the hospital in the event of a water shortage or other water emergency could help to lower overall water demand in the Village.

The SHELDUS “Damages from Recorded Hazards Events” database indicates just one drought in the County between 1960 and 2009 where damages (crop loss) occurred. However, a drought that occurred in Westchester County from November 2001 through January 2002 affected the combined storage in the New York City reservoir system by reducing its volume from 71 percent to 41 percent. A second drought that occurred between April and October of 2002 also caused water storage facilities to fall below normal levels. The dollar amount of the damages from these droughts is unknown (NYS Department of Homeland Security, 2011). A reduction in the availability of potable water in Sleepy Hollow requires the Village to purchase water from other sources. The purchase of water from other sources is considered to be very expensive.

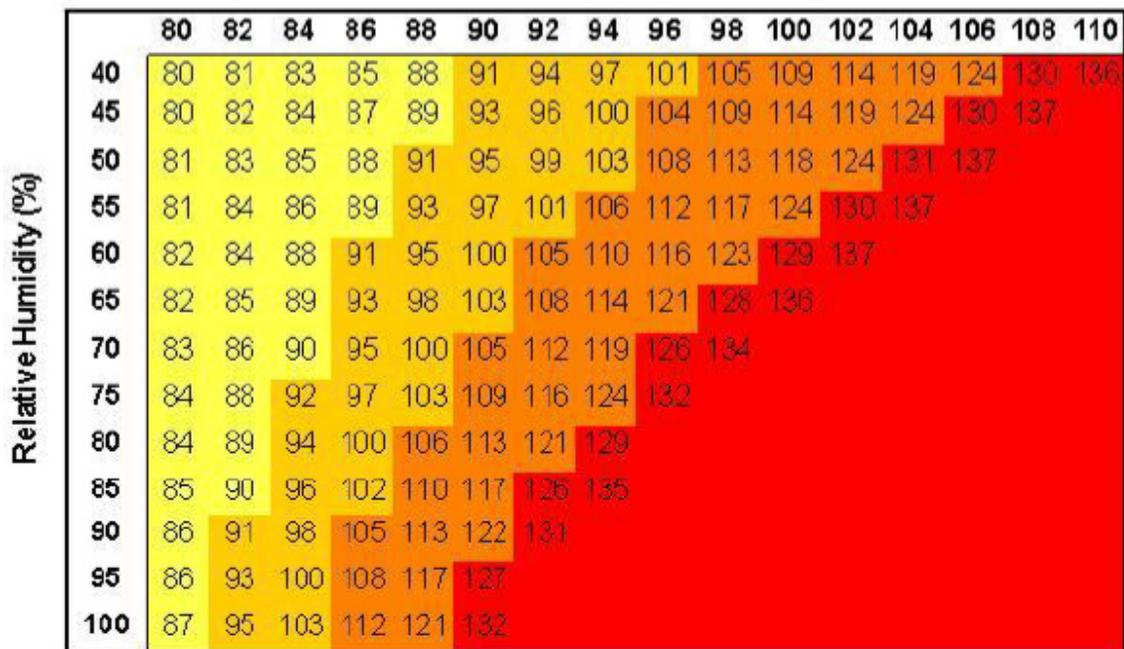
Extreme heat can be defined as temperatures that hover 10 degrees or more above the average high temperature for the region and lasts for several weeks. These conditions are sometimes accompanied by drought or humid/muggy conditions. Extreme heat and humidity can affect the health of humans and their pets.

Between 1994 and 2006, there were 86 fatalities from extreme heat in the State of New York. Seventy-nine of these deaths occurred over 7 years (NYS Department of

Homeland Security, 2011). According to the SHELDUS “Damages from Recorded Hazards”, there were two extreme heat events in Westchester County between 1960 and 2009 that resulted in deaths. Conversely, according to SHELDUS, there were four events involving severe or bitter cold conditions in the region that resulted in a death, physical injury and/or property damage as defined by SHELDUS. The Village of Sleepy Hollow has experienced several episodes of high heat in recent years (1999, 2001, 2002, and 2006) that have caused blackouts (loss of power) or brownouts (reduction in power). The Village has budgeted for the purchase of a generator for the Senior Center so that it can be used as a cooling center even when the power goes out. It is expected that the generator will be installed during the summer of 2013.

Exposure to high temperatures for prolonged periods can result in a variety of physical symptoms in humans, including fatigue, dehydration, sunburn, heatstroke, muscle cramps, and heat exhaustion and can result in death. Infants and children, the sick and disabled, and senior citizens are the most vulnerable to the effects of extreme heat. Figure 3-6 is a heat index provided by the NYS Division of Homeland Security (2011). The index identifies zones of dangerous conditions based on temperature and relative humidity.

**Figure 3-6
HEAT INDEX
Temperature (°F)**



Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

- Caution
- Extreme Caution
- Danger
- Extreme Danger

Droughts and heat waves would generally affect the entire Village rather than any particular location, though cool breezes may be slightly more likely along the open waters of the Hudson River when west winds are blowing. Vulnerable individuals without functioning air conditioning would be of particular risk. The MHMP Committee estimated a “medium” level probability of drought or heat wave in the Village.

3.2.2.11 Wildfires

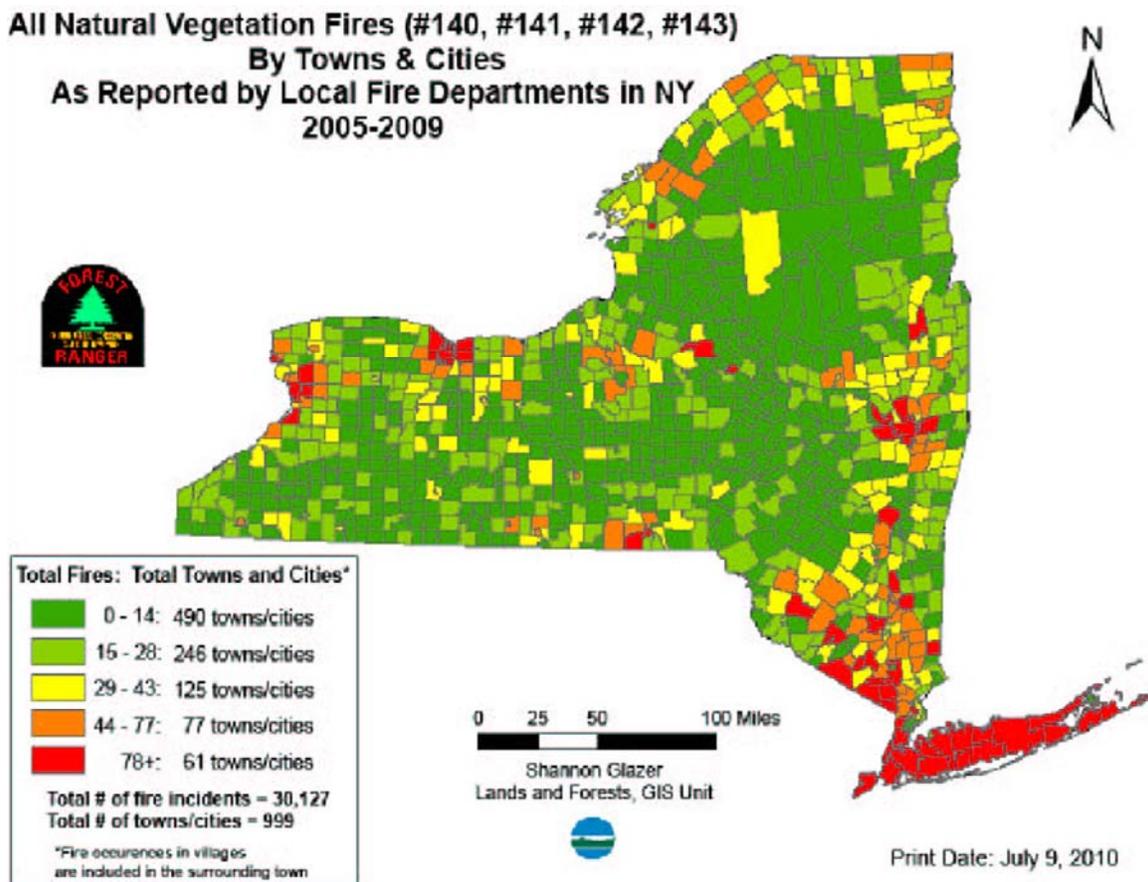
Wildfires/brush fires/forest fires caused by humans or natural causes are a concern in areas with large tracts of dry undeveloped woodlands. In the Village of Sleepy Hollow, woodlands exist primarily in the eastern half of the Village; while the western half is largely cleared and developed. The primary factors affecting the spread of wildfires is weather, topography, which affects wind patterns and temperature depending on whether the slope is facing the sun or not, and the availability of fuel to feed the fire. Hot, dry, windy weather, the accumulation of dry leaf and pine needle litter on the forest floor, and spontaneous combustion or a spark either from a lightning strike or more likely, a careless or deliberate action (e.g., deliberate burning, campfires, children playing with matches, smoking, arson, etc.) or railroad activity and equipment operation can result in a potentially major forest fire. According to the NYS Division of Homeland Security (2011), an estimated 96 percent of forest fires are caused by humans.

There are limited areas of open woodlands in the Village as compared to some other parts of the state. The Village of Sleepy Hollow/Town of Mount Pleasant area is shown to have a moderate to high level of wildfire occurrence when compared to other communities, though the MHMP Committee rates the probability of wildfires as low and there is only one “brush, field and forest fire” listed for the County in the SHELDUS database that caused any significant property damage. Areas within the Village where wildfires could conceivably start include the Rockefeller Estate, Rockefeller State Park Preserve, other Village and County parklands, undeveloped and sparsely developed areas on the east side of Sleepy Hollow, and the narrow wooded areas immediately adjacent to

the Metro North railroad tracks, especially during times of dry and windy weather when forest fire risk is high.

Figure 3-7 provided by NYS Division of Homeland Security (2011) shows natural vegetation fire occurrences in the State of New York between the years 2005 and 2009 as reported by local fire departments.

Figure 3-7



3.2.2 Geologic Hazards

3.2.2.1 Earthquakes

An earthquake can be defined as the sudden release of energy from prolonged accumulation of stress along a fault line within the earth's crust. This release of energy

causes the surface of the earth to tremble and shake and may cause damage to buildings, foundations, roads, bridges, dams, and utilities, particularly objects and structures that are constructed of brittle or inflexible materials or that do not absorb vibration well.

Earthquakes can be of particular concern since they occur with very little if any warning, except for aftershocks which may be expected after an initial earthquake. This lack of warning coupled with the general complacency and ill-preparedness of those living on the east coast who have not experienced a major earthquake in their lifetime, intensifies the potential dangers.

Damage associated with earthquakes depends primarily on where the effects of the quake are focused. The amount of damage is also contingent upon the magnitude of the earthquake, the location of the earthquake's epicenter, soil and geologic characteristics, density of development in the earthquake zone, type of building construction, and other factors. Earthquakes that impact heavily populated areas are of course of greatest concern since there is a larger concentration of development and human habitation and activity. The concentration of human activity and buildings increases the likelihood of significant loss of life and property damage. Damage that may result from earthquakes include: destruction of buildings, broken chimneys and windows, cracked foundations, ruptured water and sewer mains, and damaged drinking water towers, gas lines, fuel storage tanks, telecommunications infrastructure, electric utilities, streets, dams, and bridges. Fires, tsunamis, seiches, landslides, and soil liquefaction are sometimes also associated with earthquakes and may cause devastating effects in and of themselves but no instances of these events happening from earthquakes in the area were found during the data and literature search for this project.

A seiche may be defined as the oscillation of the surface of a waterbody or a standing wave formed as the result of two progressive waves moving in opposite directions within an enclosed or semi-enclosed system such as a lake, bay, harbor, or estuary. The Hudson River might conceivably be subjected to this phenomenon. Seiches are most often sparked by seismic events which suddenly jolt the bed of a waterbody causing a

disturbance to the overlying water. Tides are a type of seiche which is induced by the gravitational forces of the sun and moon on the earth. No information was found that would suggest that a geologically-induced seiche has ever occurred in the area.

Liquefaction is a phenomenon that can occur when saturated soils having particular soil properties are subjected to intense shaking from seismic activity. Under certain conditions, the pore water pressure within the soil may suddenly and dramatically increase causing individual grains to move relative to one another thus lowering the frictional resistance between the grains, and potentially reducing the soil’s bearing strength. Liquefaction causes soil to behave much like a liquid which allows it to flow. This flow may damage buildings, roads, bridges, fences, gas lines, and water and sewer mains. Liquefaction can also strain retaining walls and bulkheads which may be serving to stabilize soils, control erosion, and protect property near riverbanks. There is no information about this phenomenon occurring in the area.

Earthquakes are categorized into two primary classification schemes based on earthquake intensity (“Modified Mercalli Intensity Scale”) and earthquake magnitude (“Richter Scale”). The level of earthquake intensity is classified according to the observed effects the earthquake has on people, buildings, and natural features. As a result, the intensity of seismic activity will vary from place to place within the affected region, depending on the location of the observer with respect to the earthquake epicenter. The criteria and classifications for the Modified Mercalli Intensity Scale are provided below in Table 3-5.

Table 3-6

| MODIFIED MERCALLI EARTHQUAKE INTENSITY SCALE OBSERVABLE RESULTS AND EFFECTS | | | |
|--|---|--------------------------|-------------------------|
| Level | Acceleration (%g) (Peak Ground Acceleration) | Perceived Shaking | Potential Damage |
| I. | <.17 | Not Felt | None |
| II. | .17 – 1.4 | Weak | None |
| III. | .17 - 1.4 | Weak | None |
| IV. | .14 – 3.9 | Light | None |
| V. | 3.9 – 9.2 | Moderate | Very Light |

| MODIFIED MERCALLI EARTHQUAKE INTENSITY SCALE OBSERVABLE RESULTS AND EFFECTS | | | |
|--|---|--------------------------|-------------------------|
| Level | Acceleration (%g) (Peak Ground Acceleration) | Perceived Shaking | Potential Damage |
| VI. | 9.2 - 18 | Strong | Light |
| VII. | 18 - 34 | Very Strong | Moderate |
| VIII. | 34 - 65 | Severe | Moderate to Heavy |
| IX. | 65 - 124 | Violent | Heavy |
| X | > 124 | Extreme | Very Heavy |
| XI. | > 124 | Extreme | Very Heavy |
| XII. | > 124 | Extreme | Very Heavy |

Source: NYS Division of Homeland Security and Emergency Management, 2011.

Earthquake magnitude is a measure of the amount of seismic energy released at an earthquake’s focus. It is based on the amplitude of the earthquake’s waves recorded by a calibrated seismograph and then mathematically corrected according to the distance of the seismograph from the earthquake epicenter. The Richter Scale is a logarithmic classification scheme which ranges in magnitude from 0 to 9. The higher the value: the more powerful the earthquake. The fact that the scale is logarithmic means that each increase in value (e.g., from 4 to 5) translates to a tenfold increase in the amplitude of the earthquake’s seismic waves and a 31-fold increase in the amount of energy released. An earthquake registering a 7 or more on the Richter Scale is considered a “great” earthquake which can have devastating effects in heavily developed and populated areas.

Although earthquakes are relatively uncommon or infrequent in the southern New York region, and very large or “great” earthquakes have not been documented here in recorded history, earthquakes do occur and the possibility for one that is felt to strike the region in the future is not beyond the realm of possibility. According to the National Geophysical Data Center (NGDC), New York State, itself, has had eight significant earthquakes between 1823 and 2002, though many small earthquakes have occurred. A 3.4 magnitude earthquake reportedly struck Tarrytown in 1874 but there was no damage reported (NYS Division of Homeland Security, 2011). According to Wheeler *et al.* (2001), an earthquake with a magnitude of 5.2 struck New York City in December of 1737. The earthquake caused bells to ring, several chimneys to fall, and was felt in

Boston, Philadelphia and northern Delaware. An earthquake registering a 5.2 on the Richter Scale occurred just south of the southwest coast of Nassau County, Long Island in August of 1884. This event caused chimneys to fall in New York City and plaster walls to crack in Connecticut, northern New Jersey, southern New York, and eastern Pennsylvania. The earthquake was felt from southern Maine to Central Virginia and western Ohio. Three strong aftershocks also occurred from this earthquake, with the second being the largest of the three (Wheeler, *et al.* 2001). More recently, in August of 2011, southern New York including New York City and Long Island felt the effects of a magnitude 5.8 earthquake which had its epicenter in Mineral, Virginia. The earthquake had no significant impact on the area, but this event and the others discussed above provide testament that the region is not immune from the effects of such events.

An earthquake affecting the Village of Sleepy Hollow could affect all areas of the community by causing damage to water and sewer mains; electric, cable, telecommunications, and gas utilities; public streets and highways; the Metro North Railroad; and area dams, bridges, and buildings. Buildings that tend to be vulnerable to the effects of earthquakes include: old unreinforced wood-frame buildings, unreinforced masonry, adobe, non-ductile concrete frame structures, and tilt-up concrete buildings. Nonstructural features such as chimneys, parapets, brick veneer, and cladding can also be susceptible to damage and collapse. Fires are possible as a result of earthquakes and injuries or deaths can occur in extreme circumstances if buildings or other features collapse. Aftershocks are commonly associated with earthquakes. Aftershocks, although usually of lesser magnitude, can have adverse effects as well, and can disrupt the post-earthquake recovery process. Compliance with the NYS Building Code which follows International Building and Residential Codes (IBRC) is of critical importance in damage prevention and mitigation.

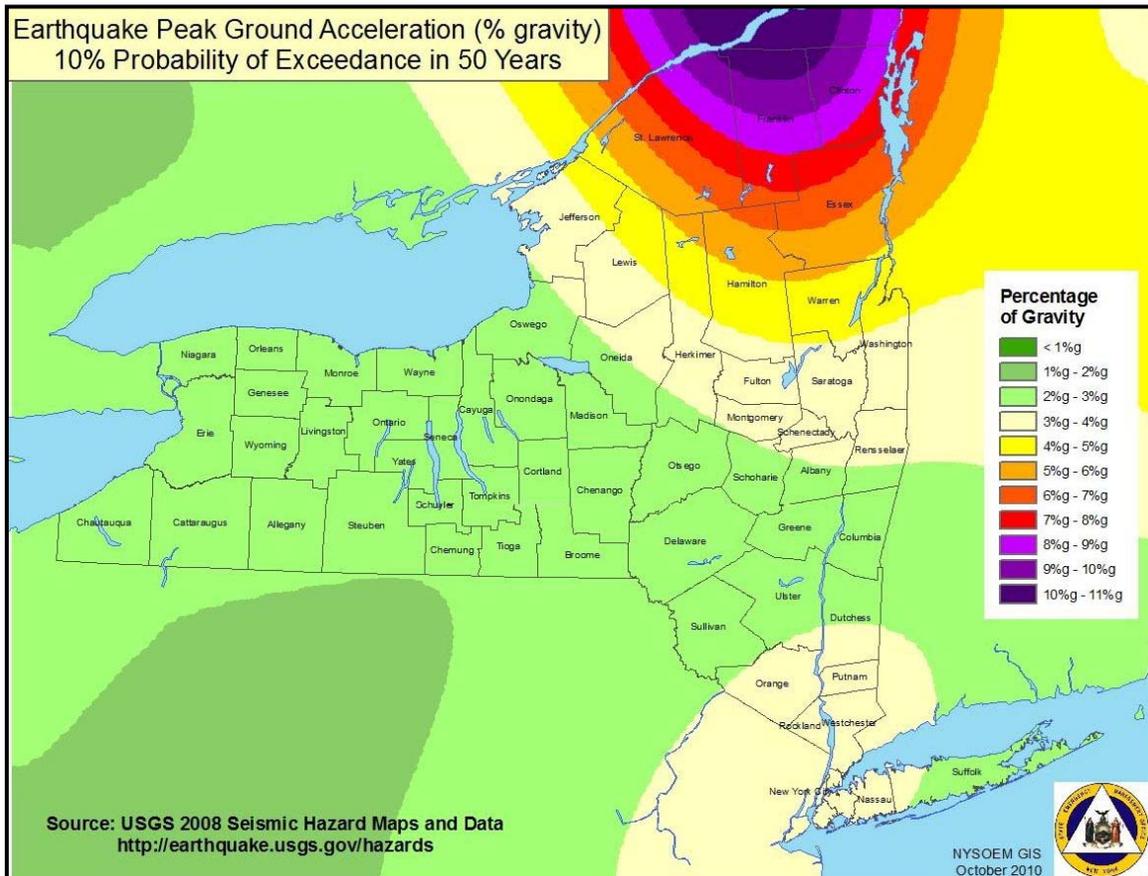
Based on the Peak Ground Acceleration (PGA) Percent Seismic Hazard Map below, Westchester County would be expected to have a 10 percent chance in 50 years of an earthquake with PGA exceeding 4 percent. The Modified Mercalli Intensity (MMI) and PGA Equivalents table provided above, indicates that an earthquake with a PGA of 1.4 to

3.0 would have “light” perceived shaking and no potential damage, and an earthquake with a PGA of 3.9 to 9.2 would have “moderate” perceived shaking and “very light” potential damage. Based on the above discussion, the frequency of powerful earthquakes and potential for damage is relatively low in Westchester County. The MHMP Committee also ranked the probability of an earthquake as low.

Concerns are also sometimes raised about the potential for damage to the Indian Point nuclear reactor located approximately 12 miles north of Sleepy Hollow in Buchanan, NY, and its possible adverse effects on human health and safety. The Indian Point reactor was built to withstand a magnitude VII (“Very Strong” perceived shaking and “moderate” potential damage) and a 6.1 on the Richter Scale. Moreover, the Village is located outside of the 10-mile evacuation zone established for the facility in the event of a hazardous release. Based on the above information, the chance of a major problem at the facility as the result of an earthquake is low. Figure 3-8 shows earthquake hazard in New York State and Westchester County by peak ground acceleration (percent gravity) ten percent probability of exceedance in 50 years. The data shown on this map can be compared with the information provided in Table 3-5 Modified Mercalli Earthquake Intensity Scale to determine typical observable results and effects based on intensity.

Figure 3-8

Peak Ground Acceleration (PGA) Percent Seismic Hazard Map



3.2.2.2 Mass Movement, Slope Failure, & Subsidence

Mass movements involve the downward movement of soil, rock and vegetation under the influence of gravity. There are various types of mass movements or slope failures that occur in nature including slumps, slides, slips, flows, avalanches, heaves, creeps, runs, and falls. The exact nature of mass movement events can be further defined using a descriptor such as “rock”, “mud”, “sand”, or “debris” to describe the nature and composition of the moving material. Large scale events in areas where people or buildings are present can jeopardize human life and property. These occurrences are largely affected by the force of gravity acting on the face of cliffs, bluffs, mountains and steep hillsides. Factors that contribute to slope failure may include, undercutting/erosion of the toe of a slope by moving water; the texture, structure, compaction, cohesion, and

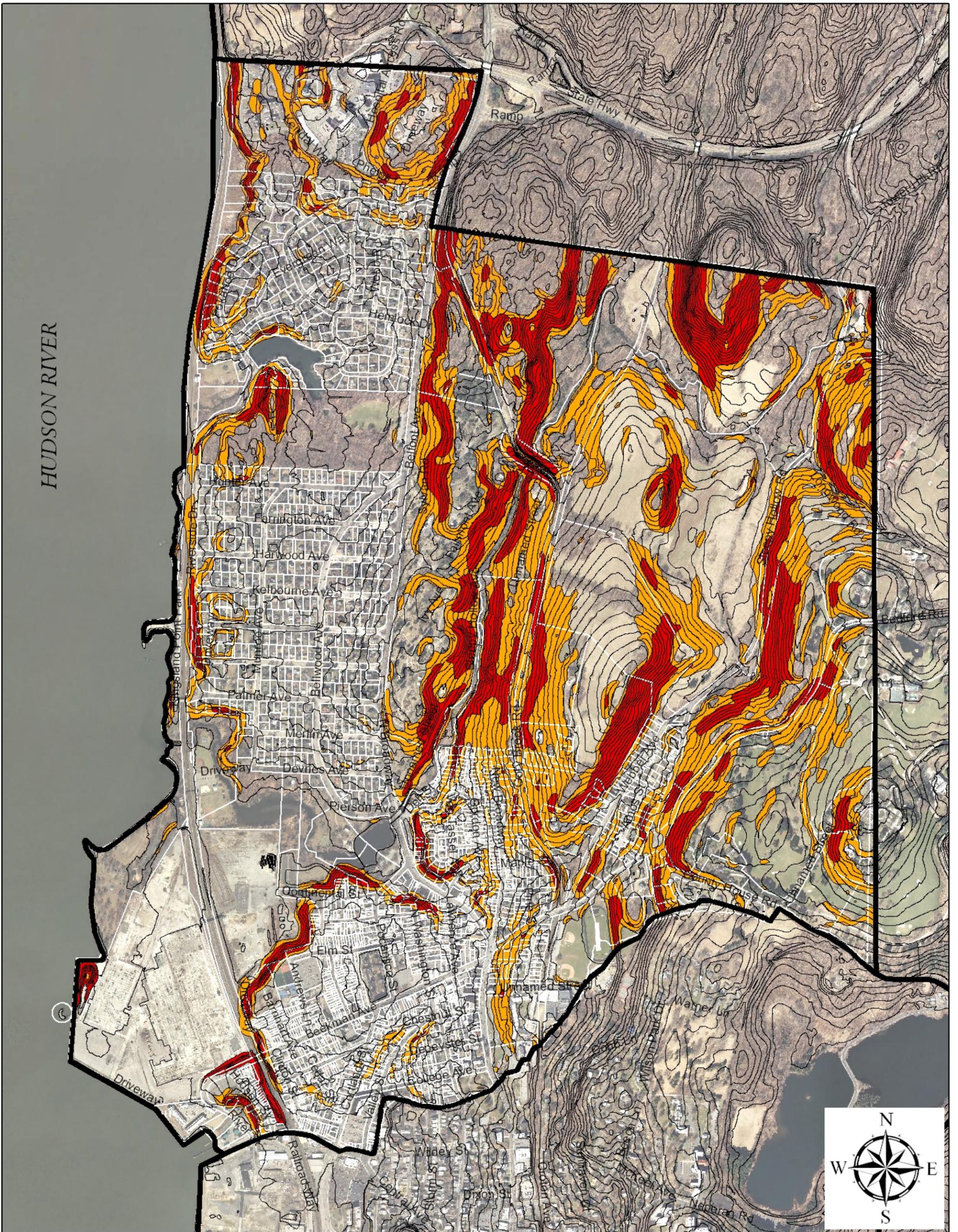
water content of sediment comprising the slope; the physical and chemical weathering of the slope and its steepness; the type and amount of vegetation stabilizing the slope; weather factors; direction the slope faces relative to the sun; and man's activities, such as clearing and development on or along the edge of a slope.

In the Village of Sleepy Hollow, the potential for "large-scale" mass movement phenomena would be limited and confined primarily to areas where steep slopes and possibly bedrock outcroppings exist. The mass movement events that are most likely to occur in the Village of Sleepy Hollow would be minor slumps and possibly minor rock falls from an eroding bedrock outcrop. Simply put, a slump is the downward movement of a mass of unconsolidated earth materials under the influence of gravity. Bank failure usually occurs along a curved (rotational) surface or plane of weakness where the upper slope moves vertically downward and the lower section of the slope moves outward away from the slope. A rock fall is simply that, rock that falls from a cliff or bedrock outcropping.

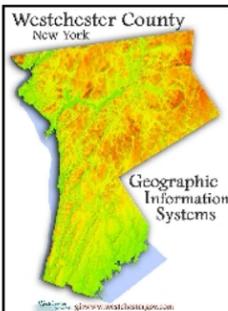
Locating buildings and other structures on or at the edge of steep slopes or at the base of steeply dipping unstabilized hills, particularly those that are not vegetated or sparsely vegetated and are not otherwise stabilized, can increase the potential for structural damage from slope failure. Figure 3-9 shows steep and very steep slopes in the Village. Very steep slopes (over 25% grade) would be more prone to failure depending on various factors (soil type, slope loading, sparseness of vegetation, running water or wave action causing erosion along stream and river banks that would undercut the slope, presence and type of slope stabilization structures, etc.). Steep embankments along the Hudson and Pocantico Rivers are vulnerable to slope failure from the erosive forces of running or choppy waters and possibly boat wakes in the case of the Hudson River, especially in areas where bank stabilization structures, such as bulkheads and revetments, do not exist, are insufficient or are in disrepair.

Figure 3-10 shows a map of landslide susceptibility in New York State as determined by the NYS Division of Homeland Security (2011). This map indicates a low landslide

incidence in Westchester County, even though the County ranks as the 12th most likely to experience a landslide out of 62 counties in the State. Since Sleepy Hollow is not located in a mountainous region of the state, the incidence of slope failure is expected to be less than those that are. The overall low landslide hazard classification coincides with the MHMP Committee's probability ranking for landslides in the Village. Between 1837 and 2007, a total of 11 landslide events are known to have occurred in New York State (NYS Division of Homeland Security, 2011). Based on a review of the SHELDUS Damage from Hazard Events data, there was just one slope failure incident between 1960 and 2009 (a mud slide in 1969) that caused property damage in Westchester County and no Presidential Disaster Declarations have been issued for landslides in the County. In January of 1988, a person was killed by a rockfall along the NYS Thruway near Tarrytown.



HUDSON RIVER



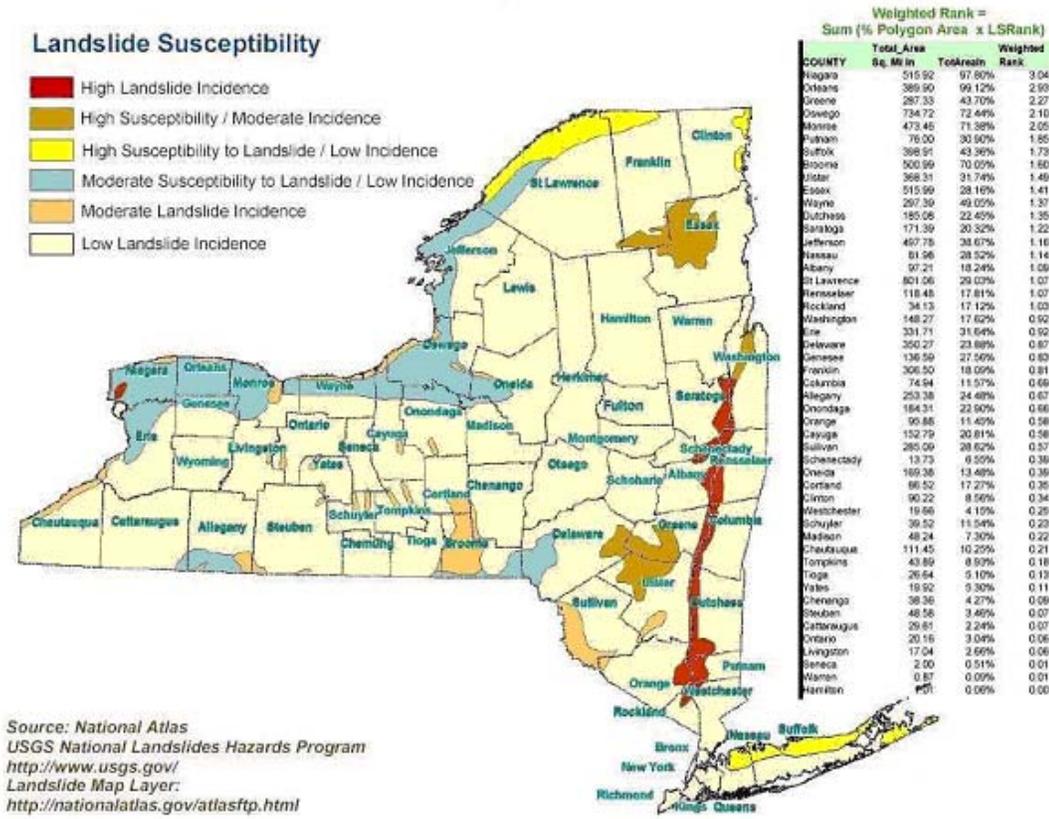
Legend

- 10 FT CONTOUR INTERVAL
- ▭ VILLAGE OF SLEEPY HOLLOW BOUNDARY
- SLOPES**
- 15 to 25%
- Over 25%



**FIGURE 3-9
VILLAGE OF
SLEEPY HOLLOW
MULTI-HAZARD
MITIGATION PLAN
TOPOGRAPHY**

Figure 3-10
LANDSLIDE INCIDENCE



Ground subsidence or the development of sink holes are another threat. Ground subsidence is the sudden or gradual collapse, settling, or compaction of the ground surface without horizontal movement. Subsidence can be associated with subsurface mining including large scale withdrawal of groundwater, compaction of unclean fill, and the dissolution of underlying carbonate bedrock including limestone, dolomite, or marble and evaporate minerals including salt and gypsum which are not present in Sleepy Hollow. Based on available data, the possibility of a major subsidence event is low in Sleepy Hollow. The MHMP Committee concluded that the probability of such an incident is low.

Mass movements are localized phenomena and predicting these events is very difficult. If mass movements or subsidence were to occur in the Village there may be little to no

warning. These events could conceivably cause damage to roads, buildings, utilities, and cars, and other property, and potentially cause injury or threaten life.

3.2.2.3 Expansive Soils

Expansive soils typically contain high amounts of clay that expand when wet and shrink when dry. The shrinking and swelling action of expansive soils can affect the overall strength of a soil mass causing slope failure, and on flatter land surfaces cause damage to buildings/foundations, streets, and underground utilities from soil expansion and contraction.

The United States Department of Agriculture Natural Resources Conservation Service's 2002 Soil Survey database and Westchester County Geographic Information Systems' soil maps were reviewed to assess the potential risks from expansive soils in the Village. Soils in the Village consist primarily of loams (a mixture of sand, silt, and clay), gravelly fine sandy loams, gravelly loams, sandy loams, silt loams and urban land or fill. The urban land information was limited as to the soil's exact properties as the origins of the soils are usually unknown and their properties must be examined on a site by site basis. The soils data reviewed indicate liquid limits and plasticity indexes that suggest either no risk or low to moderate risk of soil shrink and swell. Proper site preparation (replacement of soil where a high proportion of clay exists) and engineering practices can be used to limit shrink-swell activity.

A review of available data did not reveal any expansive soil events in the County that caused damage, death or injury. According to SHELDUS, however, a mudslide did occur in the County in 1969 causing some limited damage. Mudslides are similar to expansive soil events, in that they both involve the deformation/movement of soil as a result of water saturation conditions but are different as mudslides involve movement down a slope, while expansive soils, which can shrink and swell (or deform) in place on flat land. The soil texture in a mud flow may also be different since clays often have cohesion that

can limit its potential to flow. The MHMP Committee estimated that the possibility of a serious expansive soil incident is “low”.

3.2.3 Technological or Man-Caused Incidents

3.2.3.1 Train Derailments, Plane Crashes, Shipping Accidents, Nuclear and Other Hazardous Materials Releases

Major transportation accidents, such as train derailments, plane crashes, and boating and shipping mishaps can result in numerous injuries and fatalities and may be accompanied by fires and explosions. Such events are possible, specifically in light of the existence of major boating and shipping activities along the Hudson River, several local highways and roadways, the Metro-North commuter line that runs through the Village, and some small plane & helicopter flight activity in the general area. These potential events could place significant strain on local emergency services, not to mention Phelps Hospital.

Land or river-based shipping accidents or accidents at stationary hazardous materials storage and dispensing areas can also result in the release of toxic substances. Toxic and hazardous materials releases that occur either accidentally or intentionally can have acute or chronic public health effects and cause environmental degradation where exposure is high. Hazardous materials that could conceivably be released in the area include toxic chemicals (industrial chemicals, pesticides, etc.) and gases, flammable and explosive substances, radioactive materials, gasoline, and biological materials such as pathogenic bacteria and viruses. The release of these materials can affect human health through direct exposure or through contaminated air, food, and drinking water supplies. Hazardous materials releases can also affect ponds, streams, and soils and can kill or contaminate fish, shellfish, and other wildlife.

Examples of potential sources that could release hazardous materials into the Village include tanker trucks, trailer trucks, ships, and airplanes; leaking above-ground and underground fuel storage tanks; natural gas lines; the water treatment plant in nearby

Tarrytown; Phelps Hospital; and the Indian Point nuclear plant. In addition to the potential for human health and property impacts, these types of material releases can have, they can also persist for extensive periods of time in the soil, surface water bodies, and groundwater depending on the material's physical and chemical properties or temporarily affect air quality. These events can also affect the local economy, tourism, and recreational activities, and can be very costly and time consuming to remediate.

The northwestern boundary of Sleepy Hollow (Phelps Hospital) is estimated to be 12 miles from the Indian Point nuclear facility. Events that could potentially affect the Indian Point nuclear plant and/or cause the release of radioactive materials include equipment failure, flooding, earthquake damage, and terrorism/vandalism. Released radioactive materials would come in the form of a vapor or fine particles. The US Nuclear Regulatory Commission has established two emergency planning zones (EPZs) around the Indian Point facility. These include:

- A plume exposure pathway EPZ which extends about 10 miles in radius around nuclear plants with the primary concern in this area to be public exposure to, and the inhalation of, airborne radioactive contamination; and
- An ingestion pathway EPZ which extends about 50 miles in radius around a plant where the primary concern being the ingestion of food and liquid that is contaminated by radioactivity (US Nuclear Regulatory Commission, 2009).

The Village falls outside of the designated 10-mile plume exposure pathway EPZ but is well within the 50-mile ingestion pathway EPZ. In this zone, steps would need to be taken to ensure that food and water supplies have not been contaminated. The Village is not an agricultural community and does not produce food for the region and its primary drinking water source is the Catskill Aqueduct. The Ashokan and Shoharie Reservoirs supply the aqueduct and are both located over 50 miles from Indian Point. The exact nature of the event, the amount and type of material(s) released, and wind speed and direction affects the dispersal of any airborne hazardous materials.

Specific areas within or near the Village that may be vulnerable to other hazardous materials spills and accidents include major traffic routes (Routes 87, 287, 9, and 448), the Tappan Zee Bridge, Metro North Railroad (which includes freight shipments as well as commuter activity), the Hudson River (shipping accidents), any one of the five gasoline stations in the Village, any structures using heating oil or natural gas, Tarrytown water pump station (chlorine), Phelps Hospital, the Kendal assisted living facility (large fuel tank) and the former Duracell site, which was contaminated with mercury by past activities but is currently being cleaned up. Based on a review of Westchester County's land use map for the Village, there is just one small industrial land use in the Village. This land use is located in the southwest section of the Village off of Cortlandt Street.

Dredging is also currently occurring near the Village's historic lighthouse and the old GM plant site. Dredge spoil from the Hudson River that may contain heavy metals, solvents, lead, mercury, and petroleum, and contaminated soil removed from the old Duracell site containing lead and mercury can be further released into the environment if the materials are not properly handled and contained. The NYSDEC oversees these operations and requires materials management actions to address potential contamination releases and public exposure concerns.

There was no readily available information on past incidents of significant hazardous materials releases in the Village, but such incidents are not unusual as evidenced by New York State Department of Environmental Conservation (NYSDEC) records. The MHMP Committee estimated the probability of hazardous materials releases from trucks, tankers, trains, ships, and underground and above-ground materials storage tanks to be high and a possible incident from the Indian Point nuclear reactor that significantly affected the Village to be low. The environmental damage and threats to human health from released hazardous materials are wide ranging depending on the type and quantity of material, its dispersion and dilution, the numbers of persons that are exposed, their general health, and other factors. The NYSDEC and US Environmental Protection Agency (EPA) and other federal, state, and local agencies are routinely involved in hazardous material release

assessments and clean-ups and would provide assistance or assume responsibility in some aspects of a materials release response.

An excellent resource for first responders relating to hazardous materials spills is the U.S. Department of Transportation's "Emergency Response Guidebook" (2012). The New York State Office of Emergency Management (SOEM) Office of Public Information in 2010 also published "Protecting Public Health and Safety: New York Radiological Emergency Planning". The plan provides a program for mitigating the possible consequences of a radiological emergency, especially one that might occur at a nuclear power plant.

3.2.3.2 Building Fires and Explosions

Large devastating fires can occur in any building but are more likely to happen in old wooden buildings, buildings that are not up to code, or that have inadequate fire suppression protection. In densely developed areas, such as the Village's central business district, its multifamily residential developments, and the many compact single-family residential neighborhoods, fire can quickly spread from structure to structure, particularly if winds are strong, the buildings do not have adequate fire stops or sprinkler systems, and the structure's building materials are vulnerable to fire.

Structural fires can be started by flammable materials, electrical problems, broken or damaged gas lines, human carelessness, arsonists, and the effects of earthquakes, mass movements, and major storms which cause damage to structures and utilities.

Devastating fires in recent years have included those at the World Trade Center in 2001 which along with the collapse of the structures were responsible for killing many of its victims and a crowded nightclub in the State of Rhode Island in 2003 which was fully engulfed within three minutes of its start, killing 100 and injuring as many as 180. As tragic as the Rhode Island incident may seem, its devastation pales compared to the nearly 500 person killed in a fire in a Massachusetts nightclub in 1947. In recent years,

several fires have occurred in the Village of Sleepy Hollow including two mixed-use buildings that were completely destroyed by fire and the Korean Church and a large commercial building that were damaged.

Building fires can often be quickly controlled and loss of life prevented when smoke alarms, sprinkler systems, fire walls, fireproof building materials, and adequate emergency exits and fire escapes are provided. Adequate numbers of personnel, training, equipment, and the availability of functioning fire hydrants are also essential.

Where there is fire there is also the possibility for explosions. Explosion risks in the Village would be greatest at local gasoline stations at the fuel pump, or from automobile fires, natural gas leaks, or some act of violence or terrorism.

Old wood frame buildings in the Village, especially those that are in densely developed locations and do not have fire stops and fire escapes are considered the most prone to fire. Based on this information, some areas of concern in the Village include buildings along Cortland Street, Valley Street, Clinton Street, and Beekman Avenue. Fires in high-rise buildings over five stories, such as exist along Valley Street, can present upper-story access and evacuation issues.

Explosions could occur at local fueling stations and Village and other fuel storage areas, from natural gas leaks, or where chlorine, propane, and liquid oxygen are stored. Possible land, water, and rail freight shipping accidents along area streets and highways, the Hudson River, and the Metro North Railroad, may have the potential to result in fires or explosions in addition to causing injuries and deaths. Water shortages and water main breaks can affect fire-fighting capabilities if a hydrant is not receiving an adequate supply of water or there is insufficient water pressure. In such a situation, the fire department would have to rely on tanker trucks and possible mutual aid from neighboring fire departments.

3.2.3.3 Dam Failures

The failure of a dam whether occurring during a major precipitation event, snow and ice melt event or under perfect weather conditions can have a devastating effect on downstream areas. Pocantico Lake is located approximately 3,500 feet (two-thirds of a mile) north-northeast of the Village in the Town of Mount Pleasant. The Pocantico River flows from the lake in a southwesterly direction through the Village of Sleepy Hollow before discharging into the Hudson at Kingsland Point Park.

According to Stearns & Wheler, LLC (2010), construction of the Pocantico Lake dam was completed in 1916. The lake has a normal surface area of 67 acres. The dam is of earthen construction and owned by Westchester County Department of Parks and Recreation. The height of the dam is 35 feet and its length is 300 feet. Maximum discharge is 4,000 cubic feet per second and its capacity is 1,595 acre feet. Normal storage is 920 acre feet. The lake drains an area encompassing 12.3 square miles.



Pocantico Lake Dam

Within the Village of Sleepy Hollow, the Pocantico River channel is bound by steep embankments, some sections of which have been stabilized with physical structures, and land adjacent to the river consists almost entirely of parkland. Nevertheless, a dam failure by itself or in conjunction with a major precipitation event could result in significant downstream flooding that could adversely affect the community, including some homes and businesses, parklands and their amenities, streets, drainage structures, utilities, and bridges in the flood path. Erosion of river banks and slumping of slopes is another source of concern where structures exist near the river channel. Depending on the specific conditions and characteristics of a dam failure, the following locations could be affected by a Pocantico Dam failure: Rockefeller State Park Preserve, the Route 117/Pocantico River crossing, Dell Street residences, Philipsburg Manor, Kingsland Point Park, Devries Park, and the old GM plant site. If the Old Croton Aqueduct were to fail while impounding large volumes of water, residences on the hills around the valley would be at risk. This would include land along Devries and Pierson Avenues, and North Broadway Street from Pierson Avenue to Lawrence Avenue (Stearns & Wheeler, 2010). Floodwaters would be expected to inundate adjacent land in a matter of minutes after a collapse depending on how complete the dam failure is, how close/upstream the land is, and whether the collapse occurred under sunny or rainy conditions.

The Pocantico Lake Dam has undergone recent improvements to make the dam safer including raising the crest, adjustments to bank slopes, reconstruction of the outlet, efforts to increase overall capacity, and soil stabilization through the planting of vegetation.

“The Emergency Action Plan for Pocantico Lake Dam”, prepared by Stearns & Wheeler (2010), addresses issues relating to possible dam failure at this location. The following dam failure inundation maps from that plan show the overall estimated extent of flooding as well as the estimated travel time of the leading wave, travel time of flood wave peak, peak elevation of floodwaters, and approximate peak flow in cubic feet per second at several locations for both sunny and rainy conditions. The rainy day breach event also includes anticipated inundation and conditions if the Croton Aqueduct was to fail as well.

Village of Sleepy Hollow
Multi-Hazard Mitigation Plan



The “Sleepy Hollow Dam” or “Philipsburg Manor Dam” is located just west of Route 9 at Philipsburg Manor. The dam is classified by the NYSDEC as a low risk dam (Canestrari, 2012).

The probability of a dam failure was considered by the MHMP Committee to be low. Recent improvements to the Pocantico Lake Dam and continued oversight by the NYSDEC should help to lessen the chances of a future dam failure.

3.2.3.4 Bridge Collapses

There are a number of road crossings (i.e. bridges or culverts) over streams, rivers, and a lake outlet both in the Village and nearby jurisdictions that could affect public safety, evacuation, and general transportation if any of these structures were to fail or become inundated by floodwaters. Based on available GIS data, the Village of Sleepy Hollow has a total of 18 small bridges or culverts over the Pocantico River and other streams and over or under the Metro North Railroad. At least one of the bridges and culverts is a pedestrian bridge which is associated with the Philipsburg Manor site. Just outside of Sleepy Hollow limits, there are five bridges or culverts crossing a tributary of the Pocantico River to the northeast in Briarcliff Manor (Gorey Brook) and the Tappan Zee Bridge, including both existing and proposed bridges, is located approximately 0.7 of a mile south of the Village. (See Figure 3-13 at the end of this section.)

Severe flooding or a dam failure could cause rushing water to overtop bridges and culverts and cause severe erosion and stress on these structures, potentially causing bridges to collapse and destroying roads, creating dangerous conditions, and complicating evacuations and emergency response. Collapsed bridges can also result in long-term traffic delays, disruption to businesses, and be very expensive to repair or replace. Earthquakes and a lack of maintenance and repair can also threaten the integrity of bridges.

Estimating the potential for a bridge collapse is difficult and depends on various factors. No information was found on past bridge or culvert collapses in the area but many of the structures in the Village are roughly 100-years old. The probability of a bridge or culvert collapse in the Village was estimated by the MHMP Committee to be “medium”.

3.2.3.5 Water, Sewer, and Other Utility Disruptions

Water, sewer, telecommunications, computer system, fuel, and electrical power utilities failures can affect emergency response and recovery, limit access to potable water, create unsanitary conditions, disrupt economic activity, cause significant inconvenience, and threaten public health and safety. Widespread power outages are considered common in Sleepy Hollow. A loss of power can affect businesses, schools, governmental functions, and other important activities. Power outages can also result in traffic signals that do not work, making for dangerous conditions on roadways. This condition can be exacerbated if large numbers of persons are in the process of evacuating the area. There are currently eight traffic signals in the Village including five signalized intersections along Broadway (Route 9), plus three additional signalized intersections.

Water Supply

The delivery of a suitable supply of potable water is a critical basic need that is fulfilled by the Village’s water utility; however, a number of water supply disruptions have occurred in the past. At the time this Plan was being prepared, the Village was planning on constructing a new 1.4 million gallon public drinking water storage tank to augment its current 800,000 gallon tank. Phelps Hospital has a 250,000 gallon water storage tank that supplies its fire sprinkler system as well as a wooden 100,000 gallon tank for potable water; although the tank was empty at the time this plan was being prepared.

Sewer

The Village is sewerred and sewage is conveyed to Yonkers where it is treated and released. There is a 30-inch County trunk line and emergency outfall that discharges to the Hudson in Sleepy Hollow and a sewage booster station is located off of Riverside Drive. Infiltration and inflow including any illegal connections to sewers or storm drains can cause sewage backups and releases and threaten public health. Emergency outfall discharges and sewer main breaks can have similar effects and pollute the Hudson and other water bodies causing potential health, safety, recreational, and environmental impacts. In recent years a major sewer leak occurred along Division Street in a densely populated section of the downtown.

Drainage

Stormwater controls are of particular concern as they are essential to ensuring proper drainage and averting or lessening flooding. The Village's west side is densely developed and contains a high proportion of impervious surfaces in the form of closely spaced buildings and roofs, streets, parking lots, and sidewalks that generate large volumes of stormwater runoff. This impervious ground cover, combined with steep slopes that drain quickly and flat areas that do not drain so well, can contribute to flooding and erosion issues. A comprehensive stormwater management plan was recently prepared and adopted by the Village Trustees to address various stormwater problems that were identified in the Village.

Telecommunications

Telecommunications are commonly affected during major storm events or other disasters. Today, the loss of telecommunications can have significant and far-reaching effects as many critical information systems, public utilities, economic institutions, and other important infrastructure rely on telecommunications and computer networks. Hacking or cyber-vandalism or cyber-terrorism is a serious threat and can have far-reaching

economic, security, and other effects. Failure of emergency communications networks can also create problems and the Village's current systems are in need of upgrade.

Power Outages

Power outages are common occurrences in Sleepy Hollow and other communities around the County and State. They can cause significant inconvenience and discomfort including a loss of communications, heat, refrigeration, cooking appliances, and other important basic necessities. Thunder and lightning storms are quite common in the area and can cause power outages. A major power outage occurred in the Village in 2003 and several heat wave-related blackouts and brownouts have also occurred (1999, 2001, 2002, and 2006). The DPW garage lost power during one of the outages which placed strain on its operations.

Gasoline shortages can also occur in the event of a major disaster if shipments are disrupted, the terminals are damaged or do not have power, or gasoline stations do not have power to operate pumps.

Utility disruptions were found by the MHMP Committee to have a high likelihood of occurring. It is not surprising that the loss of utilities is common. Hurricanes, tornadoes, flooding, wind storms, thunderstorms, hail storms, earthquakes, landslides, car accidents, fires, droughts, heat waves, and lack of maintenance or human error can each affect one or more utilities.

3.2.3.6 Terrorism and Civil Disturbances

Terrorism involves the use of violence and fear against governments, individuals, or groups and organizations in order to promote political or social objectives. Unfortunately, the events of September 11, 2001, the subsequent mailing of anthrax-tainted letters, the 1995 bombing of the Alfred P. Murrah Federal Building in Oklahoma City, the recent Boston Marathon bombings, several incidents of school, university,

workplace, mall, theater, and religious institution shootings, and other similar violent acts have demonstrated the vulnerability of economic and governmental institutions, critical transportation networks, and the public.

While these events are often largely handled by federal, state, and local law enforcement, local fire, rescue, and ambulance personnel, the National Guard, Coast Guard, and local governmental officials also have a role to play and must be prepared for such events. The role of local officials largely falls within the realms of response, coordination, post-disaster recovery, and future crisis planning and mitigation.

Terrorist attacks can come in the form of bombings (conventional, nuclear, or dirty bombs – the latter releasing nuclear material into the air), fires (arson or incendiary attacks), mass shootings or armed attacks, train derailments, hijackings, sabotage or vandalism of facilities storing large quantities of toxic materials, and release of chemical, biological, and radiological agents or other hazardous materials.

Locations that may be selected for terrorist attacks or mass violence include those which:

- Contain high numbers of persons in a relatively small area (e.g., work places, schools, churches/synagogues, shopping centers, public events, and other public gathering locations);
- Have great utility to society or unique symbolism (e.g., economic and governmental institutions, utilities, transportation systems);
- Have low visibility (e.g., areas for persons to hide or approach a target and escape without being detected);
- Are easily accessible (e.g., have little security); and
- Contain hazardous materials which are dangerous in and of themselves (e.g., fuel storage facilities).

During and after a terrorist attack or incident having mass casualties, doctors and medical staff may be overloaded and the necessary equipment and medicine may be in limited

supply. Hospitals and emergency response personnel are well trained but may find themselves overwhelmed by unique circumstances and mass casualties.

Members of the public are permitted to assemble peaceably and exercise free speech but these activities of group socio-political protest or unity toward a cause can result in civil disturbances and unrest. Nevertheless, expressions of group displeasure (or pleasure such as cases when a favorite sports teams win a playoff) can sometimes escalate into vandalism, riots, looting, arson, and violence. Controlling these events can be difficult when large crowds are involved and participants become violent.

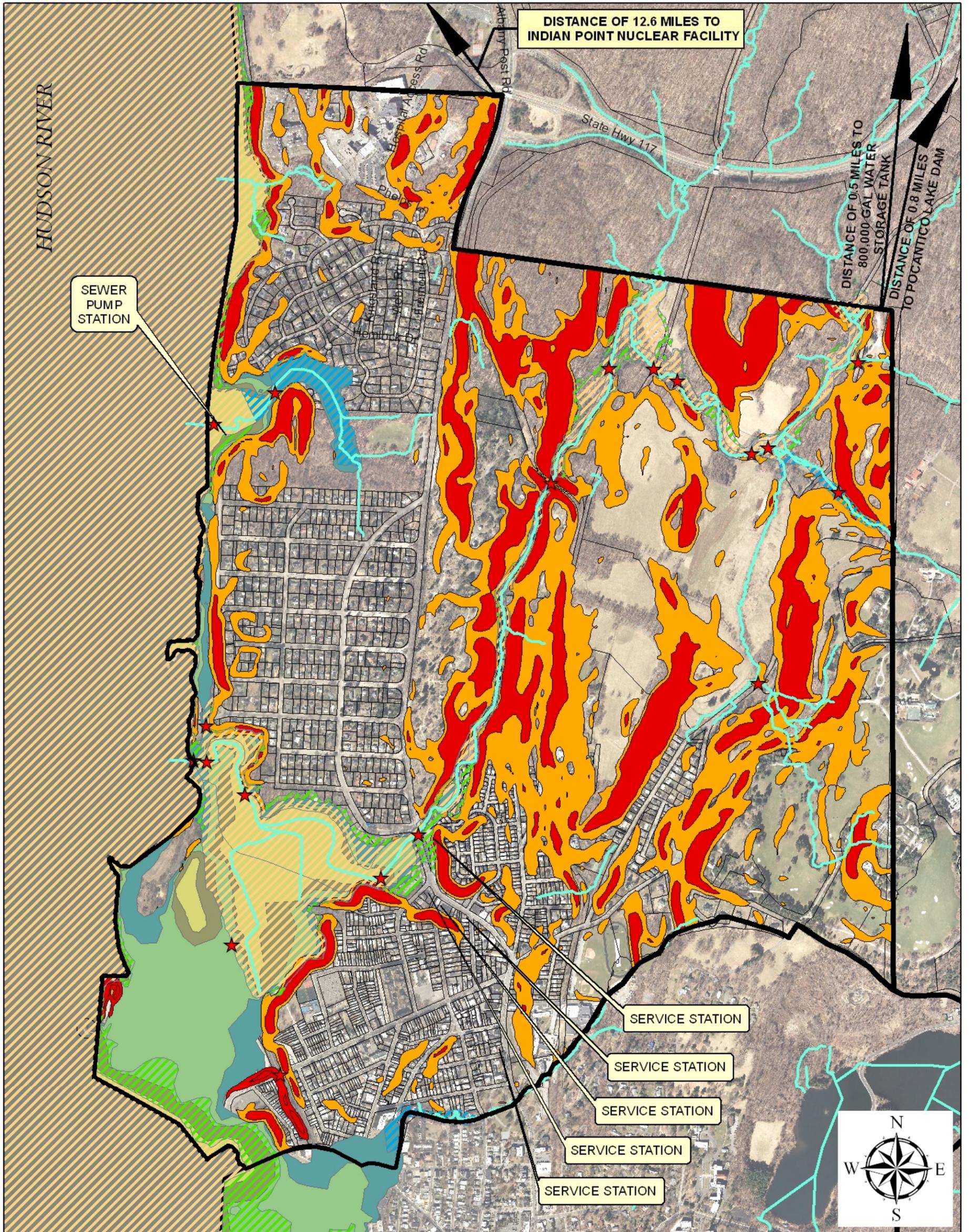
Terrorist attacks and violent civil unrest are rare. The likelihood of such events occurring in the Village of Sleepy Hollow or the effects of one being felt in the community is very small but not beyond the realm of possibility. The MHMP Committee determined the potential for terrorism, civil unrest, and acts of mass violence in the community to be low.

3.2.3.7 Epidemic

An epidemic is a contagious disease that spreads rapidly while a pandemic is an epidemic that has spread world-wide. An example of an epidemic is influenza. According to SOEM (2011), influenza causes 36,000 deaths, over 200,000 hospitalizations, and costs more than 10 billion dollars each year. Moreover, the last three pandemics that occurred (1918, 1957 and 1968) killed approximately 40 million, 2 million and 1 million people, respectively, worldwide. These data indicate the gravity of a major outbreak. A major epidemic in the area could strain local emergency services and the hospital.

The MHMP Committee found the chances of an epidemic adversely affecting the Village to be low to moderate.

Figure 3-13 below depicts potential threats and hazardous areas and conditions.



Probability of an earthquake with a PGA of 3-4 percent (light to moderate shaking and very light to no damage) is 10 percent in 50 years.

Westchester County
New York

Geographic Information Systems

Cashin Associates, P.C.

Legend

- VILLAGE OF SLEEPY HOLLOW BOUNDARY
- FEMA ZONE**
- A (100 YEAR FLOOD ZONE)
- AE (100 YEAR FLOOD ZONE W/ BASE FLOOD ELEVATIONS)
- 500 YEAR FLOOD ZONE (0.2 PCT ANNUAL CHANCE FLOOD HAZARD)
- SLOPES**
- 15 to 25%
- Over 25%

0 500 1,000 1,500 2,000 Feet

- ★ BRIDGES AND DAMS
- STREAMS
- NYS HURRICANE STORM SURGE ZONES**
- CATEGORY 1
- CATEGORY 2
- CATEGORY 3
- CATEGORY 4

FIGURE 3-13
VILLAGE OF SLEEPY HOLLOW
MULTI-HAZARD
MITIGATION PLAN
POTENTIAL
THREATS AND HAZARDS

3.3 Risk Evaluation and Ranking

3.3.2 History of Storm and Other Hazardous Events in Westchester County, NY

Historical hazardous events data are generally not available at Village or Town levels. The University of South Carolina, Hazards and Vulnerability Research Institute, however, developed a database known as the “Spatial Hazard Events and Losses Database for the United States” or “SHELDUS™” which provides data on a county-wide basis. The database includes records from 1960 through 1989 and from 1995 through 2010 indicating various types of storm events and other climate related incidents (heat waves and droughts), landslides, and wildfires during which a death, injury or property or crop damages were documented as occurring. During the years 1990 through 1995, SHELDUS™ data include only the events that caused at least one fatality or more than \$50,000 in property or crop damages – although future editions of SHELDUS™ will contain more detailed information for the time period 1990 through 1995. In cases where hazardous events affected areas that were larger than the county (e.g., a hurricane that affects several counties or an entire state), and the exact number of deaths, injuries, and damages can not be attributed to a specific county, SHELDUS apportions the numbers across the geographic area to provide its best estimate.

Data recorded by SHELDUS for Westchester County include 358 hazardous events between 1960 and 2010 that meet the above described criteria. The events that were recorded are listed under 13 different categories including: windstorms, severe thunderstorms, winter storms, lightning storms, flooding, hail storms, tornadoes, hurricanes and tropical storms, heat waves, fog, wildfires, landslides, and droughts. It is noted, however, that many events involve more than one hazard. For instance, a hurricane would typically involve high winds and possible flooding and a tornado or thunderstorm might be accompanied by hail.

From the above 358 events listed in the database for the County, a total 141 injuries and 40 deaths were sustained and \$344,009,679 in property damages and \$5,977,682 in crop damages, as adjusted to 2011 dollars, occurred.

The most prevalent events in the database for Westchester County are windstorms, severe thunderstorms, and winter storms, respectively. The least common were droughts, followed by landslides, and wildfires. The four hazardous events that caused the most deaths include a heat wave in 1999 (4), a windstorm in 1996 (2), flooding in 1975 (2), and a heat wave in 2006 (2). The events that occurred in the County between 1960 and 2010 that caused the most property damage in 2001 dollars are: the Flood of 1973 (\$344 million) followed by the snow storm of 1983 (\$200 million), the F2 Tornado of 2006 (\$62.8 million), and Hurricane Bob in 1991 (\$11.4 million). The events that caused the most injuries are: a freezing rainstorm in 1992 (17), a thunderstorm with wind and heavy rain in 1963 (16), and a snow storm/snow squalls in 1992 (13). The F2 tornado that passed through the Village in 2006 had the fifth most injuries within the County (6). Appendix B contains the SHEL DUS hazardous event database for Westchester County. The data are sorted by type of event.

3.3.3 Presidential Disaster and Emergency Declarations for Westchester County

The University of Delaware (2009) maintains a database of Major Presidential Disaster and Emergency Declarations by County. The database for Westchester County, NY includes entries occurring between 1965 and 2007. According to the database, there were 11 major Presidential disaster declarations for Westchester County during that period, including a water shortage (1965), severe storm and flooding (1971), Tropical Storm Agnes (1972), a storm/rain/flood/landslide (1975), a coastal storm and flooding (1984), coastal storm/flooding/heavy rain/high tides (1992), a severe storm/heavy rain/flooding (1996), Hurricane Floyd (1999), fires and explosions (9/11/2001) (impacts of 9-11 on the County), severe storms and flooding (2005), and severe storm/inland and coastal flooding (2007). Records collected by NYS SOEM (2008) indicate that Westchester County had a total of 13 Presidential disaster declarations between the years 1954 and 2010. The

number of disaster declarations for Westchester County is considered relatively high when compared to other counties in the State with 3 being the least and 18 being the highest during the same time period.

There were a total of 6 Emergency Declarations listed in the database for Westchester County. Emergency Declarations include a severe blizzard (1993), Hurricane Floyd (1999), West Nile Virus (2000), a snowstorm (2003), a power outage (2003), and the Hurricane Katrina Evacuation (2005).

The lists of Major Disaster Declarations and Emergency Declarations and the costs for the above incidents in 2009 dollars are provided in Appendix C. It should be noted that not all of the listed events necessarily happened within the County or significantly and directly affected the Village (e.g., the terrorist attacks of 9/11). Moreover, the total costs of the events shown in the Presidential Declarations data in the appendices are statewide costs rather than strictly Westchester County's costs.

3.3.4 MHMP Committee Hazards Rankings

The MHMP Committee also considered the relative probabilities of future hazardous events based on collective local knowledge, past experience as residents, employees, and first responders, and anecdotal histories. This information assisted in providing additional insight, beyond the historical hazards event data collected on the County level, and helped to provide an overall greater understanding of the threats that face the Village.

The MHMP Committee's estimates of hazard probability are provided in the respective discussion of hazards provided at the beginning of this chapter. Table 3-6 below summarizes the collective opinions of the Committee.

Table 3-7

| COMMITTEE-BASED HAZARD PROBABILITIES RANKINGS | | | |
|---|---|---------------|------------|
| Hazard | Probability (check one column) | | |
| | High | Medium | Low |
| Flooding | X | | |
| Hurricane | X | | |
| Tornado | | | X |
| Blizzard | | X | |
| Hail storm | | X | |
| Other Storms (tropical storm/nor'easter/windstorm/thunderstorm) | X | | |
| Drought/Heat Wave | | X | |
| Earthquake | | | X |
| Landslide/slope failure/rock fall/subsidence/expansive soils | | | X |
| Building fires | X | | |
| Wildfire | | | X |
| Hazardous materials release (truck, train, & ship accident, storage tanks) | X | | |
| Nuclear facility accident/nuclear materials release | | | X |
| Dam failure | | | X |
| Bridge collapse | | X | |
| Utility disruptions/failures | X | | |
| Terrorism/civil unrest/mass act of violence | | | X |
| Mass casualty involving train derailment, boat accident, plane crash, multi-vehicle crash/pileup) | | X | |
| Epidemic | | X | |

3.3.5 Inventory of Community Assets and Critical Infrastructure

The inventory of community assets and critical infrastructure is a key element of the MHMP as it provides an inventory of important features and facilities, assesses their vulnerability to hazards, considers the potential scope and scale of impacts, and serves as the basis for devising the strategies, policies, programs and initiatives to protect them.

The inventory of assets and critical infrastructure was developed through various means including:

- a guided tour of the Village involving the Village Administrator and project consultants;

- follow-up field inventories by the consultants;
- a review of existing plans and studies;
- preparation and analysis of maps using Westchester County GIS data;
- other online resources, and
- direct requests for input from MHMPC members at committee meetings and the general public and other stakeholders at public meetings.

In regard to possible threats to critical infrastructure and community assets and resources, it should be noted that the Village is geographically small with just 2.3 square miles of land area. Many of the hazards considered by this MHMP can strike anywhere or everywhere within the community. Flooding is most likely to affect the 100-year flood zone along the Hudson and Pocantico Rivers, winds may tend to be stronger near the open waters of the Hudson, particularly when winds come from the west or at highest elevations where vegetation is sparse or cleared. A Pocantico Lake Dam failure would affect areas adjacent to the Pocantico River channel. The erosive force of a dam failure would likely be felt closer to the dam, in areas where the river bank is not properly stabilized, and where there is limited slope such as at the mouth of the river in southwest Sleepy Hollow. Slope failure is more likely to occur along very steep, unstabilized developed slopes, though other factors play a role. The effects of hurricanes are more likely to occur in flood zones and near the Hudson where wind speeds may be higher and more of the building stock is located, but damage from trees may be more likely in interior forested locations near development. Some hazardous materials releases can occur along major transportation routes including local highways, the Metro North Railroad, and Hudson River or at hazardous materials storage facilities such as gasoline stations, industrial facility (though only one small industrial land use was identified) the hospital or water treatment facility. A sudden sewer release at the emergency outfall in the Village would also occur at a known location. Other types of hazardous events such as tornadoes, earthquakes, blizzards, hail storms, power outages, heat waves, droughts, terrorism/violent acts, epidemics, and mass casualty events, or locations where a fire could occur tend to have a wider geographic distribution or can threaten various widely distributed locations and structures, making prevention and damage estimates difficult to

predict. The table below provides a list of critical infrastructure and community assets in the Village, and identifies their locations, functions, and some potential threats and issues associated with them.

Table 3-8

| INVENTORY OF VILLAGE ASSETS AND CRITICAL INFRASTRUCTURE | | | |
|--|--------------------------------|--|--|
| Asset or Infrastructure | Location | Function of Asset/Infrastructure | Threats and Potential Issues |
| Sleepy Hollow High School | 210 North Broadway | Educational institution, Possible emergency shelter | Vulnerable population, high occupancy, loss of power & communications, loss of records, emergency situation, disruption of school activity |
| Sleepy Hollow Middle School | 210 North Broadway | Educational institution, Possible emergency shelter | Vulnerable population, high occupancy, loss of power & communications, loss of records, emergency situation, disruption of school activity |
| John Paulding Elementary School | 154 North Broadway (Tarrytown) | Possible emergency shelter | Vulnerable population, high occupancy, loss of power & communications, loss of records, emergency situation, disruption of school activity |
| WL Morse Elementary School | 30 Pocantico Street | Educational institution, Possible emergency shelter | Vulnerable population, high occupancy, loss of power & communications, loss of records, emergency situation, disruption of school activity |
| Kendal on the Hudson Assisted Living Facility | 701 North Broadway | Housing and personal care | Vulnerable population, high occupancy, multi-story structure, loss of power & communications |
| Kendal on the Hudson Assisted Living Facility | 1010 Kendal Way | Housing and personal care | Vulnerable population, high occupancy, multi-story structure, loss of power & communications |
| High Rise Residential Building, Sleepy Hollow Senior Housing | 124 Valley Street | Housing for the elderly | Vulnerable population, high occupancy, multi-story structure, loss of power & communications |
| High-Rise Residential Building | 126 Valley Street | Housing | Vulnerable population, high occupancy, multi-story structure, loss of power & communications |
| Senior Citizen Center | 5 Elm Street | Community gathering and support center for seniors, possible emergency shelter | Vulnerable population, periodically contains a large number of occupants, loss of power & communications |

| INVENTORY OF VILLAGE ASSETS AND CRITICAL INFRASTRUCTURE | | | |
|--|--|--|---|
| Asset or Infrastructure | Location | Function of Asset/Infrastructure | Threats and Potential Issues |
| Group Homes | 258 Farrington, 49 Hudson Terrace, One Evergreen Way | Housing and personal assistance | Vulnerable populations, loss of power & communications |
| Sleepy Hollow Police Station | 28 Beekman Avenue | Critical emergency response facility and local police headquarters | Disruption to command and control center and emergency response, damage to cruisers and other equipment, loss of power, partial loss of communications |
| Sleepy Hollow Fire Station (Station 1) | 28 Beekman Avenue | Critical emergency response facility, main station | Disruption to command and control center and emergency response, damage to equipment, loss of power, partial loss of communications |
| Sleepy Hollow Fire Station (Station 2) | 11 Lawrence Avenue | Critical emergency response facility | Damage to equipment, disruption to emergency response, loss of power and partial loss of communications |
| Sleepy Hollow Fire Station (Station 3) | 129 Cortlandt Street | Critical emergency response facility | Damage to equipment, disruption to emergency response, loss of power & partial loss of communications |
| Sleepy Hollow Ambulance | 29 Andrews Lane | Critical emergency response facility/ headquarters | Disruption to command and control center and disruption to emergency response, damage to equipment, loss of power & partial loss of communications |
| Phelps Memorial Hospital | 701 North Broadway | Critical emergency response facility | Vulnerable population, high occupancy, possible evacuation, major casualties, epidemic, physicians and staff unable to get to hospital, supplies disrupted, located on a bluff above the river, possible loss of communications and loss of records |
| Village Hall | 28 Beekman Avenue | Critical emergency response and administration facility | Loss of records, disruption of command and control center, loss of power & communications |

| INVENTORY OF VILLAGE ASSETS AND CRITICAL INFRASTRUCTURE | | | |
|--|--|---|--|
| Asset or Infrastructure | Location | Function of Asset/Infrastructure | Threats and Potential Issues |
| Village DPW | River Street | Critical emergency response facility | Damage to disaster recovery equipment, fueling station, loss of power & communications, may be subject to flooding in an extreme flood or large storm surge event ² ; rising sea levels could exacerbate the potential for flooding in the future |
| 800,000 gallon water storage tank | Rockefeller State Park, Mount Pleasant | Critical infrastructure, proposed storage tank to reduce risk of shortage | Failure of tank, pumps, or piping, loss of power compromised water or shortage, drought, proposed storage tank to reduce risk of shortage, vandalism |
| Proposed 1.4 M gallon water storage tank | Rockefeller Property | Critical infrastructure | Failure of tank, pumps, or piping, loss of power compromised water or shortage, drought, proposed storage tank to reduce risk of shortage, vandalism |
| Phelps Hospital water storage tanks including one 250,000 gallon tank for fire sprinklers and a 100,000 gallon potable water tanks which at the time was empty | Phelps Memorial Hospital | Critical infrastructure, firefighting water supply | Failure of tank, pumps or piping, loss of power, water shortage, drought, one tank used for fire protection for hospital, the other tank is empty |
| Sleepy Hollow Pump Station | Village of Tarrytown | Critical infrastructure | Failure of pump, pipe failure, water shortage, loss of power |
| New Water Pump Station | Shaft 9 of New Croton Aqueduct, Sleepy Hollow Road | Critical infrastructure | Failure of pump, pipe failure, water shortage, loss of power |
| Water Pump Station/ and Treatment | Tarrytown | Critical infrastructure | Failure of pump, water shortage, treatment of water, materials stored on-site, loss of power, hazardous materials |
| Catskill Aqueduct | Through area from Catskill Mountains to Yonkers | Critical infrastructure, Sleepy Hollow's source of drinking water | Failure of pumps, contamination/ health issue, insufficient water supply (drought), loss of power |

² The Village is currently considering temporary flood barriers at Horan's and along the Riverwalk in conjunction with replacing the bulkhead due to flooding in that area during storms. These barriers would also help to protect the DPW property.

*Village of Sleepy Hollow
Multi-Hazard Mitigation Plan*

| INVENTORY OF VILLAGE ASSETS AND CRITICAL INFRASTRUCTURE | | | |
|--|---|---|---|
| Asset or Infrastructure | Location | Function of Asset/Infrastructure | Threats and Potential Issues |
| Old Croton Aqueduct | Passes through Sleepy Hollow | State and National Register of Historic Places | Historical structure |
| Sewage Treatment Plant | Yonkers | Critical infrastructure | Pump failure, loss of power leaking pipe, direct discharge to river, environmental damage, health issue |
| Tarrytown/Sleepy Hollow Sewer Booster Station | Riverside Drive | Critical infrastructure | Pump failure, loss of power pipe failure, discharge to river |
| Electricity/ tele-communications | Overhead lines and poles throughout | Critical infrastructure | Downed overhead wires from fallen trees and branches, ice, and vehicle accidents causing loss of electricity and communications |
| Natural gas lines and private propane storage tanks | Throughout | Critical infrastructure | Leaks, explosion, fire |
| Five gasoline stations | Along North Broadway in south and south-central Sleepy Hollow | Critical infrastructure | Shortage of fuel for vehicles and generators, leaks, fires, explosions, potential effect on emergency response |
| Computer systems | Village government facilities, police department, businesses | Critical infrastructure, communications | Power failure, wifi failure, hacking, loss of records, loss of communications/ inability to send mass emails |
| Sleepy Hollow Post Office | 45 Beekman Avenue | Communications | Interruption of mail service |
| HVAC systems | Buildings | Critical infrastructure | Introduction of airborne contaminants into buildings, impacts from extreme heat or cold, public health and safety |
| Pocantico Dam | Pocantico Lake 0.8-mile north and upstream of Sleepy Hollow | Critical infrastructure, improvements recently made | Dam failure, flooding, erosion, evacuation |
| Philipsburg Manor Dam (private) | 381 North Broadway | Minor water impoundment | Dam failure (low risk), impact to an historical site, tourism |
| Philipsburg Manor Pedestrian Bridge (private) | 381 North Broadway | Pedestrian bridge | Collapse, privately owned, impact to an historical site/ tourism |
| Devries Park Bridge | Devries Park | Critical infrastructure | Collapse, flooding, erosion, public health and safety |
| Metro North Railroad/ Pocantico River Bridge | Metro North Railroad and the Pocantico River | Critical transportation infrastructure | Collapse, train accident (commuter or freight), public health and safety, contamination of river |
| Metro North Railroad/ Beekman Avenue Bridge | Metro North Railroad and Beekman Avenue | Critical transportation infrastructure | Collapse, train accident, public health and safety, (commuter or freight) |

| INVENTORY OF VILLAGE ASSETS AND CRITICAL INFRASTRUCTURE | | | |
|--|---|---|---|
| Asset or Infrastructure | Location | Function of Asset/Infrastructure | Threats and Potential Issues |
| Metro North Railroad/River Street Bridge | Metro North Railroad and River Street | Critical transportation infrastructure | Collapse, train accident, public health and safety, (commuter or freight) |
| Fremont Lake Bridge | Pokahoe Drive and Fremont Lake | Critical transportation infrastructure | traffic impacts, public health and safety |
| Route 9/Pocantico River Bridge | Intersection of Route 9 and the Pocantico River | Critical transportation infrastructure possible evacuation route, designated scenic highway | Collapse, difficult evacuation and emergency response, traffic impacts, public health and safety |
| Dingle Road Bridge | Dingle Road | Critical transportation infrastructure | Collapse, difficult evacuation and emergency response, traffic impacts, public health and safety |
| Tappan Zee Bridge | New York Thruway (Route 287), Tarrytown | Critical transportation infrastructure, possible evacuation route depending on circumstances | Collapse, traffic impacts, difficult evacuation, public health and safety, rescues, new bridge to be constructed |
| North Roadway (Route 9) | Major north/ south route through Village | Critical transportation infrastructure, possible evacuation route, major roadway to hospital, businesses, schools, gas stations | Traffic, icy conditions, snow, emergency response including to hospital, disruption of businesses, restricted evacuation, public safety |
| Bedford Road (Route 448) | Major east-west bound route through Village, connects to Beekman Avenue | Critical transportation infrastructure, possible evacuation route | Traffic, icy conditions, snow, restricted evacuation |
| Beekman Avenue | East/ west roadway | Critical transportation infrastructure, business district, police, fire and Village headquarters, post office, school | Disruption to businesses, Village Hall, police and fire department activities, public safety |
| Sleepy Hollow Road | North south route between Highway 117, Beekman Avenue and County House Road | Critical transportation infrastructure, possible evacuation route | Loss of service, possible hazardous conditions |
| Phelps Way (Route 117) | Major east-west route in nearby Briarcliff Manor to Phelps Hospital | Critical transportation infrastructure, possible evacuation route, major route to hospital | Loss of service, hazardous conditions, disruption of traffic to hospital, traffic impacts, public safety |

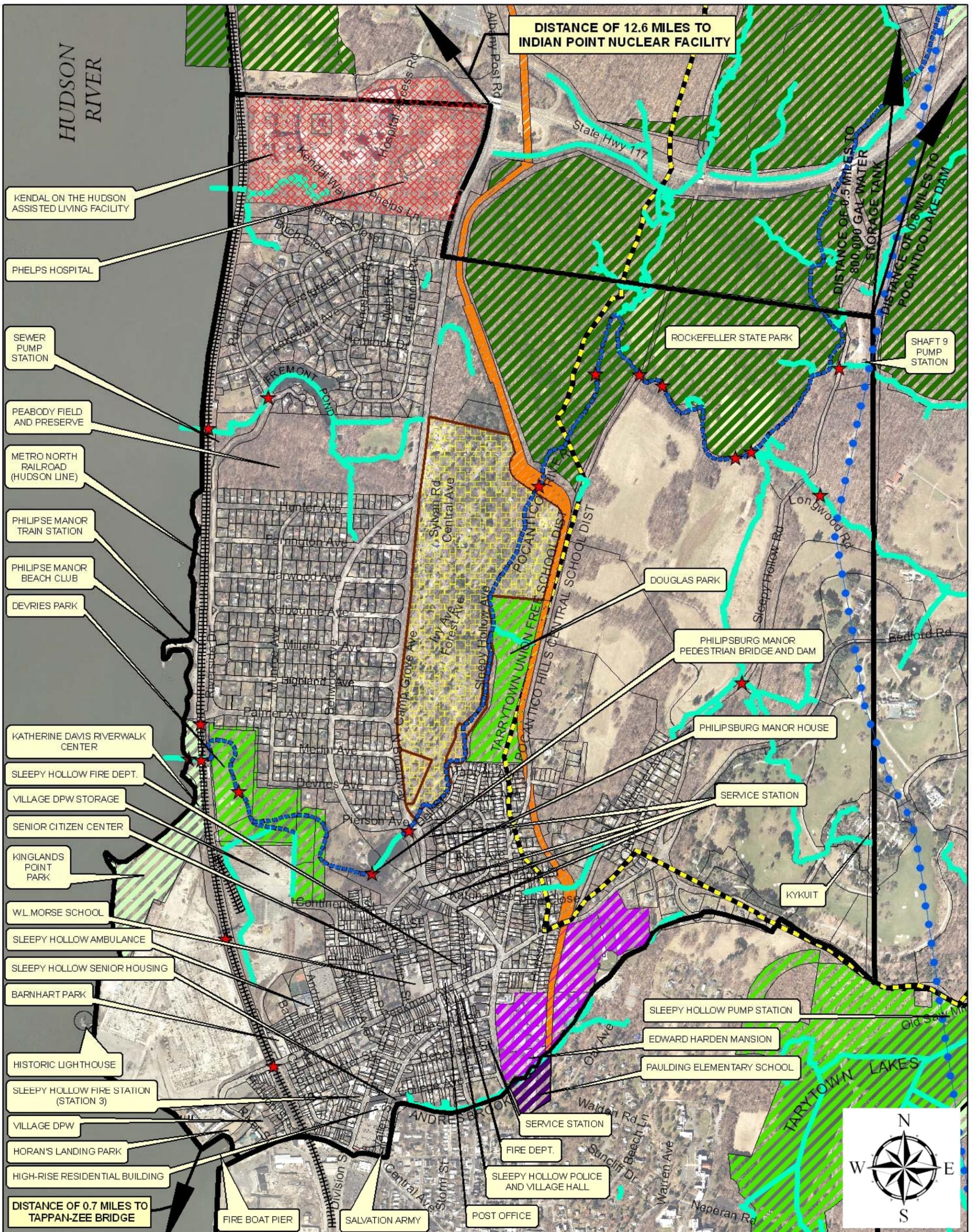
| INVENTORY OF VILLAGE ASSETS AND CRITICAL INFRASTRUCTURE | | | |
|--|--|--|--|
| Asset or Infrastructure | Location | Function of Asset/Infrastructure | Threats and Potential Issues |
| Eight signalized street intersections | Several locations: five along Route 9, plus three others | Critical transportation infrastructure | Power outages making signals inoperable and intersections hazardous, evacuation difficulties, traffic impacts, emergency response issues, public health and safety |
| Metro North Railroad (Hudson Line) | West side of Village parallel with Hudson shoreline | Critical transportation infrastructure, possible evacuation route | Derailment/accident/loss of service, earthquake, economic disruption, injuries to passengers, freight spills, economic disruption, public health and safety |
| Philipse Manor Train Station | 78 Riverside Drive & 270 Millard Avenue | Critical transportation infrastructure, State and National Register of Historic Places | Disruption of train service, economic disruption, historic landmark |
| Shipping areas/lanes | Hudson River | Critical transportation infrastructure, important environmental feature, economic importance | Economic disruption, shipping accidents, fires, explosions, spills, environmental contamination, public health and safety |
| Philipse Beach Club (Private) | 1 Riverside Drive | Private recreational facility | Flooding, erosion, impacts to private recreational facilities |
| Kingsland Point County Park | West side of Village along Hudson River | Possible emergency staging area and temporary debris storage, park | Flooding, erosion, bulkhead damage, disruption to possible emergency staging area and temporary debris storage, impacts to recreational facilities |
| Douglas Park | East side of Pocantico River, west side of Gory Brook Road | Flood storage area, park | Disruption to possible emergency staging area and temporary debris storage, impacts to recreational facilities |
| Barnhart Park | Barnhart Avenue | Possible emergency staging area and temporary debris storage, park | Disruption to possible emergency staging area and temporary debris storage, impacts to recreational facilities |
| Rockefeller State Park Preserve | Northern section of Village between Routes 9 and 448 | Flood storage area, possible emergency staging area and temporary debris storage, park | Disruption to possible emergency staging area and temporary debris storage, impacts to recreational facilities, open space and tourism |
| Weber Park | Webber Park section of Village | Possible emergency staging area and temporary debris storage, park | Disruption to possible emergency staging area and temporary debris storage, impact to recreational facilities |

*Village of Sleepy Hollow
Multi-Hazard Mitigation Plan*

| INVENTORY OF VILLAGE ASSETS AND CRITICAL INFRASTRUCTURE | | | |
|--|---|---|--|
| Asset or Infrastructure | Location | Function of Asset/Infrastructure | Threats and Potential Issues |
| Devries Park | Southwest of Philipse Manor, east side of Metro North Railroad | Flood storage area, possible emergency staging area and temporary debris storage, park | Disruption to possible emergency staging area and temporary debris storage, supply could be inundated, impact to recreational facilities |
| Peabody Field and Preserve | West of Route 9 and Cemetery between Philipse Manor and Sleepy Hollow Manor | Flood storage area for stream and wetland, recreational field, open space, wildlife preserve | Impacts to open space, wildlife habitat, impact to recreational facilities |
| Reverend Sykes Park | Wildey Street & Valley Street (Sleepy Hollow-Tarrytown) | Park | Impact to recreational facility |
| Patriots Park | Sleepy Hollow-Tarrytown, next to Warner Library | State and National Register of Historic Places, possible emergency staging area and temporary debris storage, park | Impact to historic landmark, recreational activities |
| Former GM property | Southwest Sleepy Hollow adjacent to the Hudson | Vacant redevelopment site, near shoreline | New development proposed, flooding if not properly developed, economic and residential impacts if affected |
| Part of former GM property used by Village | Former GM Site | Vacant, used by Village, prone to flooding, possible emergency response staging area when flooding not an issue | Flooding, disruption to possible emergency staging area and temporary debris storage |
| Salvation Army | Corner of Wildey Street & Valley Street in Tarrytown | Nearby provided of disaster assistance | Power outage, impacts to emergency response |
| Sleepy Hollow Cemetery | East side of North Broadway, west side of Old Croton Aqueduct | Flood storage, important tourism/ economic resource, community landmark, State and National Register of Historic Places | Valued historic and cultural landmark, impact on tourism and community character |
| Old Dutch Church | 42 North Broadway | State and National Register of Historic Places | Historical and cultural resource, impacts to tourism |
| Philipsburg Manor House | 381 North Broadway | National Register of Historic Places | Historical and cultural resource, tourism, damage from storms, flooding, impacts to tourism |

| INVENTORY OF VILLAGE ASSETS AND CRITICAL INFRASTRUCTURE | | | |
|--|--|--|---|
| Asset or Infrastructure | Location | Function of Asset/Infrastructure | Threats and Potential Issues |
| Historic Lighthouse at Sleepy Hollow/ Tarrytown | Hudson River off Kingsland Point County Park | State and National Register of Historic Places | Historical and cultural resource, shipping accident/dredging currently occurring around lighthouse, impacts to tourism |
| Edward Harden Mansion | 200 North Broadway | State and National Register of Historic Places | Historical and cultural resource, impacts to tourism |
| Kykuit (Rockefeller Estate) | 381 North Broadway | State and National Register of Historic Places | Historical and cultural resource, impacts to tourism |
| Hudson River and adjacent floodplains | West side of Village from north to south sides | Flood storage area, important environmental and economic resource, flood-prone areas, travel and shipping corridor | Flooding, erosion, boating/ shipping accidents, hazardous materials spills, damage to shoreline structures, loss of building contents and bulkheads/ slope failure, recreational impacts, future sea level rise |
| Pocantico River and adjacent floodplains | Northeast to southwest through Sleepy Hollow | Flood storage area, flood prone at lower elevations, especially in southwest Sleepy Hollow | Flooding, erosion, damage to bulkheads, undercut banks/slope failure, Pocantico Lake dam failure, future sea level rise |

Community Assets and Critical Infrastructure in the Village are depicted in Figure 3-14.



- NOTES:
1. VILLAGE OF SLEEPY HOLLOW FIRE DISTRICT IS ALL WITHIN THE VILLAGE BOUNDARY
 2. VILLAGE OF SLEEPY HOLLOW IN ITS ENTIRETY IS WITHIN THE SAW MILL SEWER DISTRICT
 3. VILLAGE OF SLEEPY HOLLOW IN ITS ENTIRETY IS WITHIN THE NORTH TARRYTOWN WATER DISTRICT
 4. VILLAGE OF SLEEPY HOLLOW IN ITS ENTIRETY IS WITHIN THE SLEEPY HOLLOW EMS DISTRICT

Westchester County
New York

Geographic Information Systems

Cashin Associates, P.C.

ENGINEERING PLANNING & CONSTRUCTION MANAGEMENT

| Legend | |
|-----------------------------------|--------------------------------------|
| VILLAGE OF SLEEPY HOLLOW BOUNDARY | OLD CROTON AQUEDUCT |
| PHELPS/SLOAN-KETTERING HOSPITAL | SLEEPY HOLLOW MIDDLE AND HIGH SCHOOL |
| BRIDGES AND DAMS | SLEEPY HOLLOW CEMETERY |
| POCANTICO RIVER | SCHOOL DISTRICT |
| CROTON AQUEDUCT | RAILROAD |
| STREAMS | COUNTY RECREATION |
| | MUNICIPAL RECREATION |
| | STATE RECREATION |



FIGURE 3-14
VILLAGE OF SLEEPY HOLLOW
MULTI-HAZARD
MITIGATION PLAN
COMMUNITY ASSETS AND
CRITICAL INFRASTRUCTURE

3.3.6 Vulnerable Populations

Vulnerable populations identified in the community include children, the elderly, the injured, sick, and frail, those with severe cognitive limitations or psychological impairment, the handicapped, and possibly, to a lesser extent, non-English speaking residents if translators are not readily available. These populations may be more susceptible to injury, health effects, and/or death from a catastrophe. Locations where large potentially vulnerable populations exist include the Village's day care centers, its three group homes, its four schools, the Senior Citizen Center, Phelps Hospital, the Kendal assisted living facilities, individuals living in hazardous areas such as floodplains, steep slope areas or erosion prone locations, or in buildings that are not up to code or that contain illegal overcrowded conditions. Evacuation of the elderly, infants, injured, sick and handicapped from high-rise buildings or large residential buildings (Van Tassel Apartments, 124 & 126 Valley Street, Kendal Assisted Living Center) in the event of a fire, earthquake or other disaster may be complicated if elevators are not functioning. Large events such as the Village's annual Halloween celebration, parades, and the triathlon, half-marathon, 10K and 5K races that are run through the Village can also involve large numbers of people, some who may not be too familiar with the Village, not have a home or shelter in the Village, and otherwise, may be more vulnerable in an emergency situation.

School districts, hospitals, nursing homes, and adult care facilities are required by the State to have emergency plans in place and permits for large events typically require an adequate level of designated security and emergency response personnel to assist the public in the event of an emergency or dangerous situation.

The Village has a large community of Spanish speaking or bilingual people who may not be able to speak or fully speak and understand English and may therefore have difficulty understanding instructions or communicate with English speaking persons effectively. These individuals may not be able to adequately respond to emergency instructions or be properly informed about hazard mitigation, health and safety concerns, evacuation

procedures or other instructions that are essential to protecting life and property. Nevertheless, there are likely numerous bilingual residents who can assist in translating pertinent information during a crisis.

3.3.7 Repetitive Loss Properties

Based on available information from FEMA, there are a total of 21 National Flood Insurance Program properties in the Village that have flood insurance policies that were in force as of October 31, 2012. The NFIP has received ten claims since 1984 and five of these claims were paid out. Two of the five claims were for the same property. Only one property (a residential property) in the Village met the criteria as a repetitive loss property (RLP) which is defined 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, but not within ten days of one another.

The two claims for the one RLP were made about a year apart nearly thirty years ago. The exact locations of RLPs are considered confidential information and therefore are not provided in this plan. The locations of the 4 properties that received payments for their claims, including the one RLP, are relatively widely disbursed, but are within the western half of the Village.

Although not listed as an RLP, the Village has parkland that is periodically inundated by flooding.

Severe Repetitive Loss (SRL) properties are defined as residential properties that are covered under NFIP flood insurance policies and: (a) have at least four NFIP claim payments (including building and contents damages) over \$5,000 each, and the cumulative amount of such claims payments exceeds \$20,000; or (b) have had at least two separate claims payments (building payments only) with the cumulative amount of the building portion of such claims exceeding the market value of the building. For both (a) and (b) above, at least two of the referenced claims must have occurred within any

ten-year period, and must be greater than 10 days apart. No SRL properties were identified in the Village.

3.3.8 HAZUS-MH Multi-Hazard Loss Estimation

HAZUS-MH MR5 Multi-Hazard Loss Estimation (2010) is a software model developed by FEMA that estimates the potential social and economic impacts of hurricanes, riverine flooding, coastal flooding, and earthquakes in a given area based on selected recurrence intervals (probabilistic) or specially defined event characteristics. The model relies on 2000 US Census data as well as land use, building type, estimated dollar value of threatened structures, hydrography, topography, and other compiled information to generate projections for a given region. Estimates of losses are in 2006 dollars. Critical baseline data provided by the model include: total population, residential building count, residential dollar exposure, commercial building count, commercial dollar exposure, other building count, and other building exposure.

Estimated impacts and losses may differ from actual effects depending on a number of factors, including but not limited to the interplay of existing conditions and actual specific characteristics of an event, increased potential for losses from future development, inflation, the level of protection and preparedness of a community, etc. It should be noted that the data used in the HAZUS-MH model was collected prior to the construction of the Kendal on the Hudson facilities which today include a 24-bed assisted living facility and a 222-unit (325-resident) senior citizen apartment complex.

3.3.8.1 Hurricanes

Hurricane models generated for this analysis included four hurricane scenarios: probabilistic models for the 50-, 100-, and 200-year return hurricanes and a historical/user-defined model Category 3 Hurricane with 120mph sustained winds and 144 mph peak gusts. A Category 3 Hurricane is considered a severe hurricane for the area since hurricane strength typically diminishes as storms make landfall and move inland

and a Category 3 would be considered a very rare event in Sleepy Hollow. The wind speeds expected from a Category 3 hurricane would be similar to the wind speeds expected by an F2 or EF3 tornado, although wind characteristics of hurricanes and tornadoes and their potential for damage differ.

The analyses were based on approximately 1,965 buildings, 9,200 residents, and a total of \$691 million in exposure value (total potential loss). Data delivered by the HAZUS-MH model included:

- information about the general building stock including: building counts by type of construction and building use, total dollar exposure, number of buildings damaged by percent of damage, and estimated economic losses from the repair or replacement of buildings and their contents; and
- business interruption/loss of income by use classification, affects to critical services (i.e., police, fire, hospital, schools), number of displaced persons requiring temporary shelter, debris generation in tons, and total economic losses.

A summary of the findings of the projections for the four hurricane scenarios is provided below.

Table 3-9

| SUMMARY OF TOTAL ESTIMATED ECONOMIC LOSS FROM 50-, 100-, AND 200-YEAR HURRICANES AND A CATEGORY 3 HURRICANE | | | | |
|--|----------------|-----------------|-----------------|------------------------|
| <i>Recurrence Interval</i> | <i>50-Year</i> | <i>100-Year</i> | <i>200-Year</i> | <i>Category3</i> |
| Total Buildings Damaged¹ | 1(Mod) | 4(Mod) | 19 (Mod) | 1,349(Mod); 222 (D) |
| Total Loss (\$ Millions)² | 0 | 2.0 | 5.0 | 368.8 |
| Debris Generated (Tons)³ | 138 | 602 | 1,615 | 37,160 |
| Number of Households Displaced or Evacuated⁴ | 0 | 0 | 0 | 1,430 |
| Number of Persons Displaced or Evacuated | 0 | 0 | 0 | 368 |

(1) At least moderate damage but not destroyed = (“Mod”); destroyed = (“D”)
(2) Total loss includes: damage to buildings (building, building contents, & inventory) and business interruption (income, relocation costs, rental income, and wages)
(3) Includes brick/wood, reinforced concrete/steel, and trees
(4) Displacement includes households evacuated from within or very near to the inundated area.
Source: FEMA HAZUS-MH, 2010

Appendix D includes the data printout from the HAZUS-MH hurricane loss estimation for the Village.

3.3.8.2 Flooding

The HAZUS-MH model was used to provide an estimate of the social and economic effects of the 100-year flood on the Village. The results of the 100-year flood assessments for the Pocantico and Hudson Rivers are provided separately below in Tables 3-9 and 3-10. As with the hurricane analysis, the model uses 2000 Census data and losses are estimated in 2006 dollars. The total building stock was estimated to be approximately 1,965 and the total building exposure (potential loss) is \$691 million. The population used for this analysis is 9,200.

Table 3-10

| SUMMARY OF TOTAL ESTIMATED ECONOMIC LOSS 100-YEAR FLOOD RECURRENCE POCANTICO RIVER ONLY | |
|--|------------------------|
| <i>Recurrence Interval</i> | <i>100-Year</i> |
| Total Buildings Damaged¹ | 3(Mod) |
| Total Loss (\$ Millions)² | 3.72 |
| Debris Generated (Tons) | 137 |
| Number of Households Displaced or Evacuated³ | 42 |
| Number of Persons Displaced or Evacuated | 88 |

(1) At least moderate damage but not destroyed = (“Mod”); destroyed = (“D”)
(2) Total loss includes: damage to buildings (building, building contents, & inventory) and business interruption (income, relocation costs, rental income, and wages)
(3) Displacement includes households evacuated from within or very near to the inundated area.
Source: FEMA HAZUS-MH, 2010

Table 3-11

| SUMMARY OF TOTAL ESTIMATED ECONOMIC LOSS 100-YEAR FLOOD RECURRENCE HUDSON RIVER ONLY | |
|---|------------------------|
| <i>Recurrence Interval</i> | <i>100-Year</i> |
| Total Buildings Damaged¹ | 50(Mod); 43(D) |
| Total Loss (\$ Millions)² | 29.69 |
| Debris Generated (Tons) | 4,542 |
| Number of Households Displaced or Evacuated³ | 132 |
| Number of Persons Displaced or Evacuated | 246 |

- (1) At least moderate damage but not destroyed = (“Mod”); destroyed = (“D”)
 (2) Total loss includes: damage to buildings (building, building contents, & inventory) and business interruption (income, relocation costs, rental income, and wages)
 (3) Displacement includes households evacuated from within or very near to the inundated area.
 Source: FEMA HAZUS-MH, 2010

Appendix E-1 includes the data printout from the HAZUS-MH Flood loss estimation for the section of the Pocantico River in the Village and Appendix E-2 includes the data printout for the Hudson River assessment.

3.3.8.3 Earthquakes

NYSOEM (2008) performed an analysis of projected monetary losses from earthquakes by *County* using FEMA’s HAZUS impact projection software. The software considers the level of risk from earthquakes by region (i.e., the county level) and the density of development that could be affected to estimate potential economic losses. For example, one county may have a high risk of relatively strong earthquakes but have limited development that could be affected, while another county may have a low risk from earthquakes but have dense development that may be particularly vulnerable to the effects of a rare earthquake.

The model estimates total cumulative losses for capital stock including cost of repair and replacement of damaged and destroyed buildings, damage or loss of building contents, and impacts to commercial building inventories, as well as loss of income from business and institutional land uses related to relocation expenses, capital-related income losses (loss of productivity, services or sales), wage or income losses, and rental income losses.

Annualized total losses are estimated based on the intensity of ground shaking for four 2,500-, 1,000-, 500-, and 250-year return periods. The estimated losses are then converted to annualized losses to provide dollar estimates for each county in the State from earthquakes per year. Table 3-11 shows the estimated losses for probabilistic earthquakes in *Westchester County* based on the 2,500, 1,000, 500, and 250-year earthquakes.

Table 3-12

| HAZUS-MH EARTHQUAKE LOSS ESTIMATION FOR WESTCHESTER COUNTY, NY | | | | |
|---|-------------------|-------------------|-----------------|-----------------|
| Total Exposure¹ | 2,500-year | 1,000-year | 500-year | 250-year |
| \$69,147,392,000 | \$4,579,368,000 | \$1,218,843,000 | \$343,001,000 | \$69,121,000 |

Source: NYSOEM, 2008

(1) Estimated dollar value of entire building stock

NYSOME further separates the data generated for each county into five annualized loss estimate categories (i.e., capital stock, income, total losses, loss ratio and losses per capita) and provides relative threat and vulnerability rankings for each of the 62 counties (1 being the highest ranking and 62 being the lowest) for the following categories:

- Exposure Rank
- Exposure Ratio Rank (annualized total loss ratio in dollars per million in exposure)
- Annualized Total Loss Rank
- Annualized Total Loss Per Capita Rank

Table 3-14 provides NYSOEM’s estimated losses and rankings for Westchester County based on the aggregation of 100, 250, 500, 1,000, 1,500, 2,000, and 5,000-year losses and exceedance probabilities.

Table 3-13

| HAZUS-MH ANNUALIZED LOSS ESTIMATION AND RANKING RESULTS FOR WESTCHESTER COUNTY, NY | |
|---|------------------|
| <i>Category</i> | <i>Value</i> |
| Total Exposure | \$69,147,392,000 |
| Annualized Capital Stock Losses (\$) | \$4,393,000 |
| Annualized Income Losses (\$) | \$579,000 |
| Annualized Total Losses (\$) | \$4,972,000 |
| Annualized Loss Ratio (\$ per million \$ exposure) | 72 |
| Annualized Loss per Capita (\$) | 5.38 |
| Exposure Rank | 6 |
| Exposure Ratio Rank | 9 |
| Annualized Loss Rank | 5 |
| Annualized Loss Per Capita Rank | 6 |

Source: NYSOEM (2008)

Westchester County has a relatively high vulnerability in terms of potential annualized losses from earthquakes when compared to other counties in the State and the State of New York ranks fourth highest in the country. These data suggest that while the chances of having an earthquake that causes significant damage in the short term is small in the area, an earthquake that could result in considerable losses is still possible. Figures 3-15 and 3-16 graphically depict annualized earthquake loss by county and annualized earthquake loss per capita by county, respectively.

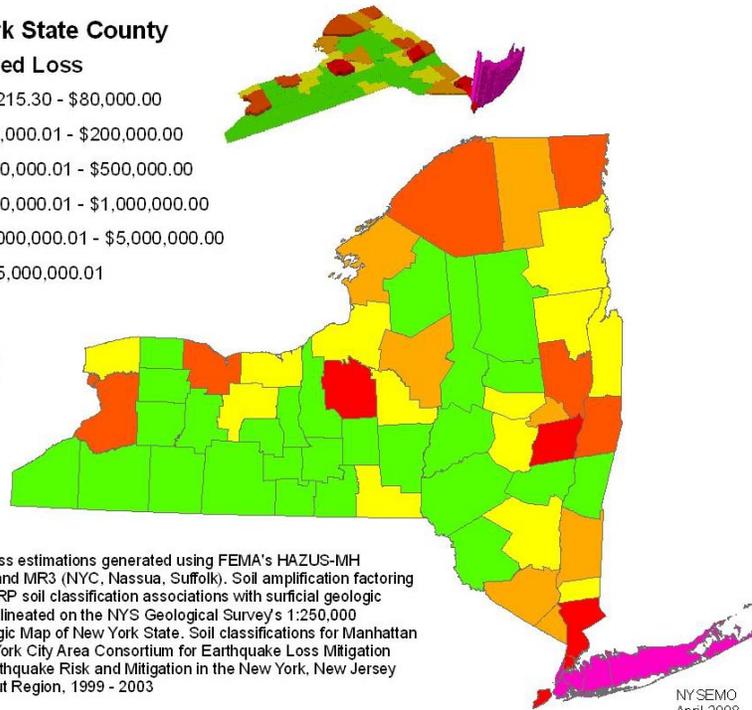
Figure 3-15

ANNUALIZED EARTHQUAKE LOSS *

New York State County

Annualized Loss

- \$4,215.30 - \$80,000.00
- \$80,000.01 - \$200,000.00
- \$200,000.01 - \$500,000.00
- \$500,000.01 - \$1,000,000.00
- \$1,000,000.01 - \$5,000,000.00
- > \$5,000,000.01



* Annualized loss estimations generated using FEMA's HAZUS-MH MR1(upstate) and MR3 (NYC, Nassua, Suffolk). Soil amplification factoring based on NEHRP soil classification associations with surficial geologic materials as delineated on the NYS Geological Survey's 1:250,000 Surficial Geologic Map of New York State. Soil classifications for Manhattan from the New York City Area Consortium for Earthquake Loss Mitigation (NYCEM) - Earthquake Risk and Mitigation in the New York, New Jersey and Connecticut Region, 1999 - 2003

| COUNTY | ANNUALIZED LOSS |
|-------------|-----------------|
| Albany | \$1,375,282 |
| Albany | \$22,374 |
| Bronx | \$2,028,295 |
| Broome | \$193,455 |
| Cattaraugus | \$30,385 |
| Cayuga | \$24,353 |
| Chautauque | \$29,853 |
| Chemung | \$48,508 |
| Chenango | \$33,095 |
| Columbia | \$506,228 |
| Columbia | \$92,441 |
| Cortland | \$30,374 |
| Delaware | \$39,022 |
| Dutchess | \$299,099 |
| Erie | \$872,128 |
| Essex | \$122,235 |
| Franklin | \$239,417 |
| Fulton | \$40,607 |
| Genesee | \$50,753 |
| Greene | \$55,265 |
| Hamilton | \$14,515 |
| Herkimer | \$72,720 |
| Jefferson | \$382,453 |
| Montgomery | \$10,022,018 |
| Lewis | \$24,653 |
| Livingston | \$39,228 |
| Madison | \$159,877 |
| Monroe | \$273,293 |
| Montgomery | \$134,098 |
| Nassau | \$5,420,070 |
| New York | \$12,203,210 |
| Niagara | \$170,073 |
| Onida | \$327,226 |
| Oswego | \$1,243,881 |
| Otsego | \$199,019 |
| Orange | \$427,064 |
| Orlean | \$28,850 |
| Oswego | \$124,970 |
| Otsego | \$17,420 |
| Pulham | \$118,373 |
| Queens | \$6,756,028 |
| Rensselaer | \$516,101 |
| Richmond | \$1,406,849 |
| Rochland | \$401,305 |
| Saratoga | \$507,855 |
| Schenectady | \$114,914 |
| Schoharie | \$80,148 |
| Schuyler | \$7,452 |
| Seneca | \$38,095 |
| St Lawrence | \$899,129 |
| Steuben | \$46,839 |
| Suffolk | \$516,137 |
| Sullivan | \$72,901 |
| Tioga | \$19,836 |
| Tompkins | \$36,273 |
| Ulster | \$170,400 |
| Warren | \$199,447 |
| Washington | \$183,000 |
| Wayne | \$122,881 |
| Westchester | \$1,498,958 |
| Wyoming | \$28,076 |
| Yates | \$4,215 |
| STATE TOTAL | \$81,639,617 |

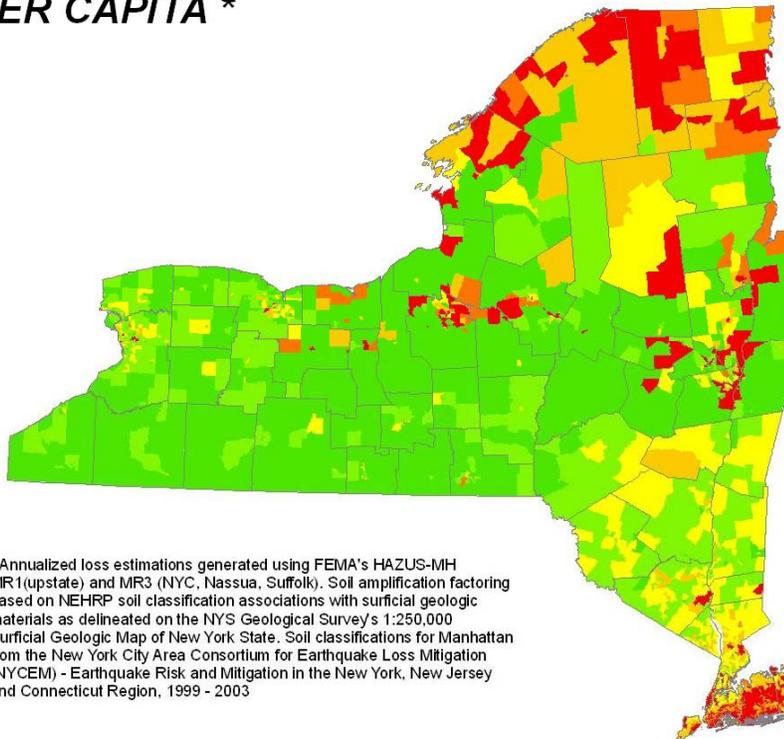
NYSEMO
April 2008

Figure 3-16

ANNUALIZED EARTHQUAKE LOSS PER CAPITA *

Annualized Loss Per Capita

- \$0.00 - \$0.50
- \$0.51 - \$1.00
- \$1.01 - \$2.00
- \$2.01 - \$4.00
- \$4.01 - \$5.00
- >\$5.00



* Annualized loss estimations generated using FEMA's HAZUS-MH MR1(upstate) and MR3 (NYC, Nassua, Suffolk). Soil amplification factoring based on NEHRP soil classification associations with surficial geologic materials as delineated on the NYS Geological Survey's 1:250,000 Surficial Geologic Map of New York State. Soil classifications for Manhattan from the New York City Area Consortium for Earthquake Loss Mitigation (NYCEM) - Earthquake Risk and Mitigation in the New York, New Jersey and Connecticut Region, 1999 - 2003



NYSEMO
April 2008

3.3.9 Multi-Jurisdictional Risk Assessment

The Village made efforts to form a consortium for a multi-jurisdictional hazard mitigation planning effort with the Town of Mount Pleasant and its other Villages but the Town was not interested in participating. The MHMP, therefore, was developed exclusively for the Incorporated Village of Sleepy Hollow and did not directly include other nearby municipalities or special districts. Risk assessments, development of impact mitigation plans, and estimates of potential economic losses were therefore not conducted for areas outside of the Village's boundaries. Nevertheless, the Village, in recognition of the importance of coordinating and seeking input from the public, neighboring communities, the school district, local organizations, and involved and interested agencies, sent invitations to Phelps Hospital, The School District of the Tarrytowns, Westchester County Emergency Services, and the Town of Mount Pleasant to attend public meetings and hearings. Public meetings and hearings were also advertised on the Village website, online, and in the local newspaper. The MHMP Committee was comprised of various first responders including representatives from the police department, fire department, and EMS as well as the Village Administrator, Building Inspector and DPW General Foreman. The Village's consultants reached out to various agencies during preparation of the Plan to obtain important information and ensure diverse opinions and expertise.

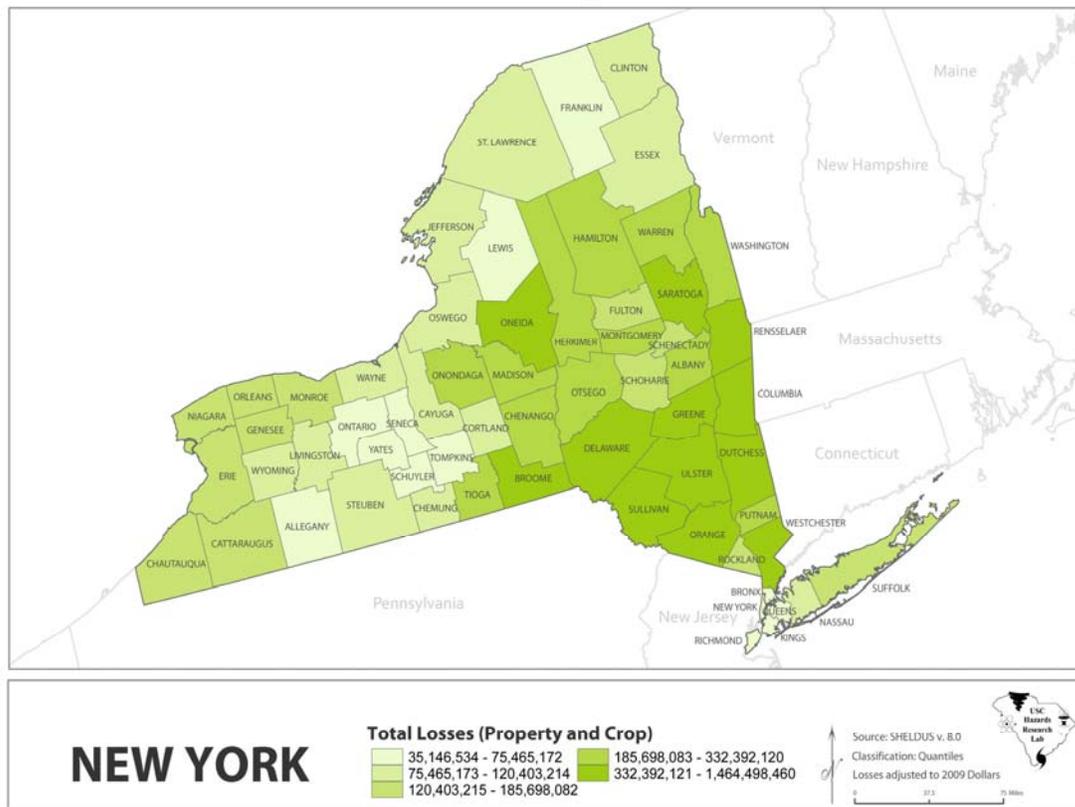
3.3.10 Estimation of Potential Losses from Hazards

The HAZUZ-MH estimates indicate potential losses for particular hazard events scenarios for hurricanes, flooding and earthquakes. It should be noted that future development, such as the mixed-use development proposed on the former GM property and others may significantly increase potential losses, business interruption, and debris generation, depending on site and building design considerations. Moreover, increased property, building, and building content values over time would also be expected to increase the monetary value of future losses in the future.

Figure 3-17 shows the relative total economic losses to property and crops from hazardous events by county in the State between 1960 and 2009 (University of South Carolina, Hazards & Vulnerability Research Institute, 2012). The data reveal that Westchester County has sustained relatively high monetary losses from hazards events in the past when compared to other counties in the State. Factors that can affect the magnitude of damage include the types, numbers, and severity of events, the density of development, acres of cropland, value of the buildings, structures, and crops affected, County hazard mitigation, preparedness and response capabilities, and various other factors.

Figure 3-17

Economic Losses from Hazard Events, 1960-2009



4.0 GENERAL PREPAREDNESS AND CAPABILITIES INVENTORY

The following is an inventory of the plans, regulations, and equipment available to the Village to respond to natural and human-caused or technological hazardous events.

4.1 Emergency and Hazard Mitigation and Response Plans

There are a number of plans, reports, laws, and memoranda that were in place at the time the MHMP was being prepared that address potential risks and hazards in the Village.

Documents include but are not necessarily limited to:

- Sleepy Hollow Police Department General Order Response to Major Emergencies
- Sleepy Hollow Police Department Major Events Contact List
- General Orders of the Sleepy Hollow Police Department
- The Mutual Aid and Rapid Response Plan for the Police Departments of Westchester County, New York
- Sleepy Hollow Ambulance Corps Capabilities Based Response Plan
- Sleepy Hollow Fire Department Mutual Aid Plan
- Village of Sleepy Hollow Stormwater Management Program
- Water Supply Emergency Plan for the Village of Sleepy Hollow
- Emergency Action Plan for Pocantico Lake Dam
- Inter Municipal Agreements with Westchester County
- Phelps Memorial Hospital Center Emergency Operations Plan
- Public Schools of the Tarrytown School Emergency/Disaster Management Plans (for Sleepy Hollow High and Middle Schools and WL Morse Elementary School)
- Sleepy Hollow Local Waterfront Revitalization Program
- The Village Code

Table 4-1 summarizes the contents of the preceding plans, reports and memoranda.

Table 4-1

| EMERGENCY AND HAZARD MITIGATION AND RESPONSE PLANS | |
|--|---|
| Document | General Content |
| Sleepy Hollow Police Department General Order Response to Major Emergencies (2005) | Policies, procedures, duties & responsibilities of police personnel in natural and man-made disasters and civil disturbances; command posts and responsibilities; coordination, available equipment, resources and assistance; communications; special considerations for aircraft crashes, chemical & radioactive materials releases, hostages/barricaded persons; civil demonstrations/disorders; debriefing; post-occurrence duties; and reporting |
| Sleepy Hollow Police Major Events Contact List (2011) | List of contacts in the event of fires, fatal accidents, homicides and other events of extreme importance. |
| General Orders of the Sleepy Hollow Police Department | General orders addressing communications, command protocols, radiation incidents and radiation detection procedures, mass arrest operation and procedures, active shooters, reporting and handling hazardous highway conditions and snow emergencies, |
| The Mutual Aid and Rapid Response Plan for the Police Departments of Westchester County, New York (2011) | Procedures for providing mutual aid and rapid response to jurisdictions during natural and man-made disasters, civil unrest and terrorism, when situations exceed the resources of any individual department; establishment of zones of response; lists of departments included in each zone (e.g., Sleepy Hollow is in Zone C); definitions of levels of response; resources to be dispatched based on level of response; duties of requesting agency; duties of responding agency; responsibilities at scene; post occurrence reporting; annual training and plan review requirements |
| Sleepy Hollow Ambulance Corps Emergency Response Plan | This Emergency Response Plan describes the actions to be implemented in response to a variety of potential events associated with the Duracell, Inc. Site Interim Remedial Measure Program being conducted in the Village of Sleepy Hollow. The Village is currently in the process of preparing a general Emergency Response Plan that will address the entire Village. |
| Sleepy Hollow Fire Department Mutual Aid Plan | Protocols for first, second, and third alarm assignments. The protocols include representation from 10 different area fire departments, three EMS corps, Town paramedics, Westchester County Emergency Services, and Con Edison Gas and Electric. The protocols indicate which equipment and services should go to the scene, relocate, or stand by during each alarm. |
| Fire Department Public Protection Classification Summary Report (2012) | A fire capabilities evaluation by ISO for the Sleepy Hollow Fire Department which assesses current capabilities based on ISO's Fire Suppression Rating Schedule. The schedule considers the following classifications: theoretical amount of water necessary for fire suppression purposes; receiving and handling of fire alarms (telephone systems, telephone lines, staffing, training, and geographic distribution), fire department (equipment, staffing, training, and geographic distribution of fire stations); available water supply (water supply, maintenance of hydrants, and alternative supply(ies)). The fire department received a total Public Protection Classification of 63.10 out of 100 points or Class 4 with 1 being exemplary and 10 not meeting ISO's minimum criteria. The credit for receiving and handling fire alarms was 8.15 out of 10. The total credit for the fire department was 26.30 out of 50 and the total for water supply was 36.27 out of 40. |

| EMERGENCY AND HAZARD MITIGATION AND RESPONSE PLANS | |
|---|---|
| Document | General Content |
| Stormwater Management Plan (2009) | The Stormwater Management Plan covers public education and outreach, public participation and involvement, illicit discharge detection and elimination, construction site stormwater runoff control, and post construction stormwater management. The Plan identifies areas of concern for enhanced operations and maintenance services (sweeping, catch basin cleaning, and litter collection) as the Route 9 Corridor, Beekman Avenue, and areas along the Hudson. Pollution prevention, sedimentation and erosion control, drainage system inspections, employee training, and best management practices (BMP) recommendations are provided in the plan. |
| Water Supply Emergency Plan (Updated 2011) | The objectives of the Village’s Water Supply Emergency Plan are to: ensure that potable water is available in an emergency; protect public health, provide public and official notification, and provide a rapid and efficient return to normal operational conditions. The plan addresses municipal administrative authority, provides a description of the water works facilities, water and sewer department personnel, water works communications, the security system, public notification procedures, water use priorities, vulnerability assessment, and emergency response plan. The Plan addresses the following hazards: drought, power loss, main break, cross connection, contamination of source, vandalism, gasoline or chlorine leak, hurricane, fire, earthquake, blizzard, treatment equipment failure, pump failure, and loss of other controls. |
| Emergency Action Plan for Pocantico Lake Dam (2010) | This Plan addresses emergency notification, dam and site description; emergency detection, evaluation, and classification; general responsibilities under the emergency action plan; and preparedness; and also provides dam failure inundation maps. The plan identifies the following scenarios that could affect flow or the integrity of embankments and spillway: flooding from rain or snowmelt, earthquakes, landslides, sudden upstream water releases, tornadoes or high winds, fires, and vandalism. The Plan includes an evacuation Plan that identifies 58 residences and 5 commercial properties in the Village that may have to be evacuated in the event of a dam failure. |
| Phelps Memorial Hospital Emergency Management Manual (2009) | This is a comprehensive manual for planning for, mitigating, coordinating the response to, and recovering from emergency conditions that could disrupt the delivery of routine services and/or that could increase the demand for services. The Manual: <ul style="list-style-type: none"> • assesses the vulnerability of the organization to real or perceived threats that may adversely affect the environment of care or the hospital’s ability to deliver patient care services. • addresses the mitigation, preparedness, response, and recovery to frame its approach to crisis events; • uses an all-hazards approach to emergency management that is applicable to any type of situation or event, whether pre-identified or not; • establishes policies and procedures to respond to threats; • uses an incident command system (HEICS) consistent with the National Incident Management System (NIMS) to respond to crises; • orients and educates its leadership and staff to their roles in emergency management; • incorporates its emergency management activities into the hospital’s overall quality management process, including ongoing evaluations, reviews, and, as needed, revisions; and • facilitates community emergency management and cooperative planning with local and regional emergency response partners in government, emergency services, healthcare and industry. |

| EMERGENCY AND HAZARD MITIGATION AND RESPONSE PLANS | |
|---|--|
| Document | General Content |
| Phelps Memorial Hospital Center Safety Manual | Policies, responsibilities, procedures, and guidelines for responding to a person with a firearm, an active shooter, and/or hostage situation. |
| Phelps Memorial Hospital Center Emergency Preparedness Resource Inventory | Inventory of essential emergency supplies and storage areas. |
| Public Schools of the Tarrytown School Emergency/Disaster Management Plans (2011) | Policies and plans for responding to an emergency situation, lists of essential materials and resources to have in the event of an emergency, and contact information |
| Sleepy Hollow Local Waterfront Revitalization Program (1997) | The purpose of the LWRP is to promote economic development and revitalization of the Village’s waterfront while assuring the protection and beneficial use of coastal resources. The LWRP identifies land use and development patterns, community resources, applicable local and state policies, proposed land and water uses, and techniques for program implementation. The LWRP contains policies (Policies 11-17A) that relate to the prevention or mitigation of impacts associated with flooding and erosion hazards in flood hazard areas (i.e., 100-year flood zone). The policies specifically address the siting of structures, maintenance of erosion protection structures, expansion of flood and erosion control structures, construction of shoreline facilities in a manner that protects against waves and ice movement, a goal for future development that is constructed so as not to measurably increase flooding or erosion at vulnerable locations, dredging to be conducted so as not to increase erosion, use of flood and erosion structures only used based on necessity and cost/benefit, and the use of non-structural controls preferred over structural controls. |
| Village Code | The laws of the Village of Sleepy Hollow; See also Section 4.2 below |

There are numerous other disaster preparedness, response and recovery plans and studies available to the Village and its emergency responders. These materials have been prepared by federal, state, and county agencies, as well as private organizations and academic institutions. They provide useful information that can further assist the Village in its hazard mitigation efforts. The References section at the end of this plan provides the citation information necessary for obtaining copies. In addition, there are numerous agencies that can assist or provide pertinent guidance and information and a number of available funding programs (See Chapter 6). Other sources of assistance and expertise are listed in the stakeholder table in Chapter 6.

4.2 Village Code

The Village Code contains a number of chapters that directly or indirectly address potential risks. The following is a summary of applicable chapters.

Chapter 11: “Architecture, Land Use Development, Buildings and Building Compliance, Department of” creates positions for fire safety, building inspection, and building compliance.

Chapter 139: “Boardinghouses” regulates boardinghouses to address overcrowding and the hazards associated with overcrowding, requirements for sprinkler systems in buildings, and provisions to allow inspections of these facilities.

Chapter 145: “Building Construction”, addresses providing adequate egress from buildings, sprinkler systems, creation of and the jurisdictions for the Bureau of Fire Prevention, and addresses fire safety, property maintenance, and unsafe buildings and structures.

Chapter 151: “Buildings, Numbering of”, outlines requirements for numbering on all properties that have a principal building to, among other things, help in locating a structure in an emergency situation.

Chapter 182: “Electrical Standards”, to ensure that buildings are properly wired to among other things prevent electrical hazards.

Chapter 193: “Explosives and Blasting”, establishes minimum safeguards to protect human health, safety and welfare and property, by establishing reasonable regulations governing the possession and use of explosive materials.

Chapter 220: “Flood Damage Prevention”, promotes the public’s health, safety, and general welfare, and attempts to minimize public and private losses due to flooding in flood-prone areas, by: A) Regulating uses that are dangerous to health, safety and property due to water or erosion hazards, or that result in damaging increases in erosion

or in flood heights or velocities; B) Requiring that uses vulnerable to floods, including facilities that serve such uses, be protected against flood damage at the time of initial construction; C) Controlling the alteration of natural floodplains, stream channels, and natural protective barriers that accommodate floodwaters; D) Regulating filling, grading, dredging and other development that may increase erosion or flood damages; E) Providing standards for the construction of flood barriers which will unnaturally divert floodwaters or which may increase flood hazards to other lands; and F) Qualifying for and maintaining participation in the National Flood Insurance Program.

Chapter 229: “Gasoline Stations”, has primarily to do with the aesthetics of gasoline stations but also addresses requirements for automatic fire extinguishing systems in gas dispensing areas and fire suppression systems in station pump canopies.

Chapter 245: “Housing”, contains regulations pertaining to space, occupancy, structural, fire safety, equipment, property maintenance, and basic facilities requirements for housing.

Chapter 251: “Industrial Facilities” was created to protect the health, safety and welfare of the residents of the Village of Sleepy Hollow, to prevent the creation of nuisance conditions, risks to public safety, industrial blight, to assure that large industrial properties are evaluated for environmental degradation and that environmental contamination is remediated prior to any significant change in use of an industrial facility and to prevent erosion of the tax base of the Village through the creation of large parcels of abandoned, environmentally contaminated industrial property.

Chapter 268: “Mass Gatherings”, provides among other things, regulations addressing health and safety issues at large events.

Chapter 310: “Property Maintenance”, provides regulations for multifamily and commercial premises, and single-family residences so that they will be maintained in conformance with reasonable safeguards that protect the health, safety, and welfare of the occupants, users, and general public.

Chapter 319: “Residential Occupancy Restrictions”, outlines the regulations addressing overcrowding.

Chapter 353: “Storm Sewers”, provides for the health, safety, and general welfare of the citizens of the Village of Sleepy Hollow through the regulation of pollutant discharges, non-stormwater discharges to the storm drainage system, and system inspection, surveillance, and monitoring procedures.

Chapter 358: “Stormwater Management and Erosion and Sedimentation Controls”, provides regulations and standards to ensure proper stormwater and erosion controls.

Chapter 385: “Trees”, includes, among other things, provisions to require the removal of trees and branches when they threaten the public health, safety and welfare, including obstructing motorist’s views to traffic signals and traffic signs, when they project into sidewalk areas or streets, and when they jeopardize security.

Chapter 400: “Vehicles and Traffic” outlines traffic regulations relating to parking including during major snow storms, restrictions on certain turning movements, and speed limits.

Chapter 411: “Water”, contains regulations pertaining to water use, including restrictions on use during a water emergency, check valves and backflow prevention, and outlines system maintenance requirements.

Chapter 414: “Waterfront Consistency Review”, requires that agencies of the Village of Sleepy Hollow consider the policies and purposes contained in its Local Waterfront Revitalization Program (LWRP) when reviewing applications for action or direct agency action located in the coastal area and to assure that such actions and direct actions are consistent with the Villages policies and purposes. This is particularly relevant to this MHMP as it relates to LWRP policies for flooding and erosion control in the Village’s 100-year flood zone.

Chapter 418: “Wetlands and Water Courses” addresses, among other laudable objectives: the protection of water resources by providing sources of surface water; recharging groundwater and aquifers; and maintaining systems that serve as chemical and biological oxidation basins and/or function as settling basins for naturally occurring sedimentation and control of flooding and stormwater runoff by storing or regulating natural flows.

Chapter 425: “Subdivision of Land”, sets forth the standards, procedures, and regulations associated with the subdivision of land within the Village to ensure orderly, efficient and economical growth, and that developments have adequate utilities and facilities for the housing, transportation, distribution, comfort, convenience, health, safety, and welfare of the citizens of the Village.

Chapter 450: “Zoning”, promulgates the standards, procedures, and regulations for land development including site plan review and stormwater control, and other important development considerations. The Zoning Code outlines suitable uses and dimensional requirements for its different zoning districts. Included in its list of zoning district is the Riverfront Development District. The purpose of the district is to provide opportunities for permanent public views and visual access to the Hudson River and to encourage the phasing out of land uses which are incompatible with and detract from the Village’s Hudson River waterfront area. It is also the purpose of this district to protect, preserve and enhance sensitive environmental areas; prevent soil erosion, sedimentation and slope failure; prevent, to the maximum extent possible, the loss, alteration or diminution of public views of the Hudson River and the opposite shore; prevent activities which will cause water and air pollution; and ensure that the benefits provided by implementation of this article and the Village’s Local Waterfront Revitalization Program will provide future generations with a continuation of those elements and resources of the Village that serve to create a distinct community character and strong sense of place for its residents.

4.3 Village Boards, Departments, Commissions, and Committees

The Village of Sleepy Hollow is a small community with a small staff. Village Officials and Departments include:

- Administrator
- Assessor
- Ambulance Corps
- Building Department
- Village Clerk
- Court Clerk
- Fire Department
- Photographer
- Police Department
- Public Works/Sanitation
- Recreation and Parks
- Water

Land Use and Development Decisions are made by the Village:

- Board of Trustees
- Planning Board
- Zoning Board of Appeals
- Architectural Review Board
- Tree Commission
- Waterfront Advisory Commission

Other Village Boards, Committees and Commissions include:

- Fire Prevention
- Public Safety
- Parking
- Tourism and Celebrations

- Environmental Advisory
- Police Advisory

The Village Administrator would coordinate the implementation of the MHMP and would act as liaison between the Village Trustees, other Village boards and committees, outside agencies, and various other stakeholders. The Village Administrator will receive assistance from the Building, Village Clerk, Public Works, Recreation and Parks, and Water Departments, as well as local emergency services, as necessary. The Village also has a Grant Development Director who is an outside consultant. Applying for grants and other financing will be an integral component of MHMP implementation.

4.4 Emergency Services

A discussion with representatives of the Sleepy Hollow's police department, fire department, and ambulance corps reveals the following equipment, apparatuses, personnel, and training indicates the following.

4.4.1 Police Department

At the time this Plan was being prepared, the Village of Sleepy Hollow Police Department consisted of 24 certified staff. It has a fleet of cruisers, a utility truck, K9 vehicle, bus for distributing child safety information, and an indoor shooting range. The department has the following units: Detectives, Bike Patrol, K-9, School Resource, Marine, and Commercial Vehicle Enforcement. The Department has various procedures, policies, and guidelines in place that are periodically updated. (Village of Sleepy Hollow, 2012)

4.4.2 Fire Department

The Village's fire department (Department 231 Battalion 12) is a volunteer organization consisting of approximately 60 volunteers at the time this plan was prepared. Equipment

maintenance expenses and critical supplies are paid for primarily by local taxes. The fire department has three fire stations including:

- Station 1 Central Fire Headquarters (Beekman Avenue)
- Station 2 Rescue Hose Lawrence Avenue
- Station 3 Union Hose Cortland Street

Fire department apparatus include:

- Rescue 12 – 1992, International/Horton
- Tower Ladder 38 1995 Sutphen
- Engine 87 2013 Pierce Velocity triple combination pumper
- Engine 85 2006 Pierce
- Engine 86 2002 American LaFrance
- Marine 7 – 1987 Steiger Craft
- Marine 27 2009 Noreq

(Sleepy Hollow Fire Department, 2012)

The fire department has a mutual aid agreement with Westchester County and works with Westchester County Emergency Services to plan for major incidents. Fire Fighting National Incident Management System (NIMS) Training has been provided.

4.4.3 Ambulance Corps.

The Sleepy Hollow Ambulance Corps is a volunteer organization that responds to several hundred emergency calls per year and operates two basic life support (BLS) ambulances and an Emergency Medical Technician (EMT) fly-car. The Corps is a New York State Certified Emergency Medical Service (EMS) that is equipped with state-of-the-art defibrillators and advanced life support (ALS) is provided by Mount Pleasant Paramedics (MetroCare). At the time of the preparation of this Plan, the Corps had 20 volunteers. Mutual aid agreements are in place with adjoining jurisdictions. The ambulance corps also provides service to the Pocantico Fire District. A paramedic from the Town of

Mount Pleasant assists in covering Sleepy Hollow and other villages in the Town. The Corps has been awarded numerous citations over the years including unit citations in 2002 and 2005 by the Westchester County Regional EMS Council for its recent improvements. (Village of Sleepy Hollow, 2012)

The ambulance corps is required to have the minimal equipment outlined in Article 30, Part 800, of the State's Public Health Law and must be recertified every other year based on a state inspection. Mass gathering event permits require that certain levels of protection be provided based on the size of the gathering.

Future development of the old GM site as a mixed-use development will dramatically increase population in the Village and will increase demands on all emergency services in the Village. However, the increased population should provide opportunities for recruiting volunteers and fundraising.

4.4.4 Emergency Communications

The Village currently operates emergency and public notice email distribution system which provides another means of reaching out to residents and business owners in the event of an emergency or other outreach purposes (e.g., public hearings). Westchester County also has a similar notification system. A reverse 911 system and an upgrade to all emergency services systems to a digital system so they can be on the same frequency as the Village of Tarrytown and Westchester County if the Village's system goes down, would be beneficial.

4.4.5 Plan Implementation Capabilities

The Village has the responsibility, jurisdiction and capability, and authority to implement many of the recommendations of the MHMP. However, due to the Village's limited size, staffing, and funding, obstacles to implementation do exist. The time, manpower, and specialization needed to implement some of the recommendations will require the Village

to seek assistance from outside contractors, engineers, scientists, consultants, governmental agencies, etc. The Village departments, staff, and officials that will play a role in implementing identified projects are identified in the Action Plan provided in Chapter 6.

The Village will also need to apply for funding to implement many of the recommendations identified in the plan so that the planning, design, labor, and materials necessary to complete these tasks can be paid for or acquired. Chapters 5, “Hazard Mitigation Strategies”, and Chapter 6, “Available Funding and Hazard Mitigation Stakeholders”, provide applicable information regarding funding programs, as well as a list of agency stakeholders that can provide data and assistance to the Village.

4.5 National Flood Insurance Compliance

The Village has been participating in the NFIP for many years now and is in good standing with the Program. The Village’s Building Inspector is identified by the “Code of the Village of Sleepy Hollow” as the Local Administrator for the Village’s “Flood Damage Prevention Law.” The Flood Damage Prevention Law was adopted by the Board of Trustees of the Village of Sleepy Hollow on September 18, 2007 by Local Law No. 3-2007 (formerly Ch. 23 of the 1965 Code). The Law is based on the State’s Model Local Law and all revisions to the National Flood Insurance Program through March 20, 1997, and supersedes all previous laws adopted for the purpose of flood damage prevention.

Adherence to the mandates of the Flood Damage Prevention Law, consistency with the goals and objectives of the MHMP and implementation of its proposed mitigation actions will significantly advance the Village’s efforts to prevent or reduce the risks of natural and human-caused or technological hazards in the Village. Adoption of the MHMP will trigger the initiation of the implementation phase of the Plan.

5.0 HAZARD MITIGATION STRATEGIES

5.1 Development of Goals, Objectives, & Hazard Mitigation Actions

Hazard mitigation involves the:

- identification of hazards,
- assessment and prioritization of risks and vulnerabilities,
- development of hazard avoidance and reduction goals and objectives,
- creation of strategies to achieve goals and objectives,
- the fostering of a greater understanding and awareness of potential threats in the community, and
- solicitation of input from stakeholders to prevent or reduce future hazard related risks, impacts, and losses to the maximum extent possible.

Hazard Mitigation goals and objectives were developed based on a review of FEMA guidance documents, the Village's Request for Proposals (RFP) for the MHMP, and State and Local Hazard Mitigation Plans; the overall needs of the Village based on input received during steering committee meetings and the public participation process; an inventory of existing natural conditions and man-made structures; and an evaluation of the inherent risks and vulnerabilities of the community to potential hazardous events.

The draft goals were formulated, discussed, and revised during MHMP Committee meetings with input from the project consultants and committee members, including local first responders and Village officials who work and reside in the community. The differences between goals, objectives, and mitigation actions/strategies were discussed at the MHMP committee meetings. Goals are considered broad and general guidelines that are long-term in nature and frame the overall purposes, scope and vision that the Village would like to achieve through its planning and implementation efforts. Objectives identify intermediary steps that must be taken to attain the Plan's goals and provide the framework for developing the necessary actions to achieve them. Objectives are more specific than goals, are measurable, and tend to have shorter timeframes, but are broader

and more general than mitigation actions. Mitigation actions are the specific policies, strategies, projects, initiatives, and programs that must be implemented to achieve the goals and objectives.

After the goals of the MHMP were drafted, the committee conducted a brainstorming session to identify objectives and mitigation actions. The committee members identified strategies, posed questions, sought clarifications, and provided follow-up input to promote a thorough vetting of ideas. The general suitability of the actions for achieving the goals of the project was considered and the identification of the protections they would offer were weighed and balanced until consensus was achieved.

The goals and objectives were drafted by the Village's consultants based on the input compiled during committee meetings. They were then provided in the form of committee meeting minutes, and distributed to members for review and comment. The draft goals were also forwarded to representatives of the Phelps Hospital, The School District of the Tarrytowns, and RSHM Life Center. The general public was provided the opportunity to provide input, identify issues, discuss community needs and goals, and express concerns at the first public meeting (informational meeting) held at Village Hall on January 22, 2013, as well as during a later stage, after the informational meeting but before the release of the first draft and first public hearing, when the MHMP Committee's agendas, meeting minutes, and draft goals, objectives, and mitigation actions were posted on the Village's official website with a request for public input. The website posting for the agendas, meeting minutes, and draft goals, objectives and mitigation actions is provided in Appendix A). A version of the draft plan was filed with the Village Clerk, posted online, and made available to the public for review at the Warner Library. Verbal and written comments were requested and accepted during a designated 30-day written comment period for the public meeting and public hearing. The draft document was also forwarded to FEMA and SOEM for review and comment as required.

5.2 Hazard Mitigation Goals and Objectives

The goals and objectives provide a framework for the development of mitigation actions that will fulfill the Village's overall vision for protecting the public's health, safety, and general welfare. Goals and objectives for the MHMP are listed below.

Goal No. 1

Prevent death, illness, and injury from catastrophic events and identify and minimize the risks and physical and economic impacts to private property, local businesses, public infrastructure, natural systems, and other community assets.

Objectives

- A. Identify the actions, policies, and capital improvements that will prevent or reduce threats to public health and safety and essential community infrastructure from natural disasters and human-caused and technologically-based hazardous events.
- B. Conduct inspections, inventories, surveys, and studies to ensure that existing buildings, facilities, and infrastructure are structurally and functionally sound and adequately protected from major storms, flooding, fires, explosions, high winds, slope failures, snow loading, earthquakes, health and safety threats, and other hazards.
- C. Construct, maintain, repair, expand, upgrade, and augment essential infrastructure and facilities as necessary to prevent or mitigate the impacts of disastrous events.
- D. Preserve land and protect natural resources in flood-prone and steeply-sloped areas to provide natural floodplain storage and groundwater recharge, while protecting otherwise at-risk development.
- E. Incorporate hazard mitigation and life protection goals, policies, and strategies in routine site planning, subdivision and variance reviews, wetlands permit requirements, waterfront plan consistency reviews, SEQR analyses, legislative and code enforcement actions, easements and covenant and restriction language,

capital improvements programming, operational budgeting, and land use, zoning and comprehensive planning efforts.

Goal No. 2

2. Improve disaster preparedness, response, coordination, and post-disaster recovery and reduce the costs associated with these activities.

Objectives

- A. Identify the equipment, facilities, personnel, and training necessary to adequately respond to crises and serve and protect the Village from natural and human-caused disasters.
- B. Coordinate planning, response and recovery activities with adjoining municipalities, special districts, first responders and emergency services, involved agencies, local organizations, Metro North, local utilities, Village officials, and the public.
- C. Identify funding that can be used to finance the implementation of identified recommendations.

Goal No. 3

3. Enhance public education and community outreach and involvement as they relate to hazard mitigation efforts and improve the Village's emergency notification system before a significant event or incident occurs.

Objectives

- A. Identify a variety of methods and techniques to enhance public outreach, community education, and emergency notification.
- B. Promote participation, open communication, and coordination between residents, business owners, Village officials, local experts, involved and interested agencies,

first responders, area organizations and citizens groups, special taxing districts, and other local municipalities and jurisdictions.

- C. Periodically update the Multi-Hazard Mitigation Plan to address changing conditions and circumstances, newly available information, innovative technologies, and enhanced scientific understanding of hazard mitigation issues. Involve as many agencies, organizations, business owners and residents as possible, using various methods to achieve comprehensive public participation.

5.3 Development and Prioritization of Multi-Hazard Prevention and Mitigation Actions

The strategies, initiatives, policies, projects, and programs comprising the mitigation actions for the MHMP were drafted based on input received from the MHMP committee. Prioritization of mitigation actions occurred through interactive discussions by committee members and the guidance of FEMA’s “STAPLEE” criteria (i.e., Social, Technical, Admistrative, Political, Legal, Economic, and Environmental criteria). Questions that provide the general framework for developing and prioritizing mitigation actions under the STAPLEE model are as follows:

1. Social: Will the proposed action adversely affect one segment of the population? Is it consistent with community values? Will it adversely affect cultural values and resources?
2. Technical: Is the proposed action technically feasible? Will it help to reduce long-term losses and have minimal secondary impacts?
3. Administrative: Does the Village have the capability (staff, technical experts, and/or funding) to implement the action, or can it be readily obtained? Can the action be accomplished in a timely manner? Can the community provide the necessary maintenance?

4. Political: Will there be political support to implement and maintain the action?
5. Legal: Does the Village have the legal authority to implement the proposed action?
6. Economic: Is the proposed action cost-effective? Are their sources of funding available?
7. Environmental: Will the proposed action have a significant impact on the environment? Will it be consistent with environmental goals, laws, and regulations?

The MHMP Committee first engaged in interactive brainstorming to develop draft mitigation actions that would assist in achieving the goals of the Plan. Based on this initial input, a draft of the mitigation actions was developed by the project consultants and reviewed and discussed at the following committee meeting. Members of the committee were again provided with the STAPLEE criteria and asked to consider the criteria as part of the mitigation action prioritization process. Other prioritization considerations discussed during committee meetings included: the relative costs and ease of implementation of the action; anticipated cost effectiveness; the number and types of threats the action addresses; the number of people that could benefit from the recommendation; and the size of the area and population that would receive protection.

The relative priority of each mitigation action was weighed and balanced during committee meeting discussions and were subsequently categorized under either a “high”, “medium”, or “low”¹ priority classification.

The draft goals, objectives, and recommendations and their priority rankings were drafted by the consultants and made available to the committee, guests who attended the

¹ All of the identified mitigation actions are considered important. The term “low” is meant to mean “lower” in priority and should not be construed as unimportant.

committee meetings, and the public (later online) before the first draft plan was released. Input was also requested from the public, adjacent municipalities, business owners, community groups, and other interested stakeholders at the public hearing. The public was urged to submit written comments to ensure adequate opportunities for input from individuals who were unable to attend meetings or who preferred to submit comments in writing.

5.4 Multi-Hazard Prevention and Mitigation Strategies

The hazard mitigation actions developed for the MHMP are provided below. Each recommendation is listed under the objective it attempts to address.

Objective 1A: *Identify the actions, policies, and capital improvements that will prevent or reduce threats to public health and safety and essential community infrastructure from natural disasters and human-caused and technologically-based hazardous events.*

Strategies and Initiatives

1. Adopt the current FEMA advisory flood zone map to ensure greater preparedness and flood-zone protection. Future development should be evaluated according to the proposed flood maps and comply with applicable State and Village flood protection standards to protect against flooding, including any additive effects from possible future sea level rise.
2. Develop and implement a river bank restoration program along the Hudson and Pocantico Rivers including river bank erosion and sedimentation controls, restoration of topographic contours, planting of native vegetation, and/or installation of structural controls such as use of riprap gabions, etc. to stabilize soils. Use natural or “soft” non-structural solutions where possible and effective. Work with County and State agencies as applicable. Locations where erosion has been identified include Kingsland Point County Park along the Hudson, along the Pocantico River in Devries Park, and along the Pocantico River near Dell Street.

3. Relocate the Department of Public Works building and its fueling station from their River Street location to one that is less vulnerable to flooding so that future responses to disasters will not be impeded. (The Village is currently considering temporary flood barriers at Horan's and along the Riverwalk in conjunction with replacing the bulkhead due to flooding in that area during storms. These barriers would also help to protect the DPW property.)
4. Relocate the storage building at Devries Park to higher ground to prevent future flood damage.
5. Dredge sediment from the mouth of the Pocantico River at Devries Park to increase river channel capacity and reduce flooding.
6. Establish residential and commercial incentive programs for activities that reduce risks from floods, fires, and other possible hazards. Work with local banks to develop a program for low-interest loans for businesses within the Village to upgrade buildings and perform other similar types of improvements.
7. Develop and adopt a steep slope ordinance to promote the proper siting of buildings and structures and restrict clearing in steeply sloped areas, so as to reduce the threat of slope failure and protect property and public safety.
8. Implement affordable priority mitigation strategies that address events that are most likely to occur and have the greatest potential for preventing loss of life and significant physical damage.
9. Consider relocating power lines and other overhead utilities underground. Coordinate these efforts with electrical, cable and telephone utilities, and future road improvements or other utility projects (e.g., installation, upgrade or maintenance of water and sewer mains) to reduce costs and disturbances to traffic. One location where utilities should be buried is along Pocantico Street between Broadway and Howard Street.

Objective 1B: *Conduct inspections, inventories, surveys, studies and code enforcement to ensure that existing buildings, facilities, and infrastructure are structurally and functionally sound and adequately protected from major storms,*

flooding, fires, explosions, high winds, slope failures, snow loading, earthquakes, health and safety threats, and other hazards.

Strategies and Initiatives

10. Perform a survey of buildings within the Village's business districts to determine the number, condition, age, use, occupancy, and type of building construction, and assess their vulnerability to fires, flooding, high winds, slope failure, and earthquakes relative to State and Village building codes and other available criteria.
11. Conduct an upstream stormwater capture and retention study to reduce the intensity of downstream flooding.
12. Develop emergency evacuation plans that include identification of routes and traffic coordination.

Objective 1C: *Construct, maintain, repair, expand, upgrade, and augment essential infrastructure and facilities as necessary to prevent or mitigate the impacts of disastrous events.*

Strategies and Initiatives

13. Replace and resize the 100-year-old box culverts in the Village. Resizing will help to allow for the passage of greater volumes of floodwater, reduce the likelihood of blockage by debris, and help to reinforce the physical integrity of the structures.
14. Replace existing storm pipes to repair and prevent leaks and breaks in the system.
15. Reline drinking water mains to conserve water for drinking and firefighting purposes.
16. Inspect and replace, repair, improve, reinforce, and/or increase the height, as applicable, of all existing Village bulkheads, revetments, retaining walls, gabions, and other river bank stabilization structures as applicable. Areas that are most

- vulnerable to flooding are listed in Section 3.2.2.8 of the Plan and are shown in Figures 3-1, 3-4, and 3-13. These areas primarily include land along the Hudson River at the southwest end of the Village (e.g., Ichabod's Landing, Horan's Landing, River Street, the Village DPW, Devries Park, Kingsland Point Park, Philipse Manor Beach Club, part of the GM property, etc.) and along the Pocantico River, especially the lower Pocantico River. Nonstructural measures to minimize damage to natural resources and property from flooding should be used whenever feasible.
17. Consider the possibility of using sediment removed from the recommended dredging of the Pocantico River at Devries Park and current dredging around the historic lighthouse as backfill for taller bulkheads and retaining walls in flood-prone areas if sediment-size and contamination analyses indicate suitability for this use. If the sediment is found to be contaminated, it must be properly disposed in accordance with NYSDEC requirements.
 18. Consider constructing a weir at the Fremont Pond Bridge to regulate water levels. Levels could be lowered before a major precipitation event, thereby reducing the potential for flooding to occur.
 19. Continue to implement a plan for a new water storage tank to help provide an adequate supply of emergency drinking water and water for firefighting purposes.
 20. Install security fencing and surveillance cameras around the existing drinking water storage tank.
 21. Install a redundant 30-inch water main between Greenburgh and the Village to ensure that a constant supply of water is available for drinking and firefighting purposes, should a main break or major leak occur.
 22. Inspect and maintain bridges, culverts, and wing walls and work with the County and State to address structures in their jurisdictions.
 23. Raise the bridge over the Pocantico River in Devries Park to prevent overtopping by floodwaters and/or undermining of the bridge.

Objective 1-D: *Preserve land and protect natural resources in flood-prone and steeply-sloped areas to provide natural floodplain storage and groundwater recharge, while protecting otherwise at-risk development.*

Strategies and Initiatives

24. Acquire flood-prone property as funding and opportunities arise or team up with the State or County for acquisitions that will ensure these properties can serve the function of a floodplain (i.e., flood overflow storage and recharge) and prevent threats to life and property. Acquired land can also provide environmental conservation benefits and passive or active recreational opportunities.
25. Maintain vacant land, open space, and dedicated parkland in flood zones (e.g., Horans Landing and Devries Park) so they can serve the dual function of providing fair weather recreational opportunities and foul weather floodplain/water storage and recharge. Coordinate with the County and State based on park ownership.

Objective 1-E: *Incorporate hazard mitigation and life protection goals, policies, and strategies in routine site planning, subdivision and variance reviews, wetlands permit requirements, waterfront plan consistency reviews, SEQOR analyses, legislative and code enforcement actions, easements and covenant and restriction language, capital improvements programming, operational budgeting, and land use, zoning and comprehensive planning efforts.*

Strategies and Initiatives

26. Adopt an ordinance that can be implemented as part of site plan review that restricts the total impervious ground cover permitted on commercial, industrial, and multi-residential development sites to promote groundwater recharge, rather than surface water runoff, and reduce the potential for flooding and water quality impacts.

27. Consider the use of natural/vegetated stormwater controls where possible, if they can be shown to enhance flood protection.
28. Consider alternative sites when identifying the best locations for future Village facilities, police, fire, and ambulance stations, emergency shelters, and essential utilities and capital infrastructure. Do not locate these facilities within floodplains, on steep slopes, or in other areas that may pose risks.
29. Ensure that future private development occurs in a manner that prevents or lessens the potential for fires, flooding, high winds, erosion, slope failure, damage from earthquakes, and other natural phenomena, through the use and implementation of applicable building codes, land development regulations, site plan and subdivision design reviews, variance proceedings, environmental assessments, wetlands permits, waterfront consistency reviews, and code enforcement. The issuance of permits and granting of approvals should be consistent with the spirit and intent of the Village's adopted Multi-Hazard Mitigation Plan.
30. Establish a subcommittee or conduct roundtable discussions with representatives from the fire, EMS, and police departments as part of major projects reviews to ensure that potential health and safety issues are adequately addressed.

Objective 2A: Identify the equipment, facilities, personnel, and training necessary to adequately respond to crises and serve and protect the Village from natural and human-caused disasters.

Strategies and Initiatives

31. Redevelopment of the former GM property could dramatically increase the Village's population and increase demands on emergency services. Promote first responder (e.g., fire and ambulance) volunteerism in the community. Seek to recruit additional first responders by targeting future residents of the former GM site and target this new development and the rest of the community, in future fundraising efforts.

32. Hire an additional full-time building inspector to assist in building inspections and code enforcement. Issues of concern include but are not be limited to overcrowding of residences, inappropriate fire prevention and suppression, inadequate egress, substandard flood- and wind-proofing, and non-conformance with construction, wiring, building and yard maintenance, and health codes.
33. Inspect all Village facilities and establish best management practices and emergency response plans to prepare for and protect them from potential future disasters.
34. Establish at least two emergency shelters at different locations before a disaster occurs. Identify shelter locations that are not within high risk areas, such as flood zones, and make sure they are handicapped accessible, well-constructed, meet all applicable health and safety codes, and have adequate facilities to serve the intended purpose. Potential locations include the senior center and the middle and high schools. Have a plan in place for timely shelter preparation, stocking and distribution of essential supplies, standard operations, rules of behavior to be followed, waste disposal, and health, safety, and security issues.
35. Establish locations for cooling centers in preparation of extreme prolonged heat waves accompanied by power outages. Emergency shelters that are equipped with generators and air conditioning may be appropriate for this purpose.²
36. Designate Village Hall as the Village's emergency command center where department heads, Village officials, FEMA representatives, and emergency response chiefs can operate and coordinate efforts.
37. Establish alternative locations for use as emergency staging areas to serve Village staff, FEMA, and first-responders and for use as temporary post-disaster debris storage, management, and emergency supplies distribution locations. Parks that are located outside of flood danger and/or large parking lots such as those at the high school and middle school are candidates for staging areas. The part of the GM property currently used by the Village is a possible site when severe flooding is not an issue.

² The Village recently appropriated funds for the purchase of a generator for the Senior Center to be used as a cooling center location even when the power is out. The generator is expected to be installed during the summer of 2013.

38. Identify locations, such as parklands and the portion of the GM property currently used by the Village, to store large volumes of snow after a blizzard to keep streets, sidewalks, parking lots, and fire hydrants clear. Areas identified for snow storage should have adequate drainage to accommodate large volumes of melt water on top of any precipitation that may be received.
39. Purchase generators for Village Hall, the ambulance building, the Lawrence Avenue fire station, the Department of Public Work's headquarters, and any designated emergency shelters. Phelps Hospital may need another generator to achieve full operation in the event of an outage. An additional portable generator is needed by the Village. A portable generator could also be used by the police to operate a traffic signal at one of the major intersections during a power outage.
40. Request that emergency generators be installed and available at gasoline fueling stations as part of site plan approvals to prevent local gasoline shortages which can affect evacuations, emergency vehicle use, and normal community activities. Generators that are fueled by natural gas may be beneficial if gasoline is unavailable.
41. Replace the fire company's oldest rescue boat.
42. Expand the fire boat dock.
43. Upgrade the fire department's airpacks.
44. Replace the Department of Public Work's dump trucks that are in disrepair.
45. The Village and first responders should review the list of references provided at the end of the MHMP and copy and keep on file those reports that may be helpful in addressing potential disasters.
46. Review Insurance Services Office, Inc. (ISO's) "Public Protection Classification Report" (2012) for the Village's fire department and develop a plan to address any deficiencies.
47. Emergency services in the Village should be asked to develop an annual report including an inventory of and inspection of equipment, number of personnel, and training needs and the need for capital investments based on priorities.
48. Provide enhanced floodplain and disaster management training for applicable Village staff and planning and zoning officials.

Objective 2B: *Coordinate planning, response and recovery activities with adjoining municipalities, special districts, first responders and emergency services, involved agencies, local organizations, Metro North, local utilities, Village officials, and the public.*

Strategies and Initiatives

49. Start a dialogue with other jurisdictions, such as the State Department of Transportation, to identify and remediate drainage issues on non-Village roadways within Village boundaries.
50. Coordinate with electric, cable, and telephone utilities, the Village DPW, and the Tree Commission to develop a tree trimming maintenance plan that identifies hazardous trees and limbs that threaten buildings, utilities, and public safety and develop a schedule for necessary trimming and removal. In cases where trees must be removed, consider offsetting the loss by planting new trees of suitable species at other locations.
51. Conduct an annual meeting between representatives of the Village, fire, police, EMS, school district, hospital, Metro North Railroad, and others, as applicable, to conduct site and hazard specific risk assessments and discuss hazard preparedness and mitigation, plan for future drills and simulations, and develop appropriate response and recovery policies.
52. Village government, the police department, fire department, and ambulance corps should retain copies of all applicable emergency plans, including but not limited to, the final Multi-Hazard Mitigation Plan, Indian Point evacuation plan, Pocantico dam failure plan, school and hospital emergency plans, and water supply emergency plan, at their respective stations.

Objective 2C: *Identify funding that can be used to finance the implementation of identified recommendations.*

Strategies and Initiatives

53. Assign the task of seeking and securing funding for the numerous recommendations outlined in the Plan to a designated grant administrator. The “Action Plan” provided in the final Multi-Hazard Mitigation Plan, offers numerous leads on possible funding sources that can be pursued.
54. Identify those areas that contribute non-point source runoff to the Village’s surface waters and seek funding for water quality, stormwater, and flood control improvement projects. Secure funds and implement projects for mitigation of erosion impacts at Village parks and road ends that provide river access and are experiencing severe erosion or are vulnerable to flooding.

Objective 3A: *Identify a variety of methods and techniques to enhance public outreach, community education, and emergency notification.*

Strategies and Initiatives

55. Develop Village public education and awareness programs to include topics such as disaster preparedness; fire prevention; proper handling, storage, use and disposal of hazardous materials (waste oil, paints, solvents, pesticides and fertilizers, etc.); routine and emergency water conservation strategies; residential overcrowding restrictions; locations of emergency shelters; rules and regulations at emergency shelters; the four-way stop requirement for proceeding through intersections when traffic signals are not functioning; and evacuation including avoiding bridges, railroad crossings, steep unstable slopes, streets with numerous trees, and flood-prone areas. Efforts could include distribution of flyers door-to-door with focus on vulnerable populations and vulnerable or especially-affected locations, making brochures and pamphlets available at Village Hall, posting information on the Village website, and conducting periodic informational meetings.
56. Increase the availability and distribution of educational information to owners and operators of hazardous facilities (e.g., gasoline stations and other fuel storage

- areas, propane distributors, etc.) or explain where additional information may be available (e.g., NYSDEC website).
57. Inform residents, business owners, and not-for profit agencies of the existence of the Village's emergency email notification system. Brochures and pamphlets that provide information about the notification system and how to register could be made available at Village Hall. Development and building applications could also include this information.
 58. Inform residents, business owners, and not-for profit agencies of the existence of the Westchester County Community Emergency Notification System which sends email, text and/or phone messages to persons who are registered. Brochures and pamphlets that provide information about the notification system and how to register could be made available at Village Hall. Development and building applications could also include this information.
 59. Permanently post the final adopted Multi-Hazard Mitigation Plan on the Village's website so residents can review it at any time and make copies available at the Village Clerk's Office and the Warner Library to reach as wide an audience as possible.
 60. Develop a reverse 911 system to contact residents and provide necessary warnings and instructions before, during, and after a disaster.
 61. Upgrade all emergency services systems to a digital system and get on the same frequency as Tarrytown and Westchester County so if the Village's system goes down, it will be able to use their system.

Objective 3B: Promote participation, open communication, and coordination between residents, business owners, Village officials, local experts, involved and interested agencies, first responders, area organizations and citizens groups, special taxing districts, and other local municipalities and jurisdictions.

Strategies and Initiatives

62. Ensure that future updates to the Multi-Hazard Mitigation Plan include input from residents, business owners, nearby municipalities, representatives of involved agencies, and other experts and stakeholders, by developing a comprehensive public outreach plan.
63. Create a post storm/disaster task force to assess the Village's response to future natural disasters and human caused events, discuss the pros and cons of event preparedness and response, lessons that were learned, identify actions that worked well, inventory damages that were incurred, estimate costs of recovery, and develop plans to improve for the next event.
64. Provide public information in English and Spanish formats and periodically update the information as applicable.

Objective 3C: *Periodically update the Multi-Hazard Mitigation Plan to address changing conditions and circumstances, newly available information, innovative technologies, and enhanced scientific understanding of hazard mitigation issues.*

Strategies and Initiatives

65. Periodically review and update the Multi-Hazard Mitigation Plan in accordance with the protocols and scheduling indicated in the plan.
66. Involve residents, local experts, members from academia, agency professionals, first responders, local business persons, and Village officials in hazard mitigation planning and implementation processes. Use of the most up-to-date information, standards, and practices, including the latest science, laws, engineering practices, planning principles, and environmental and economic data.
67. Consider participating in Westchester County's current Multi-Jurisdictional Hazard Mitigation Plan Update.

Table 5-1 contains the Village of Sleepy Hollow Multi-Hazard Mitigation Plan Action Plan. The Action Plan contains the following pertinent information:

- a list of each mitigation action;
- the hazard(s) that each recommendation addresses;
- the relative priority of each mitigation action (either “high”, “medium” or low”) based on the criteria developed by FEMA known as “STAPLEE” discussed above;
- the agencies, departments, offices, etc. that will be involved in the implementation of the recommendation;
- the relative estimated costs of each recommendation (“high”, “medium”, or “low”);
- possible funding sources to implement each recommendation; and
- an implementation schedule based on “short-term” (6 months or less) or “long-term” (more than 6 months) time-frames.

TABLE 5-1: VILLAGE OF SLEEPY HOLLOW MULTI-HAZARD MITIGATION PLAN ACTION PLAN

| HIGH PRIORITY RECOMMENDATIONS | | | | | | | |
|---------------------------------------|---|----------------------------|--|--|---|--|---|
| (¹)Item Referral #: | Action | Hazard(s) Addressed | Priority Class: High Medium Low | Relative Estimated Costs: High Medium Low | (²)Possible Funding Source(s) | Administration & Implementation (Involved Parties) | Approximate Implementation Time Frame (duration to complete) Short-term (≤6 mos) Long-term (>6 mos) |
| 1 | Implement affordable priority mitigation strategies that address events that are more likely to occur and have the greatest potential for preventing loss of life and significant physical damage. | All Hazards | High | Low | OB-staff time | Lead Agency: Village Administrator (Village Board, Grant Director, Other Village Staff) | Ongoing |
| 2 | Designate Village Hall as the Village's emergency command center where department heads, Village officials, FEMA representatives, and emergency response chiefs can operate and coordinate efforts. | All Hazards | High | Low | OB-staff time | Lead Agency: Village Administrator (Village Board, School District, Senior Center, emergency services) | Short-term (≤ 6 mos.) |
| 3 | Establish/designate at least two emergency shelters at different locations before a major event or disaster occurs. Identify shelter locations that are not within high risk areas, such as flood zones, and make sure they are handicapped accessible, well-constructed, meet all applicable health and safety codes, and have adequate facilities to serve the intended purpose. Potential locations include the senior center and the middle and high schools. Have a plan in place for timely shelter preparation, stocking and distribution of essential supplies, standard operations, rules of behavior to be followed, waste disposal, and health, safety, and security issues. | All Hazards | High | Low | OB-staff time, volunteerism | Lead Agency: Village Administrator (Village Board, Village Building Inspector, Code Enforcement, School District, Senior Center, emergency services) | Short-term (≤ 6 mos.) |

| (1)Item Referral #: | Action | Hazard(s) Addressed | Priority Class: High Medium Low | Relative Estimated Costs: High Medium Low | (2)Possible Funding Source(s) | Administration & Implementation (Involved Parties) | Approximate Implementation Time Frame (duration to complete) Short-term (≤6 mos) Long-term (>6 mos) |
|---------------------|---|-----------------------------------|--|--|-------------------------------|---|---|
| 4 | Establish locations for cooling centers in preparation of extreme prolonged heat waves accompanied by power outages. Emergency shelters that are equipped with generators and air conditioning may be appropriate for this purpose. The Village recently funded the purchase of a generator for the Senior Center to be used as a cooling center. The generator is expected to be insatalled during the summer of 2013. | Heat wave | High | Low | OB-staff time | <i>Lead Agency:</i> Village Administrator (Village Board, Village Building Inspector, Code Enforcement, School District, Senior Center, emergency services) | Short-term (≤ 6 mos.) |
| 5 | Continue to implement a plan for a new water storage tank to help provide an adequate supply of emergency drinking water and water for firefighting purposes. | Drought, fires, water shortages | High | Low | Current funding, DWSRF | <i>Lead Agency:</i> Village DPW (Village Board, Village Administrator, Grant Director, contractors, Water Utility, DOH) | Long-term (>6 mos.) |
| 6 | Adopt an ordinance that can be implemented as part of site plan review that restricts the total impervious ground cover permitted on commercial, industrial, and multi-residential development sites to promote groundwater recharge, rather than surface water runoff, and reduce the potential for flooding and water quality impacts. | Flooding, storm surge, hurricanes | High | Low | OB-staff time | <i>Lead Agency:</i> Village Planning Board (Village Board, Village Zoning Board, Village Attorney, Village Administrator, Village Building Inspector, Grant Director) | Short-term (≤ 6 mos.) |

| ⁽¹⁾ Item Referral #: | Action | Hazard(s) Addressed | Priority Class: High Medium Low | Relative Estimated Costs: High Medium Low | ⁽²⁾ Possible Funding Source(s) | Administration & Implementation (Involved Parties) | Approximate Implementation Time Frame (duration to complete) Short-term (≤6 mos) Long-term (>6 mos) |
|---------------------------------|--|---|--|--|---|--|---|
| 7 | Consider alternative sites when identifying the best locations for future Village facilities, police, fire, and ambulance stations, emergency shelters, and essential utilities and capital infrastructure. Do not locate these facilities within floodplains, on steep slopes, or in other areas that may pose risks. | Flooding, storm surge, hurricanes, high winds, slope failure, earthquakes | High | Low | OB-staff time | Lead Agency: Village Planning Board (Village Board, Village Administrator, Village Building Inspector, Village DPW, Grant Director) | Ongoing |
| 8 | Maintain vacant land, open space, and dedicated parkland in flood zones (e.g., Horans Landing and Devries Park) so they can serve the dual function of providing fair weather recreational opportunities and foul weather floodplain/water storage and recharge. Coordinate with the County and State based on park ownership. | Flooding, storm surge, hurricanes | High | Low | OB-staff time | Lead Agency: Village Planning Board (Village Board, Village Administrator, Village DPW, Village Recreation & Parks, Grant Director, State and County Parks Depts.) | Ongoing |
| 9 | Ensure that future private development occurs in a manner that prevents or lessens the potential for fires, flooding, high winds, erosion, slope failure, damage from earthquakes, and other natural phenomena, through the use and implementation of applicable building codes, land development regulations, site plan and subdivision design reviews, variance proceedings, environmental assessments, wetlands permits, waterfront consistency reviews, and code enforcement. The issuance of permits and granting of approvals should be consistent with the spirit and intent of the Village's adopted Multi-Hazard Mitigation Plan. | Fires, flooding, high winds, erosion, slope failure, earthquakes, and other natural phenomena | High | Low | OB-staff time | Lead Agency: Village Planning Board (Village Board, Village Zoning Board, Waterfront Advisory Commission, Village Attorney, Village Administrator, Village Building Inspector, Grant Director) | Ongoing |

| (1)Item Referral #: | Action | Hazard(s) Addressed | Priority Class: High Medium Low | Relative Estimated Costs: High Medium Low | (2)Possible Funding Source(s) | Administration & Implementation (Involved Parties) | Approximate Implementation Time Frame (duration to complete) Short-term (≤6 mos) Long-term (>6 mos) |
|---------------------|--|---------------------|--|--|----------------------------------|---|---|
| 10 | Request that emergency services in the Village develop an annual report including an inventory and inspection of equipment, number of personnel, and training needs and the need for capital investments based on priorities. | All Hazards | High | Low | OB-staff time, volunteer work | <i>Lead Agency:</i> Village Administrator (Village Board, Village DPW, Village Building Inspector, WC Emergency Services, Grant Director, First Responders) | Annually/Ongoing |
| 11 | Permanently post the final adopted Multi-Hazard Mitigation Plan on the Village's website so residents can review it at any time and make copies available at the Village Clerk's Office and the Warner Library to reach as wide an audience as possible. | All Hazards | High | Low | OB-staff time | <i>Lead Agency:</i> Village Administrator (Village Board, Village Staff) | Short-term (≤ 6 mos.) |
| 12 | Conduct an annual meeting between representatives of the Village, fire, police, EMS, school district, hospital, Metro North Railroad, and others, as applicable, to conduct site and hazard specific risk assessments and discuss hazard preparedness and mitigation, plan for future drills and simulations, and develop appropriate response and post-event recovery policies. | | High | Low | OB-staff time, Volunteerism, NPG | <i>Lead Agency:</i> Village Administrator (Village Board, Village DPW, Village Building Inspector, Fire, Police, EMS, School District, Hospital, Metro North RR, and others, as applicable) | Annually/Ongoing |

| (1)Item Referral #: | Action | Hazard(s) Addressed | Priority Class: High Medium Low | Relative Estimated Costs: High Medium Low | (2)Possible Funding Source(s) | Administration & Implementation (Involved Parties) | Approximate Implementation Time Frame (duration to complete) Short-term (≤6 mos) Long-term (>6 mos) |
|---------------------|--|---------------------|--|--|--|---|---|
| 13 | Create a post storm/disaster task force to assess the Village's response to future natural disasters and human caused events, discuss the pros and cons of event preparedness and response, lessons that were learned, identify actions that worked well, inventory damages that were incurred, estimate costs of recovery, and develop plans to improve for the next event. | All Hazards | High | Low | OB-staff time, Volunteerism | <i>Lead Agency:</i> Village Administrator (Village Board, Village DPW, Village Building Inspector, Fire, Police, EMS, School District, Hospital, Metro North RR, and others, as applicable) | Annually/Ongoing/After Disasters and Major Events |
| 14 | Request that the Village Clerk, police department, fire department, and ambulance corps retain copies of all applicable emergency plans, including but not limited to, the final Multi-Hazard Mitigation Plan, Indian Point evacuation plan, Pocantico dam failure plan, school and hospital emergency plans, and water supply emergency plan, at their respective stations. | All Hazards | High | Low | OB, Volunteerism | <i>Lead Agency:</i> Village Administrator (Village Board and Staff, Police Fire, and Ambulance Corps) | Ongoing |
| 15 | Periodically review and update the Multi-Hazard Mitigation Plan in accordance with the protocols and scheduling indicated in the plan. | All Hazards | High | Low | OB-staff time, FEMA/SOEM funding, Volunteerism | <i>Lead Agency:</i> Village Administrator (Village Boards and Staff, MHMP Committee) | Ongoing/Update Every Five Years or as Needed |

| (1)Item Referral #: | Action | Hazard(s) Addressed | Priority Class: High Medium Low | Relative Estimated Costs: High Medium Low | (2)Possible Funding Source(s) | Administration & Implementation (Involved Parties) | Approximate Implementation Time Frame (duration to complete) Short-term (≤6 mos) Long-term (>6 mos) |
|---------------------|--|--|--|--|-------------------------------|---|---|
| 16 | Ensure that future updates to the Multi-Hazard Mitigation Plan include input from residents, business owners, nearby municipalities, representatives of involved agencies, and other experts and stakeholders, by developing a comprehensive public outreach plan. | All Hazards | High | Low | OB, Volunteerism | <i>Lead Agency:</i> Village Administrator (Village Boards and Staff, MHMP Committee, Police Fire, and Ambulance Corps, Residents, Business Owners, Other Agencies, Special Districts, Local Organizations, Adjacent Municipalities, Academia, etc.) | Every Five Years or Sooner As Needed |
| 17 | Hire an additional full-time building inspector to assist in building inspections and code enforcement. Issues of concern include but are not be limited to overcrowding of residences, inappropriate fire prevention and suppression, inadequate egress, substandard flood- and wind-proofing, and non-conformance with construction, wiring, building and yard maintenance, and health codes. | Flooding, high winds, fires, hurricanes, tornadoes, earthquakes, public safety | High | Low-Medium | OB | <i>Lead Agency:</i> Village Administrator (Village Board, Village Building Inspector) | Hiring: Short-term (≤ 6 mos.) Inspections: Long-term (>6 mos.) |
| 18 | Purchase generators for Village Hall, the ambulance building, the Lawrence Avenue fire station, the Department of Public Works' headquarters, and any designated emergency shelters. An additional portable generator is needed by the Village. Phelps Hospital may need another generator to achieve full operation in the event of an outage. A portable generator could also be used by the police to operate a traffic signal at one of the major intersections during a power outage. | All Hazards | High | Low-Medium | OB, MAP, PAG, APG, NPG | <i>Lead Agency:</i> Village Administrator (Village Board, Village Building Inspector, School District, Senior Center, Emergency Services) | Short-term (≤ 6 mos.) |

| (1)Item Referral #: | Action | Hazard(s) Addressed | Priority Class: High Medium Low | Relative Estimated Costs: High Medium Low | (2)Possible Funding Source(s) | Administration & Implementation (Involved Parties) | Approximate Implementation Time Frame (duration to complete) Short-term (≤6 mos) Long-term (>6 mos) |
|---------------------|---|-------------------------------------|--|--|-------------------------------|---|---|
| 19 | Assign the task of seeking and securing funding for the numerous recommendations outlined in the Plan to a designated grant administrator. The "Action Plan" provided in the final Multi-Hazard Mitigation Plan, offers numerous leads on possible funding sources that can be pursued. | All Hazards | High | Low-Medium | OB | Lead Agency: Village Administrator (Village Board, Grant Director) | Short-term (≤ 6 mos.) |
| 20 | Develop and adopt a steep slope ordinance to promote the proper siting of buildings and structures and restrict clearing in steeply sloped areas, so as to reduce the threat of slope failure and protect property and public safety. | Slope failure, erosion | High | Low-Medium | OB | Lead Agency: Village Administrator (Village Board, Village DPW, Village Building Inspector, Grant Director) | Short-term (≤ 6 mos.) |
| 21 | Install security fencing and surveillance cameras around the existing drinking water storage tank. | Terrorism, vandalism, public health | High | Low-Medium | OB, CIP, NPG, HRGP, DWSRF | Lead Agency: Village DPW (Village Board, Village Administrator, Grant Director, contractors, Water Utility, DOH, Homeland Security/ Emergency Services) | Short-term (≤ 6 mos.) |

| ⁽¹⁾ Item Referral #: | Action | Hazard(s) Addressed | Priority Class: High Medium Low | Relative Estimated Costs: High Medium Low | ⁽²⁾ Possible Funding Source(s) | Administration & Implementation (Involved Parties) | Approximate Implementation Time Frame (duration to complete) Short-term (≤6 mos) Long-term (>6 mos) |
|---------------------------------|--|---|--|--|--|---|---|
| 22 | Provide enhanced floodplain and disaster management training for applicable Village staff and planning and zoning officials. | All Hazards | High | Low-Medium | OB | <i>Lead Agency:</i> Village Administrator (Village Board, Village Planning Board, Village Zoning Board, Waterfront Advisory Commission, Village Attorney, Village Building Inspector, Village DPW, Village Staff, Grant Director) | Annually/Ongoing |
| 23 | Conduct an upstream stormwater capture and retention study to reduce the intensity of downstream flooding. | Flooding, erosion, mass wasting/ landslides, hurricanes, snow storms and other precipitation events | High | Low-Medium | OB, CIP, HMG, PDM, FMA, EWP, EPF, HREG, CWSRF, GIG, WCFA | <i>Lead Agency:</i> Village DPW (Village Board, Village Administrator, Village Building Inspector, Code Enforcement) | Short-term (≤ 6 mos.) |
| 24 | Upgrade the fire department's airpacks. | Fires, Lightning storms, | High | Low-Medium | APG, Fundraising, volunteer work | <i>Lead Agency:</i> Fire Department (Village Board, Village Administrator, WC Emergency Services, Grant Director) | Short-term (≤ 6 mos.) |

| ⁽¹⁾ Item Referral #: | Action | Hazard(s) Addressed | Priority Class: High Medium Low | Relative Estimated Costs: High Medium Low | ⁽²⁾ Possible Funding Source(s) | Administration & Implementation (Involved Parties) | Approximate Implementation Time Frame (duration to complete) Short-term (≤6 mos) Long-term (>6 mos) |
|---------------------------------|---|---------------------|--|--|---|--|---|
| 25 | Develop Village public education and awareness programs to include topics such as disaster preparedness; fire prevention; proper handling, storage, use and disposal of hazardous materials (waste oil, paints, solvents, pesticides and fertilizers, etc.); routine and emergency water conservation strategies; residential overcrowding restrictions; locations of emergency shelters; rules and regulations at emergency shelters; the four-way stop requirement for proceeding through intersections when traffic signals are not functioning; and evacuation procedures, including avoiding bridges, railroad crossings, steep unstable slopes, streets with numerous trees, and flood-prone areas. Efforts could include distribution of flyers door-to-door with focus on vulnerable populations and vulnerable or especially-affected locations, making brochures and pamphlets available at Village Hall, posting information on the Village website, and conducting periodic informational meetings. | All Hazards | High | Low-Medium | OB, EPF, HREG, private donations, fundraising | Lead Agency: Village Administrator (Village Board, Village Clerk, Village Staff, Grant Director) | Short-term (≤ 6 mos.) for first round - Ongoing |
| 26 | Develop a reverse 911 system to contact residents and provide necessary warnings and instructions before, during, and after a disaster. | All Hazards | High | Medium | AFG, NPG | | |

| (1)Item Referral #: | Action | Hazard(s) Addressed | Priority Class: High Medium Low | Relative Estimated Costs: High Medium Low | (2)Possible Funding Source(s) | Administration & Implementation (Involved Parties) | Approximate Implementation Time Frame (duration to complete) Short-term (≤6 mos) Long-term (>6 mos) |
|---------------------|---|---|--|--|--|---|---|
| 27 | Upgrade all emergency services systems to a digital system and get on the same frequency as Tarrytown and Westchester County so if the Village's system goes down, it will be able to use their system. | All Hazards | High | Medium | AFG, NPG | <i>Lead Agency:</i> Police Department (Village Board, Village Administrator, Grant Director, Fire, EMS, Westchester County & Tarrytown Emergency Services) | Short-term (≤ 6 mos.) |
| 28 | Develop and implement a river bank restoration program along the Hudson and Pocantico Rivers including riverbank erosion and sedimentation controls, restoration of topographic contours, planting of native vegetation, and/or installation of structural controls such as use of riprap gabions, bulkheads, revetments, etc. to stabilize soils. Use natural or "soft" solutions where possible and cost effective. Work with County and State agencies as applicable. Locations where erosion has been identified include Kingsland Point County Park along the Hudson, along the Pocantico River in Devries Park, and along the Pocantico River near Dell Street. | Flooding, erosion, mass wasting/ landslides | High | Medium | OB, CIP, HMGP, PDM, EWP, EPF, HREG, CWSRF, GIG, State and County parks funds | <i>Lead Agency:</i> Village DPW (Village Board, Village Administrator, Waterfront Advisory Commission, Grant Director, consultants, State and County DOT/DPW, NYDEC, Army Corps, NYSDOS, contractors) | Long-term (>6 mos.) |
| 29 | Perform a survey of buildings within the Village's business districts to determine the number, condition, age, use, occupancy, and type of building construction, and assess their vulnerability to fires, flooding, high winds, slope failure, and earthquakes relative to State and Village building codes and other available criteria. | Fire, flood, hurricane, tornado, high wind, earthquake, slope failure | High | Medium | OB, HMGP, PDM, FMA, DRF, CDGB, CDBG108 | <i>Lead Agency:</i> Village Building Inspector (Village Board, Village Administrator, Grant Director, Code Enforcement) | Ongoing |

| ⁽¹⁾ Item Referral #: | Action | Hazard(s) Addressed | Priority Class: High Medium Low | Relative Estimated Costs: High Medium Low | ⁽²⁾ Possible Funding Source(s) | Administration & Implementation (Involved Parties) | Approximate Implementation Time Frame (duration to complete) Short-term (≤6 mos) Long-term (>6 mos) |
|---------------------------------|---|--|--|--|---|---|---|
| 30 | Relocate the Department of Public Works building and its fueling station from their River Street location to one that is less vulnerable to flooding so that future responses to disasters will not be impeded. (The Village is currently considering temporary flood barriers at Horan's and along the Riverwalk in conjunction with replacing the bulkhead due to flooding in that area during storms. These barriers would also help to protect the DPW property.) | Flooding, hurricanes, storm surge | High | Medium-High | OB, CIP, HMGP, PMA, FMA, PAG | <i>Lead Agency:</i> Village DPW (Village Board, Village Administrator, Grant Director, consultants) | Long-term (>6 mos.) |
| 31 | Dredge sediment from the mouth of the Pocantico River at Devries Park to increase river channel capacity and reduce flooding. | Flooding, hurricanes, storm surge | High | Medium-High | HMP, PDM, EWP | <i>Lead Agency:</i> Village DPW (Village Board, Village Administrator, Waterfront Advisory Commission, Grant Director, Army Corps, NYSDEC, NYSDOS, contractors) | Long-term (>6 mos.) |
| 32 | Replace and resize the 100-year-old box culverts in the Village. Resizing will help to allow for the passage of greater volumes of floodwater, reduce the likelihood of blockage by debris, and help to reinforce the physical integrity of the structures. | Flooding, erosion, slope failure, disruptions to transportation services | High | Medium-High | OB, HMP, EWP, PDM, FCA, ERP, WCFA, County & State Parks funds | <i>Lead Agency:</i> Village DPW (Village Board, Village Administrator, NYSDEC, NYSDOS, State and County DOTs, consultants, contractors) | Long-term (>6 mos.) |

| ⁽¹⁾ Item Referral #: | Action | Hazard(s) Addressed | Priority Class: High Medium Low | Relative Estimated Costs: High Medium Low | ⁽²⁾ Possible Funding Source(s) | Administration & Implementation (Involved Parties) | Approximate Implementation Time Frame (duration to complete) Short-term (≤6 mos) Long-term (>6 mos) |
|---------------------------------|---|---------------------------------|--|--|---|---|--|
| 33 | Reline drinking water mains to conserve water for drinking and firefighting purposes. | Drought, fires, water shortages | High | Medium-High | DWSRF | Lead Agency: Village DPW (Village Board, Village Administrator, Grant Director, contractors, Water Utility) | Long-term (>6 mos.), Coordinate with any road improvements, drainage projects or installation, maintenance, or upgrade of utilities along targeted streets |

| ⁽¹⁾ Item Referral #: | Action | Hazard(s) Addressed | Priority Class: High Medium Low | Relative Estimated Costs: High Medium Low | ⁽²⁾ Possible Funding Source(s) | Administration & Implementation (Involved Parties) | Approximate Implementation Time Frame (duration to complete) Short-term (≤6 mos) Long-term (>6 mos) |
|---------------------------------|---|--|--|--|--|---|---|
| 34 | Inspect and replace, repair, improve, reinforce, and/or increase the height, as applicable, of all existing Village bulkheads, revetments, retaining walls, gabions, and other riverbank stabilization structures where necessary. Areas that are most vulnerable to flooding are listed in Section 3.2.2.8 of the Plan and are shown in Figures 3-1, 3-4, and 3-13. These areas primarily include land along the Hudson River at the southwest end of the Village (e.g., Ichabod's Landing, Horan's Landing, River Street, the Village DPW, Devries Park, Kingsland Point Park, Philipse Manor Beach Club, part of the GM property, etc.) and along the Pocantico River, especially the lower Pocantico River. Nonstructural measures to minimize damage to natural resources and property from flooding should be used whenever feasible. | Flooding, hurricanes, storm surge, erosion, mass wasting | High | Medium-High | OB, HMP, PDM, EWP, FCA, EPF, ERP, County & State Parks funds | <p><i>Lead Agency:</i> Village DPW (Village Board, Village Administrator, Grant Director, contractors, Waterfront Advisory Commission, NYSDEC, Army Corps, NYS DOS)</p> | Long-term (>6 mos.) |

| ⁽¹⁾ Item Referral #: | Action | Hazard(s) Addressed | Priority Class: High Medium Low | Relative Estimated Costs: High Medium Low | ⁽²⁾ Possible Funding Source(s) | Administration & Implementation (Involved Parties) | Approximate Implementation Time Frame (duration to complete) Short-term (≤6 mos) Long-term (>6 mos) |
|---------------------------------|---|---|--|--|---|--|---|
| 35 | Consider participating in Westchester County's current Multi-Jurisdictional Hazard Mitigation Plan Update | All Hazards | High | Low-Medium | OB-Staff | Village Boards and Staff, Village Administrator, MHMP Committee, Police Fire, and Ambulance Corps, Residents, Business Owners, Other Agencies, Special Districts, Local Organizations, Adjacent Municipalities, Academia, etc. | Long-term (>6 mos.) |
| 36 | Raise the bridge over the Pocantico River in Devries Park to prevent overtopping by floodwaters and/or undermining of the bridge. | Flooding, erosion, storm surge, hurricanes, public safety | High | High | EWP, State DOT funding | <i>Lead Agency:</i> Village DPW (Village Board, Village Administrator, Grant Director, contractors, NYSDEC, Army Corps, NYS DOS) | Long-term (>6 mos.) |

| ⁽¹⁾ Item Referral #: | Action | Hazard(s) Addressed | Priority Class: High Medium Low | Relative Estimated Costs: High Medium Low | ⁽²⁾ Possible Funding Source(s) | Administration & Implementation (Involved Parties) | Approximate Implementation Time Frame (duration to complete) Short-term (≤6 mos) Long-term (>6 mos) |
|--|---|---|--|--|--|---|---|
| MEDIUM PRIORITY RECOMMENDATIONS | | | | | | | |
| 37 | Adopt the current FEMA advisory flood zone map to ensure greater preparedness and flood-zone protection. Future development should be evaluated according to the proposed flood maps and comply with applicable State and Village flood protection standards to protect against flooding, including any additive effects from possible future sea level rise. | Flooding, hurricanes, major precipitation events, storm surge | Medium | Low | OB-staff time, Application fees | <i>Lead Agency:</i> Village Administrator (Village Board, Waterfront Advisory Commission) | Short-term (≤ 6 mos.) |
| 38 | Install a redundant 30-inch water main between Greenburgh and the Village to ensure that a constant supply of water is available for drinking and firefighting purposes, should a main break or major leak occur. | Fires, public health and safety, technological hazards | Medium | Low | DWSRF | <i>Lead Agency:</i> Village DPW (Village Board, Village Administrator, Grant Director, NYSDEC, Army Corps. NYS DOS, Water Utilities) | Long-term (>6 mos.) |
| 39 | Consider the use of natural/vegetated stormwater controls where possible, if they can be shown to enhance flood protection. | Flooding, drought | Medium | Low | OB-staff time, for Village projects: EPF, HGP, EWP, CWSRF, GIG | <i>Lead Agency:</i> Village DPW (Village Board, Village Planning Board, Village Zoning Board, Village Administrator) | Ongoing |

| ⁽¹⁾ Item Referral #: | Action | Hazard(s) Addressed | Priority Class: High Medium Low | Relative Estimated Costs: High Medium Low | ⁽²⁾ Possible Funding Source(s) | Administration & Implementation (Involved Parties) | Approximate Implementation Time Frame (duration to complete) Short-term (≤6 mos) Long-term (>6 mos) |
|---------------------------------|--|---------------------|--|--|---|--|---|
| 40 | Establish a subcommittee or conduct roundtable discussions with representatives from the fire, EMS, and police departments as part of major projects reviews to ensure that potential health and safety issues are adequately addressed. | All Hazards | Medium | Low | OB-staff time | <i>Lead Agency:</i> Village Administrator (Village Board, Village DPW, Village Building Inspector, First Responders, Hospital Reps., others as applicable) | Short-term (≤ 6 mos.) - Ongoing |
| 41 | Redevelopment of the former GM property could dramatically increase the Village's population and increase demands on emergency services. Promote first responder (e.g., fire and ambulance) volunteerism in the community. Seek to recruit additional first responders by targeting future residents of the former GM site and target this new development and the rest of the community, in future fundraising efforts. | All Hazards | Medium | Low | Volunteer work, OB-Public outreach | <i>Lead Agency:</i> Ambulance Corps (Village Board, Village Administrator, First Responders) | Ongoing |
| 42 | Establish alternative locations for use as emergency staging areas to serve Village staff, FEMA, and first-responders and for use as temporary post-disaster debris storage, management, and emergency supplies distribution locations. Parks that are located outside of flood danger and/or large parking lots such as those at the high school and middle school are candidates for staging areas. The part of the GM property currently used by the Village is a possible site when severe flooding is not an issue. | All Hazards | Medium | Low | OB-staff time | <i>Lead Agency:</i> Village Administrator (Village Board, Village DPW, Village Building Inspector, First Responders, Recreation and Parks, School District) | Short-term (≤ 6 mos.) |

| (1)Item Referral #: | Action | Hazard(s) Addressed | Priority Class: High Medium Low | Relative Estimated Costs: High Medium Low | (2)Possible Funding Source(s) | Administration & Implementation (Involved Parties) | Approximate Implementation Time Frame (duration to complete) Short-term (≤6 mos) Long-term (>6 mos) |
|---------------------|---|--|--|--|---|---|---|
| 43 | Identify locations such as parklands and the portion of the GM property currently used by the Village to store large volumes of snow after a blizzard to keep streets, sidewalks, parking lots, and fire hydrants clear. Areas identified for snow storage should have adequate drainage to accommodate large volumes of melt water on top of any precipitation that may be received. | Blizzards, major snow storms | Medium | Low | OB-Staff time | <i>Lead Agency:</i> Village DPW (Village Board, Village Administrator) | Short-term (≤ 6 mos.) |
| 44 | Request that emergency generators be installed and available at gasoline fueling stations as part of site plan approvals to prevent local gasoline shortages which can affect evacuations, emergency vehicle use, and normal community activities. Generators that are fueled by natural gas may be beneficial if gasoline is unavailable. | Power outages, snow storms, ice storms, wind storms, hurricanes, earthquakes, tornados | Medium | Low | OB as part of Application reviews/ Application fees | <i>Lead Agency:</i> Village Administrator (Village Board, Village Building Inspector) | Short-term (≤ 6 mos.) - Ongoing |
| 45 | Start a dialogue with other jurisdictions, such as the State Department of Transportation, to identify and remediate drainage issues on non-Village roadways within Village boundaries. | Flooding, erosion | Medium | Low | OB, State and County CIPs | <i>Lead Agency:</i> Village DPW (Village Board, Village Administrator, State DOT or and County DPW as applicable) | Short-term (≤ 6 mos.) |
| 46 | Inform residents, business owners, and not-for profit agencies of the existence of the Village's emergency email notification system. Brochures and pamphlets that provide information about the notification system and how to register could be made available at Village Hall. Development and building applications could also include this information. | All Hazards | Medium | Low | OB | <i>Lead Agency:</i> Village Administrator (Village Board, Village Clerk, Village Staff) | Ongoing |

| ⁽¹⁾ Item Referral #: | Action | Hazard(s) Addressed | Priority Class: High Medium Low | Relative Estimated Costs: High Medium Low | ⁽²⁾ Possible Funding Source(s) | Administration & Implementation (Involved Parties) | Approximate Implementation Time Frame (duration to complete) Short-term (≤6 mos) Long-term (>6 mos) |
|---------------------------------|---|---------------------|--|--|---|--|---|
| 47 | Inform residents, business owners, and not-for profit agencies of the existence of the Westchester County Community Emergency Notification System which sends email, text and/or phone messages to persons who are registered. Brochures and pamphlets that provide information about the notification system and how to register could be made available at Village Hall. Development and building applications could also include this information. | All Hazards | Medium | Low | OB | <i>Lead Agency:</i> Village Administrator (Village Board, Village Clerk, Village Staff) | Ongoing |
| 48 | Involve residents, local experts, members from academia, agency professionals, first responders, local business persons, and Village officials in hazard mitigation planning and implementation processes. Use of the most up-to-date information, standards, and practices, including the latest science, laws, engineering practices, planning principles, and environmental and economic data. | All Hazards | Medium | Low | OB | <i>Lead Agency:</i> Village Administrator (Village Board, MHMP Committee, Village Staff, Involved and Interested Agencies, the public, first responders, business owners) | Ongoing |
| 49 | Establish residential and commercial incentive programs for activities that reduce risks from floods, fires, and other possible hazards. Work with local banks to develop a program for low-interest loans for businesses within the Village to upgrade buildings and perform other similar types of improvements. | All Hazards | Medium | Low-Medium | OB, DL, Banks, private cost sharing | <i>Lead Agency:</i> Village Administrator (Village Board, Grant Director, Building Inspector, Banks, Businesses, Public, Landlords, Residents) | Short-term (≤ 6 mos.) - Ongoing |

| ⁽¹⁾ Item Referral #: | Action | Hazard(s) Addressed | Priority Class: High Medium Low | Relative Estimated Costs: High Medium Low | ⁽²⁾ Possible Funding Source(s) | Administration & Implementation (Involved Parties) | Approximate Implementation Time Frame (duration to complete) Short-term (≤6 mos) Long-term (>6 mos) |
|---------------------------------|--|--|--|--|--|--|---|
| 50 | Review Insurance Services Office, Inc. (ISO's) "Public Protection Classification Report" (2012) for the Village's fire department and develop a plan to address any outstanding deficiencies. | Building and forest fires | Medium | Low-Medium | Volunteerism, fundraising, contributions, taxes | <i>Lead Agency:</i> Fire Department (Village Board, Village Administrator, Grant Director, Westchester County Emergency Services) | Short-term (≤ 6 mos.) |
| 51 | Coordinate with electric, cable, and telephone utilities, the Village DPW, and the Tree Commission to develop a tree trimming maintenance plan that identifies hazardous trees and limbs that threaten buildings, utilities, and public safety and develop a schedule for necessary trimming and removal. In cases where trees must be removed, consider offsetting the loss by planting new trees of suitable species at other locations. | Power outages, snow storms, ice storms, wind storms, hurricanes, earthquakes, tornados | Medium | Low-Medium | OB, PDM, EWP, CWSRF, utilities | <i>Lead Agency:</i> Village Administrator (Village Board, Village DPW, Tree Commission, Utilities) | Short-term (≤ 6 mos.) |
| 52 | Provide public information in English and Spanish formats and periodically update the information as applicable. | All Hazards | Medium | Low-Medium | OB, HREG | <i>Lead Agency:</i> Village Clerk (Village Board, Village Administrator, Village Staff) | Ongoing |
| 53 | Identify those areas that contribute non-point source runoff to the Village's surface waters and seek funding for water quality, stormwater, and flood control improvement projects. Secure funds and implement projects for mitigation of erosion impacts at Village parks and road ends that provide river access and are experiencing severe erosion or are vulnerable to flooding. | Flooding, Hurricanes, major precipitation events | Medium | Medium | OB, CIP, HMG, PDM, FMA, EWP, EPF, HREG, CWSRF, GIG, WCFA | <i>Lead Agency:</i> Village Administrator (Village Board, Village DPW, Grant Director) | Long-term (>6 mos.) |

| ⁽¹⁾ Item Referral #: | Action | Hazard(s) Addressed | Priority Class: High Medium Low | Relative Estimated Costs: High Medium Low | ⁽²⁾ Possible Funding Source(s) | Administration & Implementation (Involved Parties) | Approximate Implementation Time Frame (duration to complete) Short-term (≤6 mos) Long-term (>6 mos) |
|---------------------------------|--|--|--|--|--|---|--|
| 54 | Inspect all Village facilities and establish best management practices and emergency response plans to prepare for and protect them from potential future disasters. | All Hazards | Medium | Medium | OB, PDM, FMA, PAG, CWSRF, GIG, WCFA | <i>Lead Agency:</i> Village Building Department (Village Board, Village Administrator, Village DPW, First Responders, Recreation and Parks) | Ongoing |
| 55 | Relocate the storage building at Devries Park to higher ground to prevent future flood damage. | Flooding, hurricanes, major precipitation events, storm surge | Medium | Medium-High | OB, CIP, HMG, PDM, FMA, possible RFC | <i>Lead Agency:</i> Village DPW (Village Board, Village Administrator, Grant Director, Building Inspector, Recreation & Parks) | Short-term (≤ 6 mos.) |
| 56 | Consider relocating power lines and other overhead utilities underground. Coordinate these efforts with electrical, cable and telephone utilities, and future road improvements or other utility projects (e.g., installation, upgrade or maintenance of water and sewer mains) to reduce costs and disturbances to traffic. One location where utilities should be buried is along Pocantico Street between Broadway and Howard Street. | Power outages, snow storms, ice storms, wind storms, hurricanes, earthquakes, tornados | Medium | Medium-High | Utilities, customer fees, work coordinated with road improvements, ERP | <i>Lead Agency:</i> Village Administrator (Village Board, Grant Director, Village DPW, Utilities & Public Services, State DOT/County DPW as applicable) | Long-term (>6 mos.), Coordinate with any road improvements, drainage projects or installation, maintenance, or upgrade of utilities along targeted streets |

| ⁽¹⁾ Item Referral #: | Action | Hazard(s) Addressed | Priority Class: High Medium Low | Relative Estimated Costs: High Medium Low | ⁽²⁾ Possible Funding Source(s) | Administration & Implementation (Involved Parties) | Approximate Implementation Time Frame (duration to complete) Short-term (≤6 mos) Long-term (>6 mos) |
|---------------------------------|--|---|--|--|--|---|---|
| 57 | Replace existing storm pipes to repair and prevent leaks and breaks in the system. | Flooding, major precipitation events | Medium | Medium-High | OB, HMG, PDM, DRF, EWP, FCA | <i>Lead Agency:</i> Village DPW (Village Board, Village Administrator, Grant Director, Village DPW, State DOT/County DPW as applicable) | Long-term (>6 mos.)/ Ongoing |
| 58 | Consider constructing a weir at the Fremont Pond Bridge to regulate water levels. Levels could be lowered before a major precipitation event, thereby reducing the potential for flooding to occur | Flooding, erosion | Medium | Medium-High | HMG, PDM, DRF, EWP, FCA, WCFA | <i>Lead Agency:</i> Village DPW (Village Board, Village Administrator, Grant Director, NYSDEC, Army Corps. NYS DOS) | Long-term (>6 mos.) |
| 59 | Inspect and maintain bridges, culverts, and wing walls and work with the County and State to address structures in their jurisdictions. | Technological hazards, public health and safety, flooding | Medium | Medium-High | OB, PDM, PAG, EWP, ERP, County & State contributions | <i>Lead Agency:</i> Village DPW (Village Board, Village Administrator, Grant Director, NYSDEC, Army Corps. NYS DOS, County DPW, State DOT) | Long-term (>6 mos.) - Ongoing |

| ⁽¹⁾ Item Referral #: | Action | Hazard(s) Addressed | Priority Class: High Medium Low | Relative Estimated Costs: High Medium Low | ⁽²⁾ Possible Funding Source(s) | Administration & Implementation (Involved Parties) | Approximate Implementation Time Frame (duration to complete) Short-term (≤6 mos) Long-term (>6 mos) |
|---------------------------------------|--|---|--|--|---|--|---|
| 60 | Replace the Department of Public Works' dump trucks that are in disrepair. | Snow storms, hurricanes, tornadoes, earthquakes, flooding, major debris clearance | Medium | Medium-High | CIB, OB | <i>Lead Agency:</i> Village DPW (Village Board, Village Administrator, Grant Director) | Long-term (>6 mos.) |
| LOWER PRIORITY RECOMMENDATIONS | | | | | | | |
| 61 | Develop emergency evacuation plans that include identification of routes and traffic coordination. | Flooding, erosion, possible severe nuclear event, chemical contamination | Low | Low-Medium | OB, PDM | <i>Lead Agency:</i> Village Administrator (Village Board, Village DPW, First Responders, State DOT, County DPW) | Short-term (≤ 6 mos.) |
| 62 | Expand the fire boat dock | Fire, water-related accidents & rescues | Low | Medium | AFG, donations, fundraising, HREG | <i>Lead Agency:</i> Village Fire Department (Village Board, Village Administrator, Grant Director) | Short-term (≤ 6 mos.) |

| ⁽¹⁾ Item Referral #: | Action | Hazard(s) Addressed | Priority Class: High Medium Low | Relative Estimated Costs: High Medium Low | ⁽²⁾ Possible Funding Source(s) | Administration & Implementation (Involved Parties) | Approximate Implementation Time Frame (duration to complete) Short-term (≤6 mos) Long-term (>6 mos) |
|---------------------------------|--|------------------------------------|--|--|--|--|---|
| 63 | Replace the fire company's oldest rescue boat. | Fire, water-related accidents | Low | Medium | AFG, donations | <i>Lead Agency:</i> Village Fire Department (Village Board, Village Administrator, Grant Director) | Short-term (≤ 6 mos.) |
| 64 | Consider the possibility of using sediment removed from the recommended dredging of the Pocantico River at Devries Park and current dredging around the historic lighthouse as backfill for taller bulkheads and retaining walls in flood-prone areas if sediment-size and contamination analyses indicate suitability for this use. If the sediment is found to be contaminated, it must be properly disposed in accordance with NYSDEC requirements. | Flooding, erosion, slope failure | Low | Medium-High | HMG, FMA, EPF, WCFA | <i>Lead Agency:</i> Village DPW (Village Board, Village Administrator, NYSDEC, Army Corps, NYSDOS, Waterfront Advisory Commission) | Short-term (≤ 6 mos.) |
| 65 | Acquire flood-prone property as funding and opportunities arise or team up with the State, County, or private preservation organizations for acquisitions that will ensure these properties can serve the function of a floodplain (i.e., flood overflow storage and recharge) and prevent threats to life and property. Acquired land can also provide environmental conservation benefits and passive or active recreational opportunities. | Flooding, hurricanes, storm surges | Low | Medium-High | State & County Community Development Programs, Other State and County funds, FMA, HMGP, PDM, NYS EPF, HREG, WCFA | <i>Lead Agency:</i> Village Administrator (Village Board, Grant Director) | Long-term (>6 mos.) - Ongoing |

| (1)Item Referral #: | Action | Hazard(s) Addressed | Priority Class: High Medium Low | Relative Estimated Costs: High Medium Low | (2)Possible Funding Source(s) | Administration & Implementation (Involved Parties) | Approximate Implementation Time Frame (duration to complete) Short-term (≤6 mos) Long-term (>6 mos) |
|---------------------|--------|---------------------|--|--|-------------------------------|--|---|
|---------------------|--------|---------------------|--|--|-------------------------------|--|---|

Notes:

(1) Item numbers are for recommendation identification only and should not be construed as a priority ranking. Recommendations are prioritized by general ranking classifications (i.e., high, medium and low) and by relative cost (low, medium high).

(2) See Funding Source Table provided in Chapter 6 for more information on the following programs. Possible funding sources are as follows:

Federal Programs: 1 Hazard Mitigation Grant Program (HMG); 2 Pre-disaster Mitigation Grant (PDM); 3 Flood Mitigation Assistance Program (FMA); 4 Repetitive Flood Claims Program (RFC); 5 Severe Repetitive Loss Program (SRL); 6 National Flood Insurance Program (NFI); 7 Disaster Loans (DL); 8 Public Assistance Grant Program (PAG); 9 Assistance to Firefighters Grant Program (AFG); 10 Disaster Recovery Funds (DRF); 11 National Preparedness Grant Program (NPG); 12 Emergency Watershed Protection Program (EWP); 13 1948 Flood Control Act (FCA), 14 Section 205; CDBG Disaster Recovery Assistance (CDBG); 15 CDBG Section 108 Loan Guarantee Program (CDBG108)

State Programs: 16 NYS Environmental Protection Fund (EPF); 17 Local Waterfront Revitalization Program (LWRP); 18 Hudson River Estuary Grants Program (HREG); 19 NYS Historic Preservation Grant Program (HPG); 20 Clean Water State Revolving Fund (CWSRF); 21 Drinking Water State Revolving Fund (DWSRF); 22 Green Innovation Grant Program (GIG); 23 Emergency Relief Program (ERP)

County Programs: 24 Westchester County Flood Action Program (WCFA)

Village Funding: 25 Operating Budget/Staff Time/Consultants/Supplies (OB); 26 Capital Improvements Budget (CIB); 27 Special Funds (SF); 28 Special Assessment/Taxing Districts (SA); 29 Im

Private Funding: 31 Private Donations or Cost Sharing (PD/CS); 32 Volunteerism (V); 33 Fundraising (F)

(3)The funding sources identified for each recommendation in the Action Plan are a starting point and should not be considered to be an exhaustive list of possibilities. Future projects should be re for applicability based on particular circumstances (e.g., pre-disaster/post-disaster, etc.) and the exact nature of the proposed project to be implemented.

6.0 AVAILABLE FUNDING AND HAZARD MITIGATION STAKEHOLDERS

This chapter identifies available hazard mitigation funding programs and the agencies, offices, and organizations that have a stake in hazard mitigation efforts.

6.1 Funding

Table 6-1 below provides a summary of potential funding sources, some of the types of projects or actions for which the funding may be used, and program contact information. Resources identified include Federal, State and County programs and Village resources (e.g., staff, capital improvements budgets, operating budgets, etc.). The Action Plan for this MHMP identifies possible grant and other funding or assistance opportunities for identified mitigation strategies and techniques.

6.2 Stakeholders

Following Table 6-1 is Table 6-2, “Stakeholders”, which provides a list of over 75 agencies, offices, special districts, utilities, and private interests and organizations that have a stake, would be involved or could be used as a resource for future multi-hazard mitigation planning, response and recovery efforts. Identified stakeholders include the general public, federal, state, and county agencies, Village offices, boards, committees, and officials, special districts, community service providers, utilities, and private organizations.

Table 6-1

| POSSIBLE FUNDING SOURCES FOR MULTI-HAZARD MITIGATION PROJECTS | | |
|---|---|---|
| Funding Program | Funding Program Purpose | For More Information |
| <i>Federal Programs</i> | | |
| 1-Hazard Mitigation Grant Program | Grants for State and local governments to implement long-term hazard mitigation measures after a major disaster declaration. Examples of projects that can be funded include, but are not limited to: acquisition of real property from willing sellers and demolition or relocation of buildings to convert the property to open space use; retrofitting structures and facilities to minimize damages from high winds, earthquake, flood, wildfire, or other natural hazards; elevation of flood prone structures; development and initial implementation of vegetative management programs; minor flood control projects that do not duplicate the flood prevention activities of other federal agencies; localized flood control projects, such as floodwall systems, that are designed specifically to protect critical facilities; and post-disaster building code related activities that support building code officials during the reconstruction process. | FEMA/SOEM http://www.fema.gov/hazard-mitigation-grant-program http://www.dhSES.ny.gov/oeM/programs/hmgp.cfm |
| 2-Unified Hazard Mitigation Assistance Program: Pre-Disaster Mitigation Grants | Technical and financial assistance to State and local governments to assist in planning and implementation of pre-disaster hazard mitigation measures. Examples of fundable projects include but are not be limited to property acquisition and elevation, minor localized flood mitigation measures, safe rooms, wildfire and seismic retrofit projects that are cost-effective and designed to reduce injuries, loss of life, and damage and destruction of property. | FEMA/SOEM http://www.fema.gov/pre-disaster-mitigation-grant-program http://www.dhSES.ny.gov/oeM/mitigation/ |
| 3-Unified Hazard Mitigation Assistance Program: Flood Mitigation Assistance Program | FEMA provides FMA funds to assist States and communities in planning for and implementing measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insured under the National Flood Insurance Program. Examples of projects include but are not limited to elevation, acquisition, or relocation of NFIP-insured structures. Communities must have an approved flood mitigation plan and participate in the NFIP. | FEMA/SOEM http://www.dhSES.ny.gov/oeM/mitigation/ http://www.fema.gov/flood-mitigation-assistance-program |
| 4-Unified Hazard Mitigation Assistance Program: Repetitive Flood Claims Program | This program provides funding to assist states and communities in reducing flood damages to insured properties that have had one or more claims with the NFIP. | FEMA/SOEM http://www.dhSES.ny.gov/oeM/mitigation/ |

| POSSIBLE FUNDING SOURCES FOR MULTI-HAZARD MITIGATION PROJECTS | | |
|--|--|--|
| Funding Program | Funding Program Purpose | For More Information |
| 5-Unified Hazard Mitigation Assistance Program: Severe Repetitive Loss Grant Program | Provides funding to reduce or eliminate the long-term risk of flood damage to severe repetitive loss structures insured under the NFIP. SRL structures are those for which (a) at least four NFIP claim payments (including building and contents) over \$5,000 each have been made, and the cumulative amount of such claims payments exceeds \$20,000; or (b) those that received at least two separate claims payments (building payments only) with the cumulative amount of the building portion of such claims exceeding the market value of the building. | FEMA/SOEM http://www.dhSES.ny.gov/oe/mitigation/ |
| 6-National Flood Insurance Program | Flood insurance available to communities that adopt and enforce a floodplain management ordinance that reduces future flood risks to new construction in Special Flood Hazard Areas (land that would be inundated by a flood having a one-percent chance of occurring in a given year) as a financial protection against flood losses. | FEMA http://www.fema.gov/library/viewRecord.do?id=1404 |
| 7-Disaster Loans | The Small Business Administration provides loans to homeowners, renters, businesses and most private, non-profit organizations to repair or replace real estate, personal property, equipment and business assets that have been damaged in a disaster. Types of loans include home and personal property loans, business physical disaster loans, economic injury disaster loans, and military reservists' economic injury loans. | US Small Business Administration http://www.sba.gov/category/navigation-structure/loans-grants/small-business-loans/disaster-loans |
| 8-Public Assistance Grant Program | The grants are available to local and state agencies, tribes, and nonprofit groups so that communities can quickly respond to and recover from major disasters or emergencies declared by the President. The Program provides supplemental Federal disaster grant assistance for debris removal, emergency protective measures, and the repair, replacement, or restoration of disaster-damaged publicly owned facilities and the facilities of certain Private Non-Profit organizations. The PA Program also encourages protection of these damaged facilities from future events by providing assistance for hazard mitigation measures during the recovery process. The Federal share of assistance is not less than 75% of the eligible cost for emergency measures and permanent restoration. The grantee (usually the State) determines how the non-Federal share (up to 25%) is split with the subgrantees (eligible applicants). | FEMA http://www.fema.gov/public-assistance-local-state-tribal-and-non-profit |
| 9-Assistance to Firefighters Grant Program | The primary goal of AFG is to provide firefighters and meet the firefighting and emergency response needs of fire departments and nonaffiliated emergency medical service organizations. AFG has been used to obtain critically needed equipment, protective gear, emergency vehicles, training and other resources needed to protect the public and emergency personnel from fire and related hazards. | FEMA http://www.fema.gov/welcome-assistance-firefighters-grant-program http://www.dhSES.ny.gov/grants/afg-fps.cfm |

| POSSIBLE FUNDING SOURCES FOR MULTI-HAZARD MITIGATION PROJECTS | | |
|--|--|---|
| Funding Program | Funding Program Purpose | For More Information |
| 10-Disaster Recovery Funds | The Department of Commerce's Economic Development Administration (EDA) assists communities in long-term disaster relief and recovery needs through competitive grants. EDA's disaster recovery generally falls within three categories: Strategic Planning and Technical Assistance (EDA offers financial resources and technical assistance to help develop and enhance economic development plans following a disaster. This is generally achieved through the funding of disaster recovery plans, strategies, and funding for disaster recovery coordinators); Infrastructure Design and Development (EDA offers grant funds to support the construction design and engineering, or to support the building of new infrastructure, or the retrofit and expansion of existing facilities to foster economic development to retain or attract jobs to the region); and Capital for Alternative Financing (EDA offers grants to create Revolving Loan Funds (RLF), or to recapitalize existing RLFs, that provide below market rate loans to businesses to help recovery efforts and business expansion/creation.) | Economic Development Administration http://www.eda.gov/disasterrcovery.htm |
| 11-National Preparedness Grant Program | One of the core missions of the Department of Homeland Security (DHS) is to enhance the ability of state, territory, local and tribal governments to prevent, protect against, respond to and recover from terrorist attacks and other disasters including terrorism prevention capabilities, protection of critical infrastructure and key resources, and long-term vulnerability reduction. The Program contains a number of subprograms including but not limited to: Homeland Security Grant Program (HSGP); UASI Nonprofit Security Grant Program (UASI NSGP); Emergency Management Performance Grants (EMPG); Interoperable Emergency Communications Grant Program (IECGP); Regional Catastrophic Preparedness Grant Program (RCPGP); Emergency Operations Center Grant Program (EOC); Driver's License Security Grant Program (DLSGP); Buffer Zone Protection Program (BZPP); Freight Rail Security Grant Program (FRSGP); Intercity Passenger Rail (Amtrak); Port Security Grant Program (PSGP); and Intercity Bus Security Grant Program (IBSGP). The primary objectives of the NPGP are to: 1) focus on the development and sustainability of core capabilities identified in the National Preparedness Goal; utilize gap analyses to determine asset and resource deficiencies and inform the development of new capabilities through a competitive process; build a robust national response capacity based on cross-jurisdictional and readily deployable State and local assets. | http://www.dhsec.ny.gov/grants/documents/FY-2013-National-Preparedness-Grant-Program-Overview.pdf |
| 12-Emergency Watershed Protection Program | The U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) administers the Emergency Watershed Protection (EWP) Program, which responds to emergencies created by natural disasters. It is not necessary for a national emergency to be declared for an area to be eligible for assistance. The program is designed to help people and conserve natural resources by relieving imminent hazards to life and property caused by floods, fires, windstorms, and other natural occurrences. 75% of costs come from NRCS and 25% come from local sources (cash or in-kind services). Funded activities include: removal of debris from stream channels, road culverts, and bridges; reshaping and protecting eroded banks; repairing damaged drainage facilities; establishing cover on critically eroding lands; repairing levees and structures; and repairing conservation practices. | USDA NRCS http://www.nrcs.usda.gov/wp/portal/nrcs/main/national/programs/landscape/ewpp/ |

| POSSIBLE FUNDING SOURCES FOR MULTI-HAZARD MITIGATION PROJECTS | | |
|---|---|--|
| Funding Program | Funding Program Purpose | For More Information |
| 13-1948 Flood Control Act, Section 205 | The FCA provides specialized services for small flood damage reduction projects. The Corps of Engineers designs and constructs the projects. Each project selected must be engineering feasible, complete within itself, and economically justified. Nonfederal sponsoring agency will share equally in the cost of feasibility studies (cash and in-kind services), shares in the project cost in cash, lands, damages and project costs in excess of the Federal cost limit of \$7,000,000; provides a cash contribution for land enhancement benefits and for project costs assigned to project features other than flood control; prevent future encroachment which might interfere with proper functioning of the project for flood control; and, maintain the project after completion. Local cost participation requirements and procedures for determining the local share of project cost are similar to those for flood control projects specifically authorized by Congress under regular authorization procedures. Eligible recipients include states, political subdivisions of states, or other responsible local agencies established under state law with full authority and ability to undertake necessary legal and financial responsibility. | FEMA |
| 14-CDBG Disaster Recovery Assistance | HUD provides flexible grants to help cities, counties, and States recover from Presidentially declared disasters, especially in low-income areas, subject to availability of supplemental appropriations. HUD generally awards noncompetitive, nonrecurring Disaster Recovery grants by a formula that considers disaster recovery needs unmet by other Federal disaster assistance programs. These communities must have significant unmet recovery needs and the capacity to carry out a disaster recovery program (usually these are governments that already receive HOME or Community Development Block Grant allocations). Examples of fundable projects include: buying damaged properties in a floodplain and relocating residents to safer areas; relocation payments for people and businesses displaced by disasters; debris removal not covered by FEMA; rehabilitation of homes and buildings damaged by disasters; buying, constructing, or rehabilitating public facilities such as streets, neighborhood centers, and water, sewer and drainage systems; code enforcement; homeownership activities such as down payment assistance, interest rate subsidies and loan guarantees for disaster victims; public services (generally limited to no more than 15 percent of the grant); helping businesses retain or create jobs in disaster impacted areas; and planning and administration costs (limited to no more than 20 percent of the grant). | HUD http://portal.hud.gov/hudportal/HUD?src=/program_office/comm_planning/communitydevelopment/programs/drsi |

| POSSIBLE FUNDING SOURCES FOR MULTI-HAZARD MITIGATION PROJECTS | | |
|--|--|--|
| Funding Program | Funding Program Purpose | For More Information |
| 15-CDBG Section 108 Loan Guarantee Program | Section 108 is the loan guarantee provision of the Community Development Block Grant (CDBG) program. Eligible recipients include metropolitan cities and urban counties (i.e. CDBG entitlement recipients); non-entitlement communities that are assisted in the submission of applications by States that administer the CDBG program; and non-entitlement communities eligible to receive CDBG funds under the HUD-Administered Small Cities CDBG program. The public entity may be the borrower or it may designate a public agency as the borrower. Eligible economic development activities include: acquisition of real property; rehabilitation of publicly owned real property; housing rehabilitation eligible under CDBG; construction, reconstruction, or installation of public facilities (including street, sidewalk, and other site improvements); related relocation, clearance, and site improvements; payment of interest on the guaranteed loan and issuance costs of public offerings; debt service reserves; and in limited circumstances, housing construction as part of community economic development, Housing Development Grant, or Nehemiah Housing Opportunity Grant programs. | HUD http://portal.hud.gov/hudportal/HUD?src=/program_office/comm_planning/communitydevelopment/programs/108 |
| State Programs | | |
| 16-New York State Environmental Protection Fund | Funding from the EPF includes but is not limited to open space conservation, waterfront revitalization, historic preservation, coastal rehabilitation, and nonpoint source pollution control. | NYSDEC, NYSDOS, NYSOPRHP http://www.dec.ny.gov/lands/5071.html http://www.imapinvasives.org/media/EANY_EPFSuccessStory.pdf |
| 17-Local Waterfront Revitalization Program | 50/50 matching grants for local governments to prepare plans for waterfront revitalization which can include but not be limited to land and water use planning, shoreline protection, flood prevention, stormwater controls, environmental protection, and economic development. | NYS Department of State Division of Communities & Waterfronts http://www.dos.ny.gov/communitieswaterfronts/WFRevitalization/LWRP.html |
| 18-Hudson River Estuary Grants Program | Municipalities and not-for-profit corporations are eligible; grants can be used for a wide variety of purposes including but not limited to open space acquisition, habitat and water quality protection, natural resource inventories, replacement of docks, enhanced water access, watershed management, and public education. | NYSDEC Hudson River Estuary Program http://www.dec.ny.gov/lands/5091.html |

| POSSIBLE FUNDING SOURCES FOR MULTI-HAZARD MITIGATION PROJECTS | | |
|---|---|---|
| Funding Program | Funding Program Purpose | For More Information |
| 19-New York State Historic Preservation Grant Program | A matching grant program to improve, protect, preserve, rehabilitate, restore or acquire properties listed on the State or National Registers of Historic Places and for structural assessments and/or planning for such projects. Funds are available to municipalities or not-for-profits with an ownership interest. | NYS Office of Parks, Recreation & Historic Preservation http://www.nysparks.com/grants/grant-programs.aspx |
| 20-Clean Water State Revolving Fund | Grants or loans are available for permeable pavement (porous asphalt, concrete, or pavers) ; bioretention (rain gardens or bioswales) ; green roofs or green walls ; street trees or urban forestry programs designed to manage stormwater ; construction or restoration of wetlands, floodplains, or riparian buffers ; stream daylighting (removing streams from pipes and restoring the natural morphology) ; downspout disconnection (redirecting stormwater from sewers to vegetated areas) ; and stormwater harvesting and reuse (rain barrel and cistern projects) . Applicants eligible for grants include municipalities, school districts, private or not-for-profit organizations, individuals, firms, partnerships, associations, and soil and water conservation districts. | http://www.nysefc.org/CleanWaterStateRevolvingFund/EligibilityandRegulations.aspx |
| 21-Drinking Water State Revolving Fund | The Drinking Water State Revolving Fund (DWSRF) is a program that that assists public and private water systems with the financing needed for drinking water infrastructure improvements (e.g. treatment plants, distribution mains, storage facilities, etc.). The DWSRF provides market rate financing, subsidized low-interest rate financing and limited grants for construction of eligible water system projects. The Fund is administered jointly by NYS Environmental Facilities Corporation and the NYS Department of Health. | http://www.nysefc.org/Default.aspx?tabid=83 |
| 22-Green Innovation Grant Program | The GIGP is another funding program available from the NYS Environmental Facilities Corporation. Funding is provided for projects that incorporate innovative ideas for stormwater management, green infrastructure design, and cutting-edge green technologies. Projects include various stormwater and wastewater improvements ranging from basic rain gardens to large-scale wastewater treatment sites. The GIGP provides financial assistance, technical support and administrative guidance to municipalities, private or public institutions, small businesses and non-profit organizations that constructing and implement innovative projects that will help to protect and improve water quality in the State. Green infrastructure is used to manage rain where it falls, reducing runoff volume and the need to treat it through conventional grey infrastructure (piped drainage and water treatment systems). | http://www.nysefc.org/Default.aspx?tabid=461 |
| 23-Emergency Relief Program | The ER program helps state and local highway agencies pay for costs incurred from repairing damage to facilities functionally classified as interstates, principal arterials, minor arterials, urban collectors and rural major collectors by either natural disasters or catastrophic failures. ER funds may be used for both emergency repairs and permanent repairs including: repairs intended to restore essential traffic, to control further damage or to protect the remaining facilities (establishing emergency detours, removing debris, providing temporary bridges or ferry service, placing rip-rap to prevent further scour) and repairs made after emergency repairs are completed to restore the facility to its pre-disaster condition (restoring pavement surfaces, rebuilding bridges and culverts, replacing signs, guiderails, fences and other highway appurtenances). | NYSDOT https://www.dot.ny.gov/programs/emergency-relief |

| POSSIBLE FUNDING SOURCES FOR MULTI-HAZARD MITIGATION PROJECTS | | |
|--|--|---|
| Funding Program | Funding Program Purpose | For More Information |
| <i>Westchester County Programs</i> | | |
| 24-Westchester County Flood Action Program | The County partners with municipalities and other agencies for flood control and flood damage reduction projects. Types of projects that could be funded include: construction of new municipal flood control structures, improvements (not maintenance) to existing stormwater structures and facilities, participation in state or federally sponsored projects such as those by the USACE or FEMA, and land acquisition/easements with the primary purpose of reducing flood damage. | Westchester County Planning http://www.westchestergov.com/pdfs/PLANNING_FloodActionCapProjFS.pdf |
| <i>Village Funding Mechanisms</i> | | |
| 25-Possible Village Funding Sources | Funding sources that are typically available to towns and villages include: operating budgets, capital improvements programs, property taxes, special assessment taxing districts, special funds, staff time, application fees, and connection fees. Other mitigation action financing mechanisms that may be available to the Village include private sector facility connection fees, private sector cost sharing, donations, volunteerism, fundraising, and technical assistance from agencies. | |

Table 6-2

| MULTI-HAZARD MITIGATION PLAN STAKEHOLDERS | | | | | |
|--|--|---|---|---|--|
| Federal Agencies | State Agencies | County or Regional Agencies | Local Offices, Agencies/Districts | Neighboring Jurisdictions | Public, Utilities & Private Organizations |
| Federal Emergency Management Agency | NYS Office of Emergency Management | Westchester County Department of Emergency Management | Sleepy Hollow Police Department | Town of Mount Pleasant | Village of Sleepy Hollow residents, organizations, and business owners |
| National Flood Insurance Program, Region 2 | NYS Homeland Security and Emergency Services Division | Westchester County Department of Emergency Services | Sleepy Hollow Fire Department | Village of Tarrytown | Metro North Railroad |
| US Army Corps of Engineers | NYS Department of State | Westchester County Division of Emergency Medical Services | Sleepy Hollow Ambulance Corps | Village of Briarcliff Manor | Consolidated Edison |
| US Geological Survey | NYSDEC Division of Water including the Bureau of Flood Protection & Dam Safety | Westchester County Division of Fire Services | Village of Sleepy Hollow Department of Public Works | Police, fire, and EMS services from surrounding communities | Sewer and Water Utilities |
| US Environmental Protection Agency | NYSDEC Division of Air Resources | Westchester County Police | Village Building Inspector | | Telecommunications utilities |
| US Department of Health and Human Services | NYSDEC Division of Environmental Remediation | Westchester County Department of Health | Village Administrator | | Cablevision |
| US Coast Guard | NYSDEC Division of Forest Protection & Fire Management | Westchester County Department of Community Mental Health | Village Grant Development Director | | Phelps Hospital |

| MULTI-HAZARD MITIGATION PLAN STAKEHOLDERS | | | | | |
|--|---|---|--|----------------------------------|--|
| Federal Agencies | State Agencies | County or Regional Agencies | Local Offices, Agencies/Districts | Neighboring Jurisdictions | Public, Utilities & Private Organizations |
| US Department of Justice, Federal Bureau of Investigation | NYSDEC Division of Law Enforcement | Westchester County Senior Services | Union Free School District of the Tarrytowns | | American Red Cross (White Plains) |
| US Central Intelligence Agency | NYS Department of Transportation | Westchester County Department of Transportation | Sleepy Hollow Tarrytown Chamber of Commerce | | Salvation Army (Tarrytown) and other local religious institutions |
| US Department of Homeland Security | NYS Division of Military and Naval Affairs | Westchester County Department of Public Works | Village elected officials | | Historic Hudson Valley |
| National Oceanic and Atmospheric Administration | NYS Police | Westchester County Department of Planning | Area Hostage Negotiator | | Sleepy Hollow Cemetery |
| US Nuclear Regulatory Commission | NYS Office of Parks, Recreation and Historic Preservation | Westchester County Social Services | Area SWAT Team | | Religious of the Sacred Heart of Mary Life Center and Day Care Centers |
| US Department of Agriculture, Natural Resources Conservation Service | State elected representatives | Westchester County Parks Department | Town Paramedic | | |
| US Small Business Administration | NYS Department of Health | Westchester County elected officials | Sleepy Hollow Senior Center | | |
| US Center for Disease Control | NYS Department of State, Division of Code Enforcement | Metropolitan Transportation Authority | | | |
| Federally elected representatives | | | | | |

7.0 PLAN MAINTENANCE PROCESS

7.1 Plan Adoption

Once FEMA approval was granted, the Village Board of Trustees adopted the MHMP to officially approve and validate the MHMP's contents and formally start the implementation process. Once FEMA determined the plan to be approvable, the Village of Sleepy Hollow Board of Trustees voted to adopt the Multi-Hazard Mitigation Plan by Resolution 08/120/2014, August 12, 2014. Upon receipt of this resolution, FEMA approved the plan on August 15, 2014. The adoption resolution is provided in Appendix F.

7.2 Implementation

Implementation and administration of the MHMP is the responsibility of the Village Board of Trustees and its staff and will be led by the Village Administrator or other individual appointed to the responsibility by the Village Trustees. The Board and Village Administrator or other designee with assistance from applicable Village staff, Village Boards, department heads, a grant specialist, private contractors, consultants, and others as applicable will be responsible for implementation, planning, applying for funding, budgeting, organizing and scheduling meetings, performing public outreach, conducting task oversight, and constructing and inspecting improvements. It is important that implementation begin as soon as possible after adoption of the MHMP to provide the community with the necessary protection the implementation of the identified mitigation actions will afford. High priority mitigation actions that are easily implementable, have the highest benefit/cost potential for addressing the greatest vulnerabilities, for the most likely hazards and disaster scenarios should be implemented first based on availability of funding. Applying for available funding to support the implementation of key recommendations should be one of the first priorities as securing funding is integral to implementation and the process can take considerable time. The Action Plan provided at the end of Chapter 5 includes: the list of proposed mitigation actions, the hazards each action addresses, the relative priority of each action ("high", "medium", "low"), relative costs (estimated as "high", "medium", "low"), possible funding sources, the agencies and

offices responsible for implementing each action, possible funding sources to finance each action, and approximate relative time-frames it would take to complete each project (≤ 6 months or >6 months).

7.3 Monitoring and Evaluation of Plan Implementation

Implementation of the MHMP will be monitored and periodically assessed to ensure a suitable level of progress and continued adherence to applicable agency mandates. If possible, monitoring and evaluation of the existing MHMP will involve those public officials and citizen representatives responsible for formulating the original MHMP with input from Village Board members, Village department heads, first responders, federal, state and local agencies, neighboring municipalities, special districts, utility companies, business organizations, environmental groups, members of academia, the general public (residents and business owners) and other interested individuals and entities. The Village Administrator or other designee, along with applicable staff and appointed committee members, with help from consultants (if warranted) would be responsible for overseeing the completion of this phase.

The evaluation will include, but not be limited to, assessing whether:

- The goals and objectives address current and projected conditions or whether they have become obsolete or are in need of modification;
- The nature, magnitude, and/or type of risks in the community have changed;
- The current staffing and available monetary resources are sufficient to implement the Plan's recommendations;
- The possible funding sources listed the MHMP are still available and whether there are new programs that have become available to finance the implementation of the plan;
- There are implementation problems, such as technical, political, legal, or coordination issued with other agencies;
- The outcomes of implemented actions have resulted in the anticipated results; and

- The agencies and other partners have participated as originally expected.

Progress reports will be submitted and presented to the Village Board on an annual basis to track implementation progress and the MHMP should be reviewed and updated at a minimum every five years from the date of plan adoption. The MHMP update process will provide the Village with the opportunity to consider changing issues and circumstances in the Village as well as evolving knowledge and technologies and modifications to funding sources that address hazard mitigation concerns. Progress reports will list completed action items, action items that are currently being implemented and their statuses, and next steps in the process. Adjustments may need to be made to the MHMP based on changing circumstances in the community and the availability of new information and technologies.

In order to incorporate mitigation into daily decision-making, the Village will reflect the planned flood mitigation actions and their intended effort in the Village's Stormwater Management Plan.

7.4 Incorporation into Existing Planning Mechanisms

One of the best ways to ensure that the MHMP's policies are properly instituted is to incorporate them into the existing local regulatory framework, future Village planning documents (e.g., future updated Master Plan and Local Waterfront Revitalization Program), site plan, subdivision, permit, and variance review policies and procedures, environmental assessments, capital improvements programming, and standard Village operating procedures. Future and updated laws, plans, budgets, operational guidelines, and capital improvements programming will be assessed prior to adoption to ensure that they are not contrary to the goals and recommendations of the MHMP and support the implementation of the Plan and continued protection of the community from the various risks it may be vulnerable to.

7.5 Continued Public Involvement

Public education and outreach must be an ongoing process to ensure that the MHMP continues to meet the needs of the community. The status of plan implementation, MHMP revisions, and other important information pertaining to multi-hazard mitigation should be posted on the Village's official website and made available at Village Hall and the local library for open review. Public hearings must be held prior to adoption of any revisions to the MHMP. Public meetings and hearings associated with revisions and adoption of the MHMP should be publicized in the local newspaper, local Internet newspapers, the Village website, and through the Village's email notification system. Draft documents should be made available for review on the Village website and convenient locations, including the Village Clerk's office and the local library. A written comment period should be provided after each public meeting to allow individuals who are unable to attend meetings or prefer to submit written comments to do so. Designated comment periods should allow sufficient time for individuals to review the available materials, conduct their own research if so inclined, and prepare and submit written comments for review and consideration. A thirty-day review and comment period from the time of publication is generally considered sufficient. This would include a period extending from the time the materials are filed to at least two weeks from the date of the public hearing. A record of input received at the meetings and in writing should be maintained by the Village. Continued public education and outreach will help to keep the public informed, ensure a thorough vetting of diverse ideas and recommendations, and provide the basis for reaching general consensus on critical issues that are important to the community's hazard mitigation planning, response, and recovery efforts.

7.6 Plan Updates

The MHMP is considered a "living document" that needs to be revised and updated over time. The Plan will be updated every five years to account for changing conditions, new information, changing laws, policies, and plans, new funding sources, emerging stakeholders, and lessons learned. Update of the MHMP will take approximately 2 to 6

months, depending on the degree of effort necessary and the availability of resources. Revisions will be overseen by the Village Administrator or other designee and applicable Village staff, a Multi-Hazard Mitigation Committee comprising a diverse group of stakeholders who can provide valuable and informed input into the process, and consulting professionals as needed. Proposed MHMP revisions will be referred to FEMA and SOEM to ensure continued agency compliance and acceptance of this MHMP. Future amendment or revision of this MHMP will also include public review and comment prior to consideration and adoption by the Village Board of Trustees. Materials will be made available to the public on the Village's website and at the Village Clerk's office and local library.

8.0 **BIBLIOGRAPHY**

American Dreams Inc. List of National Register of Historic Places for Westchester County, NY. Internet website: <http://www.nationalregisterofhistoricplaces.com/> Reviewed December 2012.

Canestrari, Donald, Environmental Engineer II. 2012. NYSDEC Bureau of Flood Protection and Dam Safety. Telephone conversation. December 14.

Dolan, R. and Davis, R. 1992. "An Intensity Scale for Atlantic Coastal Northeast Storms." *Journal of Coastal Research*. 8: 840-853.

Dolph Rotfield Engineering, P.C. 2009. Village of Sleepy Hollow, New York Stormwater Management Plan

Federal Emergency Management Agency. 2002. FEMA 386-1: *Getting Started with the Mitigation Planning Process, Including Important Considerations for How You Can Organize Your Efforts to Develop an Effective Mitigation Plan.*

Federal Emergency Management Agency. 2007. FEMA 386-5: *Using Benefit-Cost Review of Mitigation Planning.*

Federal Emergency Management Agency. 2005. FEMA 386-6: *Incorporating Special Considerations into Hazard Mitigation Planning For Historic Structures and Cultural Resources.*

Federal Emergency Management Agency. 2007. FEMA 386-8: *Using Multi-Jurisdictional Approaches to Mitigation Planning.*

Federal Emergency Management Agency. 2002. FEMA 386-9: *Finding and Securing Technical and Financial Resources for Mitigation Planning.*

Federal Emergency Management Agency (FEMA). 2011. *Key Points for Developing and Updating Local Hazard Mitigation Plans*. FEMA Region II. December 5.

Federal Emergency Management Agency (FEMA). 2011. *Local Mitigation Plan Review Guide*. FEMA. October.

Federal Emergency Management Agency. 2008. *Multi-Hazard Mitigation Planning Guidance Under the Disaster Mitigation Act of 2000*. FEMA: Washington, DC: Internet website: <http://www.fema.gov/library/viewRecord.do?id=3115>

Federal Emergency Management Agency (FEMA). 2003. *Integrating Manmade Hazards into Mitigation Planning*. State and Local Mitigation Planning How-to Guide. FEMA: Washington, D.C. FEMA 386-7, Version 2.0. September.

Federal Emergency Management Agency (FEMA). 2002. *Getting Started: Building Support for Mitigation Planning*. State and Local Mitigation Planning How-to Guide. FEMA: Washington, D.C. FEMA 386.1. September.

Federal Emergency Management Agency (FEMA). 2001. *Understanding Your Risks: Identifying Hazards and Estimating Losses*. State and Local Mitigation Planning How-to Guide. FEMA: Washington, D.C. FEMA 386-2.

Findlakes.com Information downloaded December 13, 2012. Internet website: http://findlakes.com/pocantico_lake_new-york~ny00049.htm

Hazards & Vulnerability Research Institute (2012). The Spatial Hazard Events and Losses Database for the United States (SHELDUS), Version 10.0 [Online Database]. Columbia, SC: University of South Carolina. Available from <http://www.sheldus.org>

Insurance Services Office, Inc. (ISO). 2012. *Public Protection Classification Summary Report, Sleepy Hollow, NY*. ISO: Marlton, NJ. February.

Mandia, Scott A, Associate Professor, Physical Sciences Department, SUNY, Stony Brook. No date. *The Long Island Express, The Great Hurricane of 1938: Long Island South Shore Hurricane Storm Surge Maps*. SUNY: Stony Brook, NY.

National Oceanic and Atmospheric Administration (NOAA), Storm Prediction Center. 2002. *The Online Tornado FAQ*. <http://www.spc.noaa.gov/faq/tornado/#About>. Roger Edwards Storm Prediction Center: Norman, OK. December.

National Oceanic and Atmospheric Administration (NOAA), National Weather Service. 2008. *The Enhanced Fujita Scale (EF)*. NOAA NWS Internet website: <http://www.crh.noaa.gov/arx/efscale.php>

New York State Division of Homeland Security and Emergency Services. 2011. *New York State Standard Multi-Hazard Mitigation Plan*.

New York State Emergency Management Office, Office of Public Information, 2010. *Protecting Public Health and Safety: New York Radiological Emergency Planning*. SOEM OPI: Internet website: http://www.dhSES.ny.gov/oem/radiological/documents/2010_0106-REPP-Protecting-Public-Health.pdf . January.

New York State Geological Survey, National Earthquake Hazard Reduction Program. 2008. NEHRP Soil Classification Map.

New York State Office of Parks, Recreation and Historic Preservation. Sphinx database. *List of State and National Register of Historic Places*. Internet website: <http://www.nysparks.com/shpo/online-tools/disclaimer.aspx?pgm=spx> December 2012.

Phelps Memorial Hospital Center. 2012. *Emergency Management Program: Hospital Emergency Preparedness Resource Inventory*. January memo.

Phelps Memorial Hospital Emergency Management Manual. 2009. *Comprehensive Emergency Management Program: Emergency Operations Plan*. Sleepy Hollow, NY. January.

Phelps Memorial Hospital. No date. Phelps Memorial Hospital Center Safety Manual.

Pilkey, O. H.; Neal, W. J.; Riggs, S. R.; Webb, C.A.; Bush, D.M.; Pilkey, D.F.; Bullock, J.; and Cowan, B.A. 1998. *The North Carolina Shore and its Barrier Islands: Restless Ribbons of Sand*. Duke University Press: Durham and London.

Stearns & Wheler, LLC. 2010. *Emergency Action Plan for Pocantico Lake Dam*. Cazenovia, NY.

The Open University, Oceanography Course Team. 1993. *Waves, Tides, and Shallow-Water Processes*. Pergamon Press: Oxford, New York, Seoul, Tokyo. Third edition.

United States Department of Agriculture. Natural Resources Conservation Service. 2002. Soils database.

United States Census Bureau. 2010. Population statistics for Sleepy Hollow, NY. American Factfinder Internet site: <http://factfinder2.census.gov> U.S. Census: Washington, D.C.

United States Department of Transportation, Pipeline and Hazardous Materials Safety Administration. 2012. *2012 Emergency Response Guidebook: A Guidebook for First Responders During the Initial Phase of a Dangerous Goods/Hazardous Material Transportation Incident*. USDOT: Internet website: <http://www.phmsa.dot.gov/staticfiles/PHMSA/DownloadableFiles/Files/Hazmat/ERG2012.pdf>

United States Geological Survey. 1989. *The Severity of an Earthquake*. U.S. Government Printing Office: Washington, D.C. General Interest Report # 1989-288-913.

United States Nuclear Regulatory Commission. 2009. *Emergency Preparedness at Nuclear Power Plants*. USNRC. January.

University of Delaware. 2009. Presidential Disaster Declarations and Emergency Declarations database for Westchester County. Internet website: <http://www.peripresdecusa.org/mainframe.htm>

University of the State of New York, State Education Department. 2001. *Project Save (Safe Schools Against Violence in Education): Guidance Document for School Safety Plans*. SED: Albany, NY. Internet website: <http://www.dhSES.ny.gov/oem/planning/documents/ProjectSAVE.pdf> April.

Village of Sleepy Hollow. Department of Public Works and Water and Sewer Department. 1993. Last Updated 2011. *Water Supply Emergency Plan for the Village of Sleepy Hollow*. Sleepy Hollow, NY.

Wheeler, Russell, L.; Trevor, Nathan K.; Tarr, Arthur, C.; Crone, Anthony, J. 2001. *Earthquakes In and Near the Northeastern United States, 1638-1998*. U.S. Department of Interior, U.S. Geological Survey in cooperation with the Northeast States Emergency Consortium. Geologic Investigation Series 1-1237.

Village of Sleepy Hollow *Code of the Village of Sleepy Hollow*

Village of Sleepy Hollow, NY Fire Department. 2012. Fire Department webpage: <http://www.sleepyhollowfd.org/>

Village of Sleepy Hollow, NY. 2012. Village's official webpage: <http://www.sleepyhollowny.gov/>

Village of Sleepy Hollow Police Department *General Order Response to Major Emergencies*

Village of Sleepy Hollow Police Department *Major Events Contact List*

Village of Sleepy Hollow Police *General Orders of the Sleepy Hollow Police Department*

The Mutual Aid and Rapid Response Plan for the Police Departments of Westchester County, New York

Village of Sleepy Hollow Fire Department Mutual Aid Plan

Public Schools of the Tarrytown School Emergency/Disaster Management Plans (for Sleepy Hollow High and Middle Schools and WL Morse Elementary School)

Village of Sleepy Hollow. 1996. *Village of Hollow Local Waterfront Revitalization Program*.

Westchester County. 2010-2011. *Westchester County Indian Point Emergency Guide 2010-2011 Edition*. WC Internet Website:
http://www.safesecurevital.com/pdf/EPZ_booklets/ipeg_westchester_web-booklet.pdf

Westchester County. 2005. *Westchester County Comprehensive Emergency Management Plan*. WC Internet website: <http://www.westchestergov.com/emergserv/reports/cemp2005.pdf>