



**NORTHERN AND EASTERN
DUTCHESS COUNTY
COMMUNITIES REGIONAL
NATURAL HAZARD MITIGATION PLAN**

FINAL PLAN
September 2010

Prepared by:

URS



PLAN ADOPTION RESOLUTIONS

In accordance with Part 201.6 of the Disaster Mitigation Act of 2000 (DMA 2000), nine jurisdictions in Dutchess County, New York (the “Northern and Eastern Dutchess County Communities” of the Towns of Amenia, Beekman, Dover, Milan, North East, Pawling and Pine Plains; and the Villages of Pawling and Millerton) have developed this Multi-Jurisdictional Hazard Mitigation Plan to identify hazards that threaten their jurisdictions and ways to reduce future damages associated with these hazards.

Following this page are the signed adoption resolutions of all participating jurisdictions that have adopted this plan, authorizing municipal government staff to carry out the actions detailed herein.

Signed resolutions of adoption by all participating jurisdictions shall be inserted following this page after FEMA has reviewed and determined that the Draft plan is approvable. A sample resolution is included on the following page.



EXECUTIVE SUMMARY

Across the United States and around the world, natural disasters occur each day, as they have for thousands of years. As the world's population and development have increased, so have the effects of these natural disasters. The time and money required to recover from these events often strain or exhaust local resources. The purpose of hazard mitigation planning is to identify policies, actions, and tools for implementation that will, over time, work to reduce risk and the potential for future losses. Hazard mitigation is best realized when community leaders, businesses, citizens, and other stakeholders join together in an effort to undertake a process of learning about hazards that can affect their area and use this knowledge to prioritize needs and develop a strategy for reducing damages.

Section 322, Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act ("the Stafford Act"), enacted by Section 104 of the Disaster Mitigation Act of 2000 ("DMA 2000"), provides new and revitalized approaches to mitigation planning. Section 322 continues the requirement for a State mitigation plan as a condition of disaster assistance, and establishes a new requirement for local mitigation plans. In order to apply for Federal aid for technical assistance and post-disaster funding, local jurisdictions must comply with DMA 2000 and its implementing regulations (44 CFR Part 201.6).

While the Northern and Eastern Dutchess County Communities (hereafter referred to as the "NEDCC", including the following nine jurisdictions in Dutchess County, New York: the Towns of Amenia, Beekman, Dover, Milan, North East, Pawling and Pine Plains; and the Villages of Pawling and Millerton) have always sought ways to reduce their vulnerability to hazards, the passage of DMA 2000, in conjunction with the devastating effects of the widespread flooding that occurred in the Ten Mile River valley in 2005 and 2007, helped local officials to recognize the benefits of pursuing a long-term, coordinated approach to hazard mitigation through hazard mitigation planning. The NEDCC has received grant funds from the Federal Emergency Management Agency (FEMA) for the purpose of developing this very hazard mitigation plan. Funding was received under the Hazard Mitigation Grant Program for development of a multi-jurisdictional hazard mitigation plan for the NEDCC. This **Northern and Eastern Dutchess County Communities Regional Natural Hazard Mitigation Plan** represents the collective efforts of nine participating jurisdictions, the general public, and other stakeholders. Natural disasters cannot be prevented from occurring. Over the long-term, the continued implementation of this plan will gradually, but steadily, lessen the impacts associated with hazard events.

This plan has been developed by the NEDCC Planning Committee (the "Planning Committee"), with support from outside consultants. The efforts of the Planning Committee were headed by Dr. Kathryn Palmer-House, Local Liaison and member of the Town of Dover. The overall Planning Committee was divided into a Core Planning Group (CPG) and Jurisdictional Assessment Teams (JATs), with one JAT for each of the participating jurisdictions. JATs undertook outreach efforts to the public and other stakeholders within their respective municipalities, who were provided with opportunities to participate throughout the process.

The plan development process was initiated in earnest in the Summer of 2008 with a meeting between the NEDCC's plan development consultants at URS and the Local Liaison on July 29, 2008. A Kickoff Meeting of the full CPG was conducted on September 12, 2008. Thereafter, the Core Planning Group met on January 16, 2009; March 26, 2009; April 16, 2009; and January 29, 2010. JATs met individually throughout the plan development process as they deemed necessary.

Community support is vital to the success of any hazard mitigation plan. The Planning Committee (CPG + JATs) provided opportunities for participation and input of the public and other stakeholders throughout the plan development process, both prior to the Draft and before approval of the Final plan, providing



citizens and other stakeholders with opportunities to take part in the decisions that will affect their future. Other stakeholders include, but are not limited to: neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties. A multi-jurisdictional hazard mitigation planning page was developed for the project, hosted on the Town of Dover web site at www.townofdover.us/AHMP.cfm. Other jurisdictions posted links on their local web sites to this overall project page. This web site was established in September 2008. Information is posted on the plan development process and where to go for additional information or comments, or to become involved. This web site has been and continues to be maintained and updated regularly. The team also conducted several other outreach actions including distribution of a project fact sheet. Local newspapers (the *Harlem Valley Times*, *Millerton News* and *Northern Dutchess News*) regularly covered the planning process. Jurisdictional Assessment Team members also reached out to the public and other stakeholders within their respective jurisdictions to get the word out through various means and provide opportunities for feedback and participation. Additionally, targeted outreach to key stakeholders was conducted via the distribution of a letter on February 1, 2010 to each of 17 entities explaining the process and soliciting comments and feedback on the Draft Plan.

The hazard mitigation planning process consisted of the following key steps:

- Researching a full range of natural hazards to identify which hazards could affect the participating jurisdictions;
- Identifying the location and extent of hazard areas;
- Identifying assets located within these hazard areas;
- Characterizing existing and potential future assets at risk;
- Assessing vulnerabilities to the most prevalent hazards; and
- Formulation and prioritization of goals, objectives, and mitigation actions to reduce or avoid long-term vulnerabilities to the identified hazards.

Natural hazards that can affect the planning area that were studied in detail in the Plan are as follows:

- **Atmospheric hazards**, including: extreme temperatures, extreme wind, hurricanes and tropical storms, lightning, nor'easters, tornadoes, and winter storms;
- **Hydrologic hazards**, including: dam failure, drought, flooding, storm surge, and wave action;
- **Geologic hazards**, including: earthquakes and landslides; and
- **Other hazards**, including: wildfires.

After evaluating these hazards and assets within the planning area to which they are vulnerable, the Planning Committee developed a mitigation strategy to increase the disaster resistance of each participating jurisdiction, along with procedures for monitoring, evaluating and updating the Plan to ensure that it remains a "living document."

If you have any questions or comments on the Northern and Eastern Dutchess County Communities Regional Natural Hazard Mitigation Plan, please contact your Town Supervisor or Village Mayor or:

Dr. Katie Palmer-House, Local Liaison
126 East Duncan Hill Rd., Dover Plains, NY 12522
Phone: (845)877-3410 or (845)877-3335
Fax: (845)877-3335
E-Mail: Hufcut@aol.com



ACKNOWLEDGEMENTS

The following nine municipal entities actively participated throughout the development of this Northern and Eastern Dutchess County Communities Regional Natural Hazard Mitigation Plan:

Amenia, Town of
Beekman, Town of
Dover, Town of
Milan, Town of
Millerton, Village of
North East, Town of
Pawling, Town of
Pawling, Village of
Pine Plains, Town of

In addition, the records show that the following four stakeholder entities participated through attending at least one meeting.

- *NYSEMO Region II*
- *NYS Senate*
- *Dutchess County Soil and Water Conservation District*
- *Dutchess County GIS Department*

URS Corporation (Wayne, NJ) acted as the plan development consultant providing hazard mitigation planning services.



TABLE OF CONTENTS

Section 1 - Introduction..... 1-1
 Purpose..... 1-1
 About the Planning Area..... 1-1
 Plan Development Process..... 1-10
 Regulatory Compliance..... 1-25
 Document Organization..... 1-26
 Key Terms..... 1-26

Section 2 - Identification of Potential Hazards..... 2-1

Section 3 - Risk Assessment..... 3-1
 3.a Hazard Profiles..... 3a-1
 3.b Vulnerability Assessment: Identification and Characterization of Assets in Hazard Areas..... 3b-1
 3.c Vulnerability Assessment: Damage Estimates..... 3c-1
 3.d Summary of Land Uses and Development Trends in Hazard Areas..... 3d-1

Section 4 - Capabilities and Resources..... 4-1

Section 5 - Mitigation Goals..... 5-1

Section 6 - Range of Alternative Mitigation Actions Considered..... 6-1

Section 7 - Action Item Evaluation and Prioritization..... 7-1

Section 8 - Implementation Strategy..... 8-1

Section 9 - Plan Maintenance..... 9-1

Section 10 - For More Information..... 10-1

Appendices:

- Appendix A – Detail Tables: Asset Identification and Characterization
- Appendix B – Critical Facilities in Hazard Areas
- Appendix C – Historic and Cultural Resources in Hazard Areas
- Appendix D – Participating Jurisdictions Action Item Prioritization Sheets
- Appendix E – Participating Jurisdictions Implementation Strategy Sheets
- Appendix F – National Flood Insurance Program Compliance Actions
- Appendix G – Planning Committee Membership Information
- Appendix H – Newspaper Articles and Coordination Letter to Stakeholder Groups
- Appendix I – Core Planning Group Meetings
- Appendix J – Additional Information



List of Tables

Table 1.1 – Planning Area Population Changes and Projections	1-4
Table 1.2 – Income and Unemployment in the Planning Area	1-7
Table 1.3 – New York State Major Disaster Declarations: 1954 – 2007	1-8
Table 1.4 – New York State Emergency Declarations: 1954 – 2007	1-9
Table 1.5 – NEDCC Jurisdictional Participation	1-11
Table 1.6 – Summary of Jurisdiction Outreach Activities	1-22
Table 1.7 – FEMA Plan Review Criteria	1-26
Table 2.1 – Descriptions of the Full Range of Initially Identified Hazards	2-2
Table 2.2 – Documentation of the Hazard Identification Process	2-5
Table 2.3 – Summary Results of the Hazard Identification and Evaluation Process	2-15
Table 3a.1 – Summary of Profiled Hazards by Jurisdiction	3a-1
Table 3a.2 – Severity and Typical Effects of Various Speed Winds	3a-10
Table 3a.3 – Average Annual Number of Wind Events (Statewide vs. Dutchess County)	3a-12
Table 3a.4 – Wind Speed Probabilities for Dutchess County and Surrounding Area	3a-12
Table 3a.5 – Expected Annual Number of Wind Events of Various Magnitudes at Various Distances from the Coast for Dutchess County and Surrounding Areas	3a-13
Table 3a.6 – Annual Probability of Wind Events of Various Magnitudes at Various Distances from the Coast for Dutchess County and Surrounding Areas	3a-13
Table 3a.7 – The Saffir-Simpson Hurricane Scale	3a-15
Table 3a.8 – Dolan-Davis Nor’easter Intensity Scale	3a-20
Table 3a.9 – The Fujita Scale: Tornado Magnitude	3a-22
Table 3a.10 – Tornadoes Reported in the Dutchess County Communities Planning Area	3a-23
Table 3a.11 – Occurrence of Winter Storms/Ice Storms, Dutchess County	3a-29
Table 3a.12 – High/Significant Hazard Potential Dams, Dutchess County Planning Area	3a-31
Table 3a.13 – Estimated Potential Exposure of Improved Property to Dam Failure	3a-37
Table 3a.14 – Distribution of Agricultural Land in Northern and Eastern Dutchess County	3a-41
Table 3a.15 – Summary of FEMA Q3 Flood Data by Municipality: Land in Flood Hazard Areas	3a-46
Table 3a.16 – Summary of FEMA Q3 Flood Data by Municipality: Improved Property Values in Flood Hazard Areas	3a-46
Table 3a.17 – Comparison of Q3 and Post-Preliminary DFIRM Datasets	3a-47
Table 3a.18 – Comparison of Exposed Improved Property Values: NEDCCR/NYSEMO	3a-48
Table 3a.19 – FEMA NFIP Policy and Claim Information for Planning Area Jurisdictions	3a-48
Table 3a.20 – Major Flood Disaster Declarations Affecting Dutchess County	3a-52
Table 3a.21 – Selected Flood Events affecting Northern and Eastern Dutchess County	3a-53
Table 3a.22 – Earthquake Magnitude/Intensity Comparison	3a-63
Table 3a.23 – Northern and Eastern Dutchess County Earthquake Hazard: Adjusted UGS 0.2 Sec Spectral Acceleration: Acreages	3a-68
Table 3a.24 – Northern and Eastern Dutchess County Earthquake Hazard: Adjusted UGS 0.2 Sec Spectral Acceleration With a 2% Probability of Exceedance over 50 Years: Improved Values	3a-68
Table 3a.25 – Earthquake History Throughout New York State (1737 – 2005)	3a-70
Table 3a.26 – Wildfire Risk in Northern and Eastern Dutchess County	3a-75
Table 3b.1 – Improved Property by Jurisdiction	3b-2
Table 3b.2 – Percentage of Improved Property in Delineated Hazard Areas	3b-2
Table 3b.3 – Emergency Facilities by Jurisdiction	3b-3
Table 3b.4 – Critical Infrastructure and Utilities by Jurisdiction	3b-4
Table 3b.5 – Other Key Facilities by Jurisdiction	3b-5
Table 3b.6 – Historic and Cultural Resources by Jurisdiction	3b-6
Table 3b.7 – Population and Households by Jurisdiction (2000 Census)	3b-7



Table 3b.8 – Vulnerable Sectors of the Population by Jurisdiction (2000 Census)	3b-8
Table 3c.1 – Total Earthquake Losses – Dutchess County: For the Four Return Periods of 2500, 1000, 500 and 250 years	3c-3
Table 3c.2 – Annual Loss Estimates –Earthquakes	3c-4
Table 3c.3 – Annual Loss Estimates –Floods	3c-5
Table 3c.4 – Annual Loss Estimates – Lightning	3c-7
Table 3c.5 – Breakdown of Dutchess County Crop Sales (2007)	3c-8
Table 3c.6 – Annual Loss Estimates – Drought	3c-9
Table 3c.7 – Annual Loss Estimates - Tornados	3c-10
Table 3c.8 – Annual Loss Estimates – Summary, All Natural Hazards	3c-12
Table 3d.1 – Land Cover Estimates – Planning Area Overall	3d-4
Table 3d.2 – Land Use Estimates – Planning Area Overall	3d-4
Table 3d.3 – Planning Area Communities with Land Use Regulations	3d-5
Table 3d.4 – Land Cover Estimates – Town of Amenia	3d-6
Table 3d.5 – Land Use Estimates – Town of Amenia	3d-6
Table 3d.6 – Land Cover Estimates – Town of Beekman	3d-7
Table 3d.7 – Land Use Estimates – Town of Beekman	3d-7
Table 3d.8 – Land Cover Estimates – Town of Dover	3d-8
Table 3d.9 – Land Use Estimates – Town of Dover	3d-9
Table 3d.10 – Land Cover Estimates – Town of Milan	3d-9
Table 3d.11 – Land Use Estimates – Town of Milan	3d-10
Table 3d.12 – Land Cover Estimates – Town of North East	3d-11
Table 3d.13 – Land Use Estimates – Town of North East	3d-11
Table 3d.14 – Land Cover Estimates – Town of Pawling	3d-12
Table 3d.15 – Land Use Estimates – Town of Pawling	3d-12
Table 3d.16 – Land Cover Estimates – Town of Pine Plains	3d-13
Table 3d.17 – Land Use Estimates – Town of Pine Plains	3d-13
Table 3d.18 – Land Cover Estimates – Village of Pawling	3d-14
Table 3d.19 – Land Use Estimates – Village of Pawling	3d-15
Table 3d.20 – Land Cover Estimates – Village of Millerton	3d-16
Table 3d.21 – Land Use Estimates – Village of Millerton	3d-16
Table 3d.22 – Vacant Land in Delineated Hazard Areas	3d-17
Table 3d.23 – Summary of Responses: Land Use and Development Questionnaire	3d-22
Table 4.1 – Legal and Regulatory Capability Inventory	4-2
Table 4.2 – Administrative and Technical Capability Inventory	4-6
Table 4.3 – Fiscal Capability Inventory	4-7
Table 4.4 – Federal Technical Assistance and Funding	4-12
Table 6.1 – Types of Actions Considered to Achieve Mitigation Goals	6-1
Table 7-1 – STAPLEE Criteria	7-2

List of Figures

Figure 1.1 – Location of the Northern and Eastern Dutchess County Communities in New York State	1-2
Figure 1.2 – Base Map of the Northern and Eastern Dutchess County Communities	1-3
Figure 1.3 – Planning Area Population Density	1-5
Figure 1.4 – Planning Committee Organizational Structure	1-14



Figure 3a.1 – NEDCCR Base Map	3a-2
Figure 3a.2 – Wind Zones in the United States	3a-9
Figure 3a.3 – Empirical Probability of a Named Storm (Atlantic Basin)	3a-17
Figure 3a.4 – Lightning Flash Density in the United States	3a-18
Figure 3a.5 – Tornado Occurrence Probability	3a-24
Figure 3a.6 – New York State Snowfall	3a-26
Figure 3a.7 – Freezing Rain Zones Nationwide	3a-27
Figure 3a.8 – Identified Dams in the Planning Area	3a-33
Figure 3a.9 – Potential Dam Failure Inundation Area: Greenhaven Correctional Facility Dam	3a-34
Figure 3a.10 – Potential Dam Failure Inundation Area: Nuclear Lake Dam	3a-35
Figure 3a.11 – Potential Dam Failure Inundation Area: Thornes Lake Dam	3a-36
Figure 3a.12 – Palmer Drought Severity Index Summary Map for the United States	3a-39
Figure 3a.13 – Northern and Eastern Dutchess County Agricultural Land	3a-40
Figure 3a.14 – Northern and Eastern Dutchess County Flood Hazard Areas	3a-45
Figure 3a.15 – NEDC NFIP Repetitive Loss Properties: Approximate Locations	3a-51
Figure 3a.16 – Odds of Being Flooded	3a-57
Figure 3a.17 – Ice Jam Incidents in New York State	3a-59
Figure 3a.18 – Earthquake Hazard Map of the Conterminous United States	3a-61
Figure 3a.19 – Earthquake Hazard Map of New York State	3a-62
Figure 3a.20 – Northern and Eastern Dutchess County Earthquake Hazard Zones	3a-64
Figure 3a.21 – Northern and Eastern Dutchess County Geological Soil Classification	3a-66
Figure 3a.22 – Dutchess County Earthquake Hazard: Combined Seismic Risk / Soil Types	3a-67
Figure 3a.23 – Significant Earthquake Epicenters in New York State (1737-1986)	3a-69
Figure 3a.24 – Wildfire Hazard Areas in Northern and Eastern Dutchess County	3a-73
Figure 3d.1 – Northern and Eastern Dutchess County Communities Land Use/Land Cover	3d-3



SECTION 1 - INTRODUCTION

Purpose

Dutchess County, New York is susceptible to a number of different natural hazards. These natural hazards have the potential to cause property loss, loss of life, economic hardship, and threats to public health and safety. While an important aspect of emergency management deals with disaster recovery – those actions that a community must take to repair damages and make itself whole in the wake of a natural disaster – an equally important aspect of emergency management involves hazard mitigation. Hazard mitigation measures are efforts taken *before* a disaster happens to lessen the impact that future disasters of that type will have on people and property in the community. They are things you do today to be more protected in the future.

While the Northern and Eastern Dutchess County Communities (hereafter referred to as the “NEDCC”, including the following nine jurisdictions in Dutchess County, New York: the Towns of Amenia, Beekman, Dover, Milan, North East, Pawling and Pine Plains; and the Villages of Pawling and Millerton) have always sought ways to reduce their vulnerability to hazards, the passage of DMA 2000, in conjunction with the devastating effects of the widespread flooding that occurred in the Ten Mile River valley in 2005 and 2007, helped local officials to recognize the benefits of pursuing a long-term, coordinated approach to hazard mitigation through hazard mitigation planning. The NEDCC has received grant funds from the Federal Emergency Management Agency (FEMA) for the purpose of developing this very hazard mitigation plan. Funding was received under the Hazard Mitigation Grant Program for development of a multi-jurisdictional hazard mitigation plan for the NEDCC.

This **Northern and Eastern Dutchess County Communities Regional Natural Hazard Mitigation Plan** (the “plan”) represents the collective efforts of nine participating jurisdictions, the general public, and other stakeholders. It has been developed by a Planning Committee, with support from outside consultants at URS Corporation. The Plan represents the collective efforts of citizens, elected and appointed government officials, business leaders, volunteers of non-profit organizations, and other stakeholders.

Through the development of this Plan, the Planning Committee has identified the natural hazards that could affect the study area, and has evaluated the risks associated with these hazards. The successful implementation of this Plan will make the NEDCC more disaster-resistant because of their initiative to recognize the benefits that can be gained by planning ahead and taking measures to reduce damages before the next disaster strikes. The Plan will also allow participating jurisdictions to comply with the Disaster Mitigation Act of 2000 (DMA 2000) and its implementing regulations (44 CFR Part 201.6), thus resulting in eligibility to apply for Federal aid for technical assistance and post-disaster hazard mitigation project funding.

Natural disasters cannot be prevented from occurring. However, over the long-term, the continued implementation of this Plan will gradually, but steadily, lessen the impacts associated with hazard events.

About the Planning Area

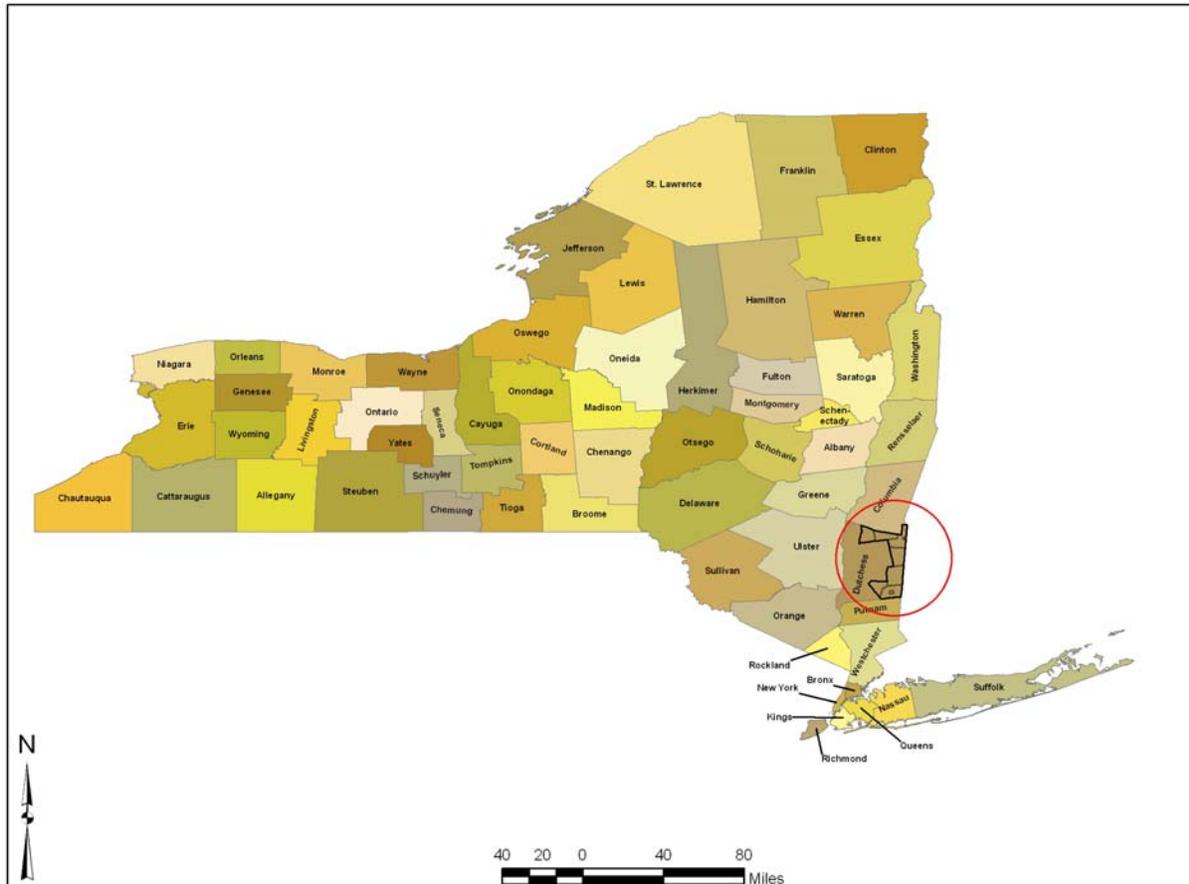
Overview

The Northern and Eastern Dutchess County Communities are located in southeastern New York State approximately 85 miles north of New York City and 85 miles south of Albany. They are generally bounded to the west by the Taconic Ridge (which provides geographical separation from the remainder of



Dutchess County’s municipalities) and the rest of Dutchess County, and to the east by the State of Connecticut. Columbia County lies to the north and Putnam County is located immediately south. The nine participating jurisdictions comprise 287 square miles in area. Figure 1.1 depicts the location of the study area within New York State and Figure 1.2 depicts a base map of the nine participating jurisdictions within Dutchess County.

Figure 1.1 - Location of the Northern and Eastern Dutchess County Communities in New York State

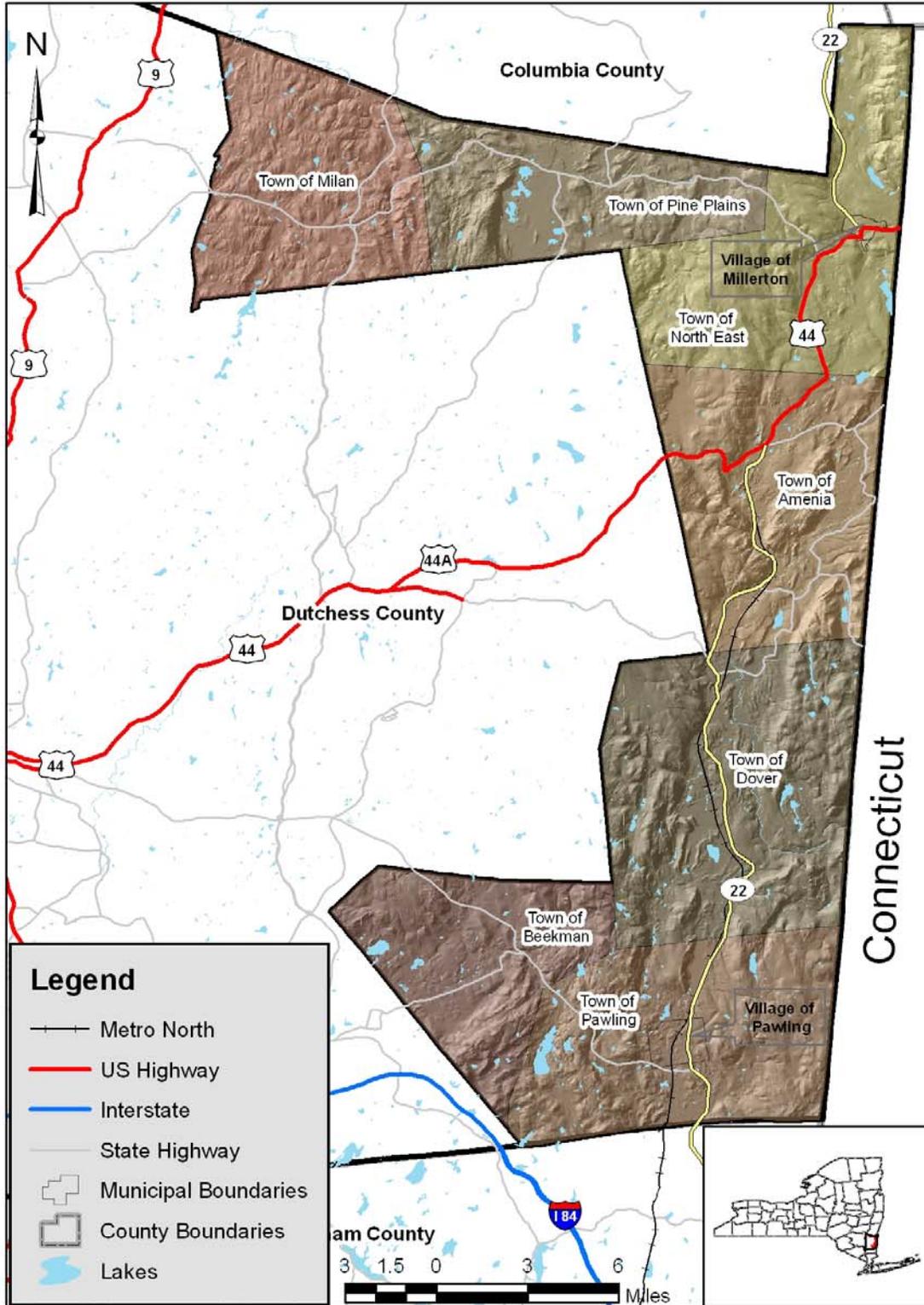


Source: ESRI, US Counties, 2005; Property Tax Services Agency, Municipal Boundaries - Towns, Cities, Villages, 2008

The planning area is home to nine municipalities (seven towns and two villages). They are the Towns of Amenia, Beekman, Dover, Milan, North East, Pawling and Pine Plains; and the Villages of Pawling and Millerton. The location and extent of all these municipalities, as well as significant transportation routes (including US Highway 44, State Route 22, and Metro North Railroad’s Harlem Line) are shown on the base map of the planning area in Figure 1.2.



Figure 1.2 – Base Map of the Northern and Eastern Dutchess County Communities



Source: US Census Borough, Putnam, Dutchess, and Columbia counties area hydrography, 2007; Real Property Tax Service Agency, Municipal Boundaries - Towns, Cities, Villages, 2008; ESRI, US Counties, 2005; ESRI, NY Major Roads, 2007; USGS DEMs, NY State; US Census Borough, Railroads, NY State, 2001



The Northern and Eastern Dutchess County Communities have a wide variety of natural resources and beautiful landscapes including mountains, valleys, rivers, lakes, streams, forests and farmlands. Roughly 90 minutes from nearby New York City and easily accessible by bus, train, car, or air travel, the area is a favorite of residents and visitors alike. Its tranquil communities are known for their many parks, agricultural areas, equestrian facilities, historic sites and museums, restaurants, cultural centers, shopping areas, and breathtaking vistas.

Most of the study area is forested (60 percent). Pastures and cultivated crops account for an additional 24.2 percent (with pasture/hay at 21.3 percent and cultivated crops at 2.9 percent). Only 6.9 percent of the study area is developed. Of the land which is developed, most is low-intensity residential. The remaining 8.9 percent of the study area is comprised of wetlands, grassland/scrub/shrub, open water, and barren land.

Population. The population of the planning area in 1990 was 39,325, whereas in 2000 it increased to 41,716 – an increase of approximately 14 percent over ten years. Across the planning area, this upward trend is expected to continue through the year 2025. Population projections of the Poughkeepsie-Dutchess County Transportation Council, as reported in the County’s “Connections” report, estimate a 2025 population of 50,451 – an increase of just over 20 percent. Table 1.1 shows key population changes and projections (across the planning area and for each municipality), while Figure 1.3 presents population density according to the U.S. Census Bureau.

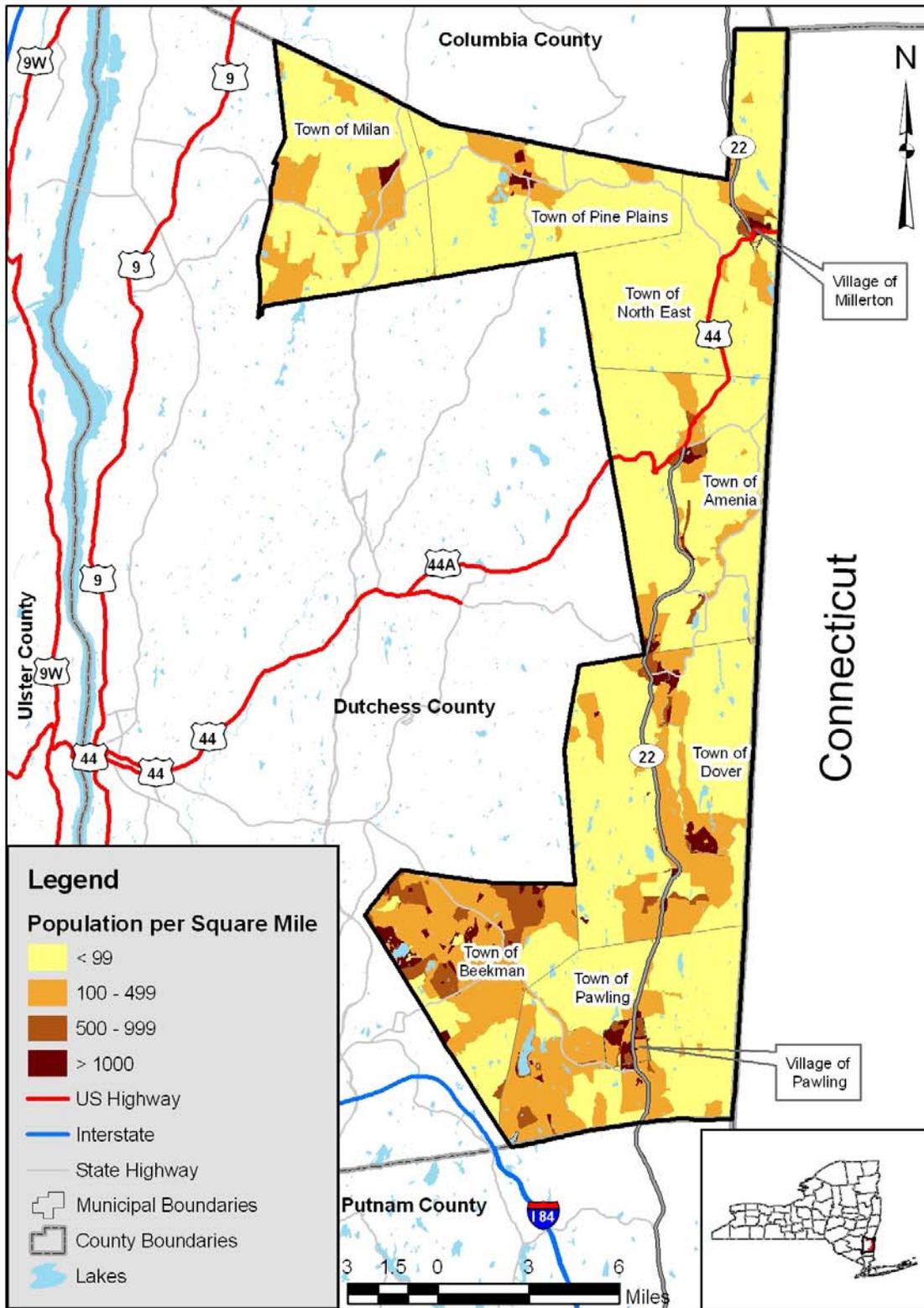
Municipality	Population 1990	Population 2000	% Change in Population 1990-2000	Population Projection 2025	Absolute Change Projected 2000-2025	Percent Change Projected 2000-2025
Amenia, Town of	5,195	4,048	-22% **	4,896	848	21%
Beekman, Town of	10,447	13,655	31%	16,514	2,859	21%
Dover, Town of	7,778	8,565	10%	10,358	1,793	21%
Milan, Town of	1,895	2,356	24%	2,849	493	21%
Millerton, Village of	884	925	5%	1,119	194	21%
North East, Town of	2,034	2,077	2%	2,512	435	21%
Pawling, Town of	3,973	5,288	33%	6,395	1,107	21%
Pawling, Village of	1,974	2,233	13%	2,701	468	21%
Pine Plains, Town of	2,287	2,569	12%	3,107	538	21%
<i>Planning Area Totals</i>	<i>36,487</i>	<i>41,716</i>	<i>14%</i>	<i>50,451</i>	<i>8,735</i>	<i>21%</i>

* from “Greenway Connections” report (which has population projections, as well as the correction of an error in the Census 2000 reported values for Beekman and Milan, as well as correction to remove Census 1990 and 2000 double counting of the Village populations)

** According to the Dutchess Count Planning Department, the Town of Amenia’s population decreased between 1990 and 2000 due to the downsizing of the Wassaic Developmental Center.



Figure 1.3 – Planning Area Population Density



Source: US Census Borough: Population data, 2000; Putnam, Dutchess, and Columbia counties area hydrography, 2007; Property Tax Service Agency, Municipal Boundaries - Towns, Cities, Villages, 2008; NY Major Roads, 2007



According to the U.S. Census Bureau, the planning area has a total area of 286.50 square miles, of which 283.57 square miles is land and 2.94 square miles is water.

The 1990 U.S. Census population density per square mile of land in the planning area was 129 persons per square mile; whereas, in the 2000 U.S. Census, there were 147 persons per square mile – an increase of 14.3 percent in ten years. By 2025, the population density is projected to be 178 persons per square mile – an increase of 20.9 percent over the year 2000 values. The population density is generally greatest in the southernmost portions of the planning area (see Figure 1.3).

Approximately 17 percent of the planning area's population is either under the age of five or over the age of 64 and therefore, anticipated to be more vulnerable to the effects of natural hazards than the balance of the population would be during such an event.

Income and Employment. Between 1990 and 2000 both the median household and median family incomes in the planning area exhibited a greater rise than either the County or national equivalents, according to the U.S. Census Bureau, as shown in Table 1.2. Also, according to the same source, between 1990 and 2000, while there was a nationwide decrease in the percentages of both persons and families living below the poverty level, Dutchess County and the NEDCC planning area both experienced an increase in the proportion of the population living in poverty. Similarly, while the level of unemployment decreased at the national level between 1990 and 2000, both Dutchess County and the NEDCC planning area both experienced a rise in unemployment over the same period.



Table 1.2
Income and Unemployment in the Planning Area

Municipality	Median Household Income		Median Family Income		Percent of Persons Below the Poverty Level		Percent of Families Below the Poverty Level		Percent Unemployed as Percentage of Population Aged 16 Years or More	
	Census 1990	Census 2000	Census 1990	Census 2000	Census 1990	Census 2000	Census 1990	Census 2000	Census 1990	Census 2000
Amenia, Town of	\$31,136	\$39,231	\$33,821	\$51,294	8.2%	8.1%	4.1%	3.4%	2.0%	1.3%
Beekman, Town of	\$53,081	\$65,610	\$56,026	\$72,066	0.03%	4.7%	0.02%	3.6%	2.5%	2.2%
Dover, Town of	\$37,376	\$50,361	\$41,567	\$57,979	0.1%	8.4%	6.8%	6.3%	2.2%	2.4%
Milan, Town of	\$35,643	\$54,491	\$39,643	\$65,250	0.1%	4.6%	7.9%	2.8%	2.4%	0.8%
Millerton, Village of	\$26,853	\$36,176	\$31,324	\$46,458	13.0%	14.3%	10.7%	7.7%	3.1%	3.6%
North East, Town of	\$30,290	\$42,038	\$34,779	\$48,179	0.1%	12.3%	0.1%	7.0%	3.7%	5.1%
Pawling, Town of	\$47,782	\$61,380	\$52,712	\$70,056	0.03%	3.3%	2.1%	1.7%	3.5%	2.6%
Pawling, Village of	\$40,435	\$46,484	\$49,165	\$59,896	3.6%	7.3%	2.0%	5.2%	1.7%	3.0%
Pine Plains, Town of	\$33,259	\$43,125	\$38,633	\$46,900	0.1%	9.2%	4.7%	5.7%	2.5%	2.6%
NEDCC Planning Area	\$37,317	\$48,766	\$41,963	\$57,564	2.8%	8.0%	4.3%	4.8%	2.6%	2.6%
Dutchess County	\$42,250	\$53,086	\$49,305	\$63,254	3.8%	7.5%	3.6%	5.0%	2.8%	3.6%
USA	\$30,056	\$41,994	\$35,225	\$50,046	13.1%	12.4%	10.0%	9.2%	4.1%	3.7%



Transportation Links. The Northern and Eastern Dutchess County Communities are located in southeastern New York State approximately 85 miles north of New York City and 85 miles south of Albany. They are generally bounded to the west by the Taconic Ridge (which provides geographical separation from the remainder of Dutchess County’s municipalities), and to the east by the State of Connecticut. Columbia County lies to the north and Putnam County is located immediately south. The participating jurisdictions are linked to the surrounding area by road, including US Highway 44 and New York State Route 22. US Highway 44 is an east-west highway that runs for 237 miles from Kerhonkson, New York to Plymouth, Massachusetts. It traverses the planning area from the western boundary of the Town of Amenia to the eastern boundary of the Town of North East. New York State Route 22 runs in a north–south direction generally parallel to the state's eastern edge from the outskirts of New York City to a short distance south of the Canadian border. The NEDCC planning area is also well served by rail via Metro North Railroad’s Harlem Line, and also by various bus links including LOOP which provides not only fixed route service but also commuter train connections.

FEMA Disaster Declarations. Disaster declarations, for the county or counties affected by a disaster, are declared by the President of the United States under the authority of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (the “Stafford Act”). FEMA then manages the entire process, including making federally-funded assistance available in declared areas; coordinates emergency rescue and response efforts; provides emergency resources; and provides other related activities/funding in the process of aiding citizens and local governments in a nationally-declared disaster. Tables 1.3 and 1.4 provide a summary of disaster and emergency declarations for the State of New York (based on review of the FEMA web site and the New York State Hazard Mitigation Plan), with an indication as to whether Dutchess County was part of the declared area.

Year	Date	Disaster Type	Disaster Number	Was Dutchess County Designated?
2009	4-Mar	Severe Winter Storm	1827	No
2007	31-Aug	Severe Storms, Flooding, and Tornado	1724	No
2007	2-Jul	Severe Storms and Flooding	1710	No
2007	24-Apr	Severe Storms and Inland and Coastal Flooding	1692	Yes
2006	12-Dec	Severe Storms and Flooding	1670	No
2006	24-Oct	Severe Storms and Flooding	1665	No
2006	1-Jul	Severe Storms and Flooding	1650	No
2005	19-Apr	Severe Storms and Flooding	1589	No
2004	1-Oct	Tropical Depression Ivan	1565	No
2004	1-Oct	Severe Storms and Flooding	1564	No
2004	3-Aug	Severe Storms and Flooding	1534	No
2003	29-Aug	Severe Storms, Tornadoes and Flooding	1486	No
2003	12-May	Ice Storm	1467	No
2002	16-May	Earthquake	1415	No
2002	1-Mar	Snowstorm	1404	No
2001	11-Sep	World Trade Center Terrorist Attack	1391	Yes
2000	21-Jul	Severe Storms	1335	Yes
1999	19-Sep	Hurricane Floyd	1296	Yes
1998	11-Sep	Severe Storms	1244	No
1998	7-Jul	Severe Storms and Flooding	1233	No
1998	16-Jun	New York Severe Thunderstorms and Tornadoes	1222	No
1998	10-Jan	Severe Winter Storms	1196	No
1996	9-Dec	Severe Storms/Flooding	1148	No



Table 1.3
New York State Major Disaster Declarations: 1954 – 2009

(Source: FEMA, online at http://www.fema.gov/news/disasters_state.fema?id=36
 NYSEMO, online at <http://www.semo.state.ny.us/programs/recovery/History.cfm>
 And Appendix N of the New York State Hazard Mitigation Plan)

Year	Date	Disaster Type	Disaster Number	Was Dutchess County Designated?
1996	19-Nov	Severe Storms/Flooding	1146	No
1996	24-Jan	Severe Storms/Flooding	1095	Yes
1996	12-Jan	Blizzard	1083	Yes
1993	2-Apr	World Trade Center Explosion	984	No
1992	21-Dec	Coastal Storm, High Tides, Heavy Rain, Flooding	974	No
1991	16-Sep	Hurricane Bob	918	No
1991	21-Mar	Severe Storm, Winter Storm	898	No
1987	10-Nov	Severe Winter Storms	801	Yes
1987	15-May	Flooding	792	No
1985	18-Oct	Hurricane Gloria	750	No
1985	22-Mar	Snow Melt, Ice Jams	734	No
1985	20-Mar	Flooding	733	No
1984	25-Sep	Severe Storms/Flooding	725	No
1984	17-Apr	Coastal Storms/Flooding	702	No
1977	5-Feb	Snowstorms	527	No
1976	3-Sep	Hurricane Belle	520	No
1976	21-Jul	Severe Storms/Flooding	515	No
1976	29-Jun	Flash Flooding	512	No
1976	19-Mar	Ice Storm, Severe Storms, Flooding	494	No
1975	2-Oct	Severe Storms, Heavy Rain, Landslides, Flooding	487	No
1974	23-Jul	Severe Storms/Flooding	447	No
1973	20-Jul	Severe Storms/Flooding	401	Yes
1973	21-Mar	High Winds, Wave Action, Flooding	367	No
1972	23-Jun	Tropical Storm Agnes	338	No
1971	13-Sep	Severe Storms/Flooding	311	Yes
1970	22-Jul	Heavy Rains, Flooding	290	No
1969	26-Aug	Heavy Rains, Flooding	275	No
1967	30-Oct	Severe Storms/Flooding	233	No
1965	18-Aug	Water Shortage	204	Yes
1963	23-Aug	Heavy Rains, Flooding	158	No
1962	16-Mar	Severe Storm, High Tides, Flooding	129	No
1956	29-Mar	Flood	52	No Details Available
1955	22-Aug	Hurricanes Connie and Diane, Floods	45	No Details Available
1954	7-Oct	Hurricanes Carol and Hazel	26	No Details Available

Table 1.4
New York State Emergency Declarations: 1954 – 2009

(Source: FEMA, online at http://www.fema.gov/news/disasters_state.fema?id=36
 NYSEMO, online at <http://www.semo.state.ny.us/programs/recovery/History.cfm>
 And Appendix N of the New York State Hazard Mitigation Plan)

Year	Date	Emergency Type	Declaration Number	Was Dutchess County Designated?
2008	18-Dec	Severe Winter Storm	3299	No
2007	23-Feb	Snow	3273	No
2006	15-Oct	Snowstorm	3268	No
2005	30-Sep	Hurricane Katrina Evacuation	3262	No
2004	3-Mar	Snow	3195	No
2003	23-Aug	Power Outage	3186	Yes
2003	27-Mar	Snowstorm	3184	Yes
2003	26-Feb	Snowstorm	3173	No
2002	1-Jan	Snowstorm	3170	No



Year	Date	Emergency Type	Declaration Number	Was Dutchess County Designated?
2000	4-Dec	Snow Storm	3157	No
2000	11-Oct	Virus Threat	3155	Yes
1999	18-Sep	Hurricane Floyd	3149	No
1999	10-Mar	Winter Storm	3138	No
1999	15-Jan	Winter Storm	3136	No
1993	17-Mar	Severe Blizzard	3107	No Details Available
1980	21-May	Chemical Waste, Love Canal	3080	No
1978	7-Aug	Chemical Waste, Love Canal	3066	No
1977	29-Jan	Snowstorms	3027	No
1974	2-Nov	Flooding (NYS Barge Canal)	3004	No

Plan Development Process

Multi-Jurisdictional Approach

Dutchess County does not have a multi-jurisdictional hazard mitigation plan in place. The devastating effects of the widespread flooding that occurred in the Ten Mile River valley in 2005 and 2007 helped local officials in the northern and eastern portions of the county to recognize the benefits of pursuing a long-term, coordinated approach to hazard mitigation through hazard mitigation planning on a multi-jurisdictional basis. And thus, nine municipalities teamed together and applied to the Federal Emergency Management Agency (FEMA) and were approved for grant monies under the Hazard Mitigation Grant Program (HMGP) to develop this very multi-jurisdictional natural hazard mitigation plan.

The following nine municipal entities participated successfully in the development of this plan by attending meetings, submitting the key deliverables (such as existing plans, studies, reports, technical information and questionnaire responses), reaching out to the public and other stakeholders in their municipalities, reviewing draft plan sections, evaluating mitigation actions, and developing mitigation strategies including action item prioritization.

*Amenia, Town of
Beekman, Town of
Dover, Town of
Milan, Town of
Millerton, Village of
North East, Town of
Pawling, Town of
Pawling, Village of
Pine Plains, Town of*

Readers are invited to review the contents of **Appendix G – Planning Committee Membership Information** for a list of Core Planning Group members.

Table 1.5 presents an overview of how each jurisdiction participated. Successful participation was deemed as having attended at least one CPG meeting, submitting at least one deliverable, and submitting all key deliverables. **A more detailed summary of the participation demonstrated by each municipality,**



including attendance at meetings and submission of requested deliverables, can be found in Appendix G.

Municipality	Expressed Interest in Participating	Attended at Least One CPG Meeting	Submitted at Least One Deliverable	Submitted Key Deliverables	Fully Participating Jurisdiction
Amenia, Town of	■	■	■	■	■
Beekman, Town of	■	■	■	■	■
Dover, Town of	■	■	■	■	■
Milan, Town of	■	■	■	■	■
Millerton, Village of	■	■	■	■	■
North East, Town of	■	■	■	■	■
Pawling, Town of	■	■	■	■	■
Pawling, Village of	■	■	■	■	■
Pine Plains, Town of	■	■	■	■	■

In addition, the records show that the following four stakeholder entities participated through attending at least one meeting.

- *NYSEMO Region II*
- *NYS Senate*
- *Dutchess County Soil and Water Conservation District*
- *Dutchess County GIS Department*

URS Corporation (Wayne, NJ) acted as the plan development consultant providing hazard mitigation planning services.

While the services of a consultant (URS Corporation) were retained to guide participants through the process and author the plan in a manner consistent with fulfilling FEMA’s requirements, participating jurisdictions contributed throughout the overall planning process, as follows:

- Each participating jurisdiction provided staff to participate in the overall NEDCC Core Planning Group (CPG). The jurisdiction’s CPG member(s) were lead members of their municipality’s Jurisdictional Assessment Team (JAT). JATs were responsible for reviewing information, data and documents, submitting feedback to the Consultant, completing questionnaires/forms, reaching out to the public and other stakeholders in their respective jurisdictions, developing a unique mitigation strategy for their municipality, and reviewing and commenting on draft documents. *More information on the planning team structure and roles/responsibilities is presented later in this section.*
- The Consultant provided **“Guidance Memorandum 1- Assessing Community Support, Building the Planning Team, and Engaging the Public and Other Stakeholders”** at the project outset (August 20, 2008). This memorandum was prepared to provide the NEDCC with suggestions for: assessing community support, building the planning team and engaging the public and other stakeholders throughout the plan development process and prior to plan approval. The Jurisdictional Assessment Team for each municipality used this memorandum as a guide for outreach, documented their completed activities in the memorandum’s **“Outreach Log”**. Six



jurisdictions provided a summary of their outreach activities to the Consultant for incorporation into the plan.

- Participating jurisdictions provided feedback during the Hazard Identification and Hazard Profile steps of the process (Sections 2 and 3.a of the plan, respectively) through their completion and submittal of a **Hazard Identification Questionnaire** to the Consultant. This questionnaire summarized the Consultant's evaluation of a full range of natural hazards, including whether or not each hazard was recommended for inclusion in the plan and why. Municipalities were asked to provide information as to whether or not they concurred with the consultant's findings, and information on impacts from past events in their respective communities. Local responses were used by the Consultant to supplement hazard information obtained through research of past disaster declarations in the County, review of the New York State Hazard Mitigation Plan (2008), and review of readily available online information from reputable sources (such as federal and state agencies). Seven jurisdictions returned this questionnaire or provided a statement of full concurrence with the Consultant's findings.
- Participating jurisdictions provided feedback during the evaluation of Land Uses and Development Trends step of the process (Section 3.d of the plan) through their completion and submittal of a **Land Uses and Development Trends Questionnaire** to the Consultant. This questionnaire asked jurisdictions to: (1) describe development trends occurring within their jurisdiction, such as the predominant types of development occurring, location, expected intensity, and pace by land use; and (2) describe any regulations/ordinances/codes their jurisdiction enforces to protect new development from the effects of natural hazards. Local responses were used by the Consultant to supplement information presented in various county-level plans and studies. Eight of the nine jurisdictions returned this questionnaire.
- Participating jurisdictions provided feedback during the Capability Assessment step of the process (Section 4 of the plan) through their completion and submittal of a **Capability Assessment Questionnaire** to the Consultant. This questionnaire asked respondents to examine their jurisdiction's abilities to implement and manage a comprehensive mitigation strategy, which includes a range of mitigation actions. The questionnaires requested information pertaining to existing plans, policies, and regulations that contribute to or hinder the ability to implement hazard mitigation actions. They also requested information pertaining to the legal and regulatory capability, technical and administrative capacity, and fiscal capability of each jurisdiction. All nine jurisdictions submitted completed Capability Assessment Questionnaires illustrating their capability to implement a mitigation strategy.
- Participating jurisdictions provided feedback regarding **problem areas in need of mitigation and possible mitigation alternatives**. Some municipalities provided this type of information to the consultant separately, either via email or separate written correspondence. Their feedback is included in Section 6 of the plan. At a working session of the Core Planning Group on April 16, 2009, participating jurisdictions were asked to consider range of various types of hazard mitigation actions, and identify a mitigation strategy for their municipality. All nine participating jurisdictions have submitted a unique mitigation strategy.
- The Consultant provided "**Guidance Memorandum #2 – Plan Maintenance Procedures: Monitoring, Evaluating and Updating the Plan**" on February 9, 2009. This memorandum provided participants with an overview of the requirements regarding plan maintenance, types of plan maintenance activities that can be selected to meet the requirements, and some examples of plan maintenance strategies from other FEMA-approved plans in FEMA Region 2. Participating jurisdictions were asked to review this information, coordinate with their Jurisdictional Assessment Team, and provide comments back to the NEDCC Local Liaison regarding what types of plan maintenance activities their community was in favor of, versus any elements their community like to see excluded. Jurisdictions were asked to submit their feedback to the Local Liaison. They were advised that lack of feedback would be interpreted to indicate that their



jurisdiction had no particular preferences regarding this plan element. In turn, URS in coordination with the NEDCC Local Liaison developed a county-wide plan maintenance strategy that best reflected the expressed desires of the full team.

- The Consultant provided “**Guidance Memorandum #3 – Plan Integration**” on February 9, 2009. The memorandum summarized requirements in terms of how mitigation recommendations can be integrated into job descriptions, or existing planning mechanisms such as comprehensive plans, capital improvement plans, zoning and building codes, site reviews, permitting and other planning tools, where such tools are appropriate. Various ways that the hazard mitigation plan can be integrated into local planning mechanisms were presented, along with sample text from other plans approved by FEMA Region 2. Participating jurisdictions were asked to review this information, coordinate with their Jurisdictional Assessment Team, and provide comments back to the NEDCC Local Liaison regarding what types of plan integration activities their community was in favor of, versus any elements their community would like to see excluded. Jurisdictions were asked to submit their feedback to the NEDCC Local Liaison. They were advised that lack of feedback would be interpreted to indicate that their jurisdiction had no particular preferences regarding this plan element. In turn, URS in coordination with the NEDCC Local Liaison developed a county-wide plan integration strategy that best reflected the expressed desires of the full team.

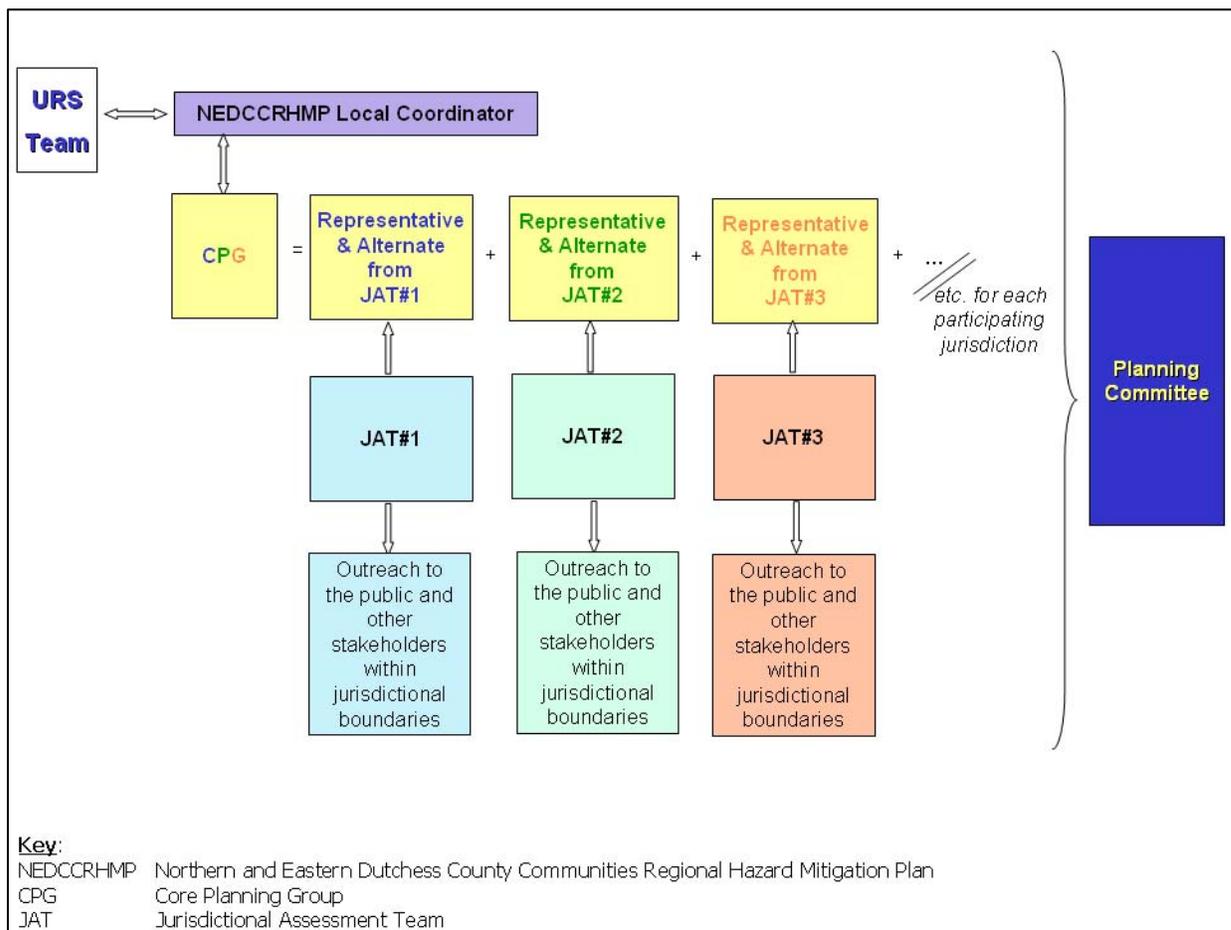
The NEDCC Regional Hazard Mitigation Planning Committee

This Plan has been developed by the **Northern and Eastern Dutchess County Communities Regional Hazard Mitigation Planning Committee (the “Planning Committee”)**, with support from an outside consulting firm (URS Corporation, “URS”). The efforts of the Planning Committee were headed by the NEDCC Local Liaison, Dr. Kathryn Palmer-House of the Town of Dover. The Plan represents the collective efforts of citizens, elected and appointed government officials, business leaders, volunteers of non-profit organizations, and other stakeholders.

The overall **Planning Committee** consisted of members of each participating jurisdiction, and the public and other stakeholders. The overall Planning Committee did not meet together in one place during the planning process. Instead, a team concept was used to more evenly distribute responsibilities and to make best of use of every participant’s unique capabilities. As shown in Figure 1.4, the overall Planning Committee was divided into a **Core Planning Group (CPG)** and a series of **Jurisdictional Assessment Teams (JATs)**, with one JAT for each of the participating jurisdictions.



Figure 1.4 – Planning Committee Organizational Structure



This team concept was beneficial for two reasons: (1) the Consultant and the CPG had a common point of contact for the project in the Local Coordinator; and (2) JATs with intimate local knowledge were best suited for coordination and outreach within their respective jurisdictions.

All members of the CPG and the JATs were also members of the overall Planning Committee. The CPG included head members of each JAT (each of the municipalities who elected to participate in the process). The Local Liaison was responsible for managing the overall plan formulation activities and overseeing the consultant. The CPG was responsible for attending CPG meetings and providing information and feedback, and coordinating an outreach program within their municipality's JAT and beyond to the public and other stakeholders. Each JAT was responsible for coordinating and facilitating local efforts, sending CPG representatives to meetings, providing information and feedback, involving the public and local community stakeholders in the planning process, assessing mitigation alternatives, selecting a course of action to be followed for their community, adopting the plan, and participating in plan monitoring and implementation.

With regard to meetings, the Local Liaison was responsible for setting meeting dates and times, securing a meeting facility, and notifying all team members of upcoming meetings. She also played a very large role in reminding CPG members of certain project deadlines. The Consultant prepared meeting agendas,



handouts, PowerPoint presentations, and meeting minutes. The Local Liaison ensured that all meeting materials and report deliverables were posted on the project web site.

The plan development process was initiated in earnest in the summer of 2008 with the NEDCC Hazard Mitigation Plan Project Initiation Meeting held on July 29, 2008. At this meeting, the Consultant met with the Local Liaison to refine the project work plan, discuss schedule and various types of support that will be provided not only by the consultant but the participating jurisdictions. At this meeting, the Consultant provided a “Wish List” of information, data and documents they hope each participating jurisdiction can submit for their review and incorporation into the plan. The Consultant also indicated that Guidance Memorandum #1 regarding assessing community support, building the planning team, and engaging the public would be ready the following week, along with the project fact sheet and web site support documents. At this meeting, expectations regarding the CPG Project Kickoff Meeting were also discussed. Handouts included the project scope of work, targeted implementation schedule and Wish List.

While Jurisdictional Assessment Teams met individually throughout the plan development process as they deemed necessary, the following is an overview of CPG meetings held during the plan development process.

- September 12, 2008 – Core Planning Group Kickoff Meeting. This was the first meeting of the Core Planning Group. Participants were provided with an overview of: the intent of the project; the organizational structure of the planning group; the plan development process overall; the role of participating jurisdictions, contractors, the public and other stakeholders; what it means to participate; key deliverables; data collection/supporting documents; the project timeline; and next steps. Handouts included the PowerPoint presentation, targeted implementation schedule, Wish List, sources of information on hazard mitigation planning, project Fact Sheet and Guidance Memo #1.
- January 16, 2009 – Core Planning Group Progress Meeting. This meeting was conducted to provide an overview of plan development progress and continued work to be completed. The Consultant provided an overview of the Hazard Identification and Hazard Profile steps, and the ongoing Risk Assessment portion of the draft plan.
- March 26, 2009 – Risk Assessment Question and Answer Session. The purpose of the meeting was to provide CPG members with an opportunity to ask questions and submit feedback on the recently distributed Risk Assessment Interim Deliverable. The Risk Assessment Interim Deliverable comprised the following working chapters of the draft report: Hazard Identification, Hazard Profiles, Asset Identification, Vulnerability Assessment, and Range of Mitigation Actions to be Considered.
- April 16, 2009 – Mitigation Strategy Working Session. At this working session, CPG members conducted an evaluation and prioritization of hazard mitigation actions and developed an implementation strategy for selected mitigation actions. For jurisdictions not present, or those who were present but who needed more time to complete the Prioritization and Implementation Strategy sheets, an opportunity was provided for jurisdictions to do so remotely. Following this meeting, all nine participating jurisdictions had evaluated, prioritized, and developed a strategy for at least two mitigation actions.
- January 29, 2010 – Working Session to Address FEMA Comments on the May 2009 Draft Plan. At this working session, the CPG members discussed FEMA’s comments on the May 2009 Draft Plan, and identified an approach for addressing these comments. Key points included modification of municipal implementation strategies to include at least one action item for each identified hazard (per FEMA’s comments, and regardless of the findings of the risk assessment); as well as additional clarification regarding roles and responsibilities of the partnering communities during plan maintenance and updates.



- Meetings on the Draft Plan. Public meetings regarding the Draft Plan will be undertaken by each participating jurisdiction, respectively, prior to plan adoption, and most likely in the context of other regularly scheduled board meetings. Partnering communities will do so in accordance with their respective local laws.

Additional information, such as meeting agendas, presentations, handouts, and minutes were posted on the multi-jurisdictional planning web site at: www.townofdover.us/AHMP.cfm, and are discussed in more detail later in this plan section. Copies are also provided in Appendix I.

The Role of the Contractors in the Plan Development Process

This Hazard Mitigation Plan is the NEDCC's plan; as such, its success rests on the decisions and directions set by the Planning Committee members throughout the plan development process. URS was contracted by the Town of Dover on behalf of the NEDCC to work with the Local Liaison and the Planning Committee to assist them in developing a plan that would meet the requirements of DMA 2000. URS was the lead firm for this assignment, doing so from their local office in Wayne, New Jersey. URS was the direct point of contact, assisted in the hazard identification and risk assessment, lead the hazard mitigation planning efforts, walked participating jurisdictions through the steps in the process they were required to undertake in a manner consistent with FEMA's requirements, authored the final document, and provided overall contract administration.

URS assisted the Planning Committee by conducting the analyses necessary to provide the team members with the information they needed to make sound decisions, and helped guide them through the necessary steps of the plan development process. The Planning Committee, in turn, took the lead by including the local community, assessing the alternatives, and ultimately selecting the course of action to be followed. At the end of the planning process, URS prepared this Plan text (with feedback from the Planning Committee) to document the group's efforts, along with hazard information and findings, in a manner consistent with applicable regulations (DMA 2000), criteria (44 CFR Part 201.6), and guidance (FEMA's Mitigation Planning "How-To" Guides; FEMA's Multi-Hazard Mitigation Planning Guidance document of March 2004, revised November 2006, June 2007 & January 2008); and FEMA's Local Multi-hazard Mitigation Planning Guidance (July 2008).

A series of three Guidance Memorandums were distributed to the NEDCC Local Liaison and the Core Planning Group by URS Corporation, at various meetings and also were posted on the County's mitigation planning web site. These three memos provide a summary of key information presented in DMA 2000, its implementing regulations (IFR), and the FEMA How-To Guides for three key topic areas. The memos are intended to serve as a supplement – and not as a replacement – to the FEMA documents. Each memo provides suggestions to municipalities in a certain topic area, and requests feedback from each municipality at the end of the process regarding their decisions. A summary of the Guidance Memos is presented below.

Guidance Memorandum #1 – Assessing Community Support, Building the Planning Team, and Engaging the Public and Other Stakeholders., dated August 20, 2008, describes the project and its goal of identifying the risks associated with natural hazards in the participating jurisdictions. It is centered on developing the structure of the Planning Committee and identifying the jurisdictions that are interested in participating in the plan; reaching out to various parties (general public, local residents, business owners, non-profit organizations, community leaders and other stakeholders) during the development and maintenance processes; identifying the role of contractors in the planning process; and ultimately, documenting the planning process.



Guidance Memorandum #2 - Plan Maintenance Procedures: Monitoring, Evaluating and Updating the Plan, dated February 9, 2009, highlights the essential steps necessary for monitoring, evaluating and maintaining the plan, and its value as a vital tool for mitigating hazards and reducing risk. The memo stresses several key factors that need to be undertaken by the Planning Committee: organizing resources, i.e., identifying and organizing interested parties, including the public, during the planning process; assessing the risks, i.e., identifying the natural hazards that generally affect the municipalities; how the communities will be impacted by the hazards; and developing a mitigation plan, i.e., once the risks have been identified, the Planning Committee determines the methods and strategies for avoiding or minimizing the risks. The memo also conveys the importance of following the regulations that require the plan to be monitored, evaluated and updated within a five-year cycle, and the importance of periodically measuring the effectiveness of the actions contributing to the overall success of the plan.

Guidance Memorandum #3 - Plan Integration, dated February 9, 2009, recapitulates the importance of using existing processes and resources by the Planning Committee during plan implementation; thus, saving time and effort in meeting the plan's goals and objectives. The memo states that by following the requirements and key steps previously discussed, the next essential goal is taking action by integrating the objectives into daily activities and by implementing the plan in a timely manner.

The memos are valuable tools that guide the team members through each step toward the establishment of the hazard mitigation plan. As such, these memos assist the Planning Committee through the planning process that leads to the formal adoption of the plan.

In addition, URS also: (1) Distributed questionnaires for CPG member completion, as described previously beginning on Page 1-12. They were the: Hazard Identification Questionnaire, Land Uses and Development Trends Questionnaire, Capability Assessment Questionnaire; and Mitigation Options Survey (2) Assisted the CPG through preparation of a project Fact Sheet (discussed on Page 1-19) and development of a project web site (discussed beginning on Page 1-17); (3) Mitigation Action Prioritization and Implementation Strategy worksheets as well as NFIP worksheets; (4) presented at each CPG meeting to guide participating jurisdictions through the process, and advise CPG members regarding each step of the process such as hazards identified and profiled, risks and vulnerabilities identified, possible types of mitigation solutions, etc.; and (5) authored the plan.

Public Involvement in the Plan Development Process

The role of public involvement in the plan development process is to provide the general public with some variety of means to not only learn about the process that the Planning Committee is undertaking, but to voice concerns and to provide input throughout the planning process. CPG members undertook a range of activities to: (a) alert the public to the fact that the group was working to develop this Hazard Mitigation Plan, and (b) provide the public an opportunity to participate with a forum to ask questions, and submit comments and/or suggestions on the process.

The CPG pursued a variety of different ways to provide the public with an opportunity to become involved and engaged during the planning process, in addition to ensuring that the participating jurisdictions were also fully aware of the process and were able to contribute and voice their concerns as well as the general public. As such, the following list of key activities were employed:

- NEDCC Regional Natural Hazard Mitigation Planning Project web site
- *Plan Facts* fact sheet
- Open public meetings



- Newspaper coverage
- Other outreach activities by CPG members

NEDCC Regional Natural Hazard Mitigation Planning Project Web Site

The CPG made an effort to involve the public and other stakeholders in the process during the drafting stage of the plan in part through a multi-jurisdictional hazard mitigation planning page developed for the project, and hosted on the Town of Dover web site at www.townofdover.us/AHMP.cfm. Other jurisdictions posted links to this overall project page on their local web sites.

This web site was established in September 2008, and will continue to be maintained and updated on a regular basis. Information is posted on the plan development process and where to go for additional information or comments, or to become involved. The purpose of this web posting was to inform the public and other stakeholders about the importance of hazard mitigation planning and their opportunity to participate and provide feedback and comments throughout the process. In this section, the NEDCC provides information about the natural hazards being evaluated, general information about the process, the organizational structure of the planning team, meeting information (agendas, presentations, handouts, and minutes), other reference materials, a link for the Risk Assessment Interim Deliverable and the Draft Plan, information about the Consultant, questionnaires, and more. Contact information for the NEDCC Local Liaison is also provided and individuals are invited to reach out to this person for information on how to become involved or to provide comments. The image on the next page is a screen-capture of the main mitigation planning web page.



Welcome to the Town of Dover, New York - Microsoft Internet Explorer

Address: http://www.townofdover.us/AHMP.htm

NORTHERN AND EASTERN DUTCHESS COUNTY

All Hazards Mitigation Plan Project
Partners in Protecting Our Communities
Town of Amenia • Town of Beekman • Town of Dover
Town of Milan • Village of Millerton • Town of North East
Town of Pawling • Village of Pawling • Town of Pine Plains

AHMP RISK ASSESSMENT INTERIM DELIVERABLE- MARCH 11, 2009

AHMP HAZARD MITIGATION TIPS AND ALTERNATIVES

JANUARY 16, 2009 AHMP PROGRESS MEETING

N & E AHMP HAZARD IDENTIFICATION QUESTIONNAIRE

CAPABILITY ASSESSMENT QUESTIONNAIRE

TYPES OF NATURAL HAZARDS

AHMP SEPTEMBER 12 INITIATION MEETING

AHMP CONSULTANT INFORMATION

AHMP LAND USE AND DEVELOPMENT QUESTIONNAIRE

Please contact Dr. Katie Palmer-House, AHMP Liasion
at AHMP@TownOfDover.us

126 East Duncan Hill Road
Dover Plains, New York 12522

Other participating jurisdictions have documented that they supplemented this by creating similar pages or links on their jurisdiction web sites to the overall county mitigation planning pages, along with an information PowerPoint presentation.

PlanFacts

The CPG made an effort to involve the public and other stakeholders in the process during the drafting stage of the plan in part through a fact sheet. The Planning Committee increased public awareness of the hazard mitigation plan process by providing a two-page summation on hazard mitigation facts and the mitigation planning process to the public, community leaders, business owners, local residents and other stakeholders in the plan. The flyer, entitled the *Northern and Eastern Dutchess County Communities Regional Hazard Mitigation Planning Project PlanFacts*, furnishes pertinent plan data that explains the purpose and need for the mitigation plan in the participating jurisdictions.



The two-page flyer begins by providing a basic understanding to “What is hazard mitigation?” It then contains information on the plan development process and how jurisdictions can participate in the plan or prepare their own hazard mitigation plans in compliance with DMA 2000 requirements. It also provides an overview of the Hazard Mitigation Planning Committee members and their roles; the steps in the mitigation process (goals, objectives, natural hazards evaluation, etc.); the plan scheduled target completion date; and a point of contact for more information.

PlanFacts was distributed to the attendees at the Core Planning Group Kickoff Meeting on September 12, 2008. It can be found electronically on the mitigation planning project web site address given above. *PlanFacts* was also distributed in hard copy format widely throughout the County by CPG members. Locations that it has been posted/distributed include local libraries, fire departments, and Town/Village Halls. A copy of the full fact sheet is presented below:



**Northern and Eastern Dutchess County
Communities Regional
Hazard Mitigation Planning Project**

PLAN FACTS

September 2008

WHAT IS HAZARD MITIGATION?

Natural hazards have the potential to cause property damage, loss of life, economic hardship, and threats to public health and safety.

Hazard mitigation measures are the things you do today to be more protected in the future. They are measures taken before a disaster happens to reduce the impact that future disasters will have on people and property in the community. Mitigation reduces the risk of loss and creates a more disaster-resistant and sustainable community. Hazard mitigation measures are essential to breaking the typical disaster cycle of damage, reconstruction, and repeated damage.



PURPOSE AND NEED FOR THE PLAN

Hazard mitigation plans are developed BEFORE a disaster strikes. The plans identify community policies, actions, and goals for long-term implementation to reduce risk and potential for future losses. Adopted, implemented and maintained on an ongoing basis, these plans will gradually, but steadily, lessen the impacts associated with hazard events.

As of November 1, 2004 communities without a FEMA-approved hazard mitigation plan are not eligible for FEMA project grant monies under programs such as the Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance Program (FMIA) and Real-Dollar Mitigation Grant Program (RDMG).





PARTICIPATION

Jurisdictions who wish to be recognized by FEMA as being compliant with DMA 2000 must either: (a) participate in the multi-jurisdictional plan development process and formally adopt the final plan, or (b) prepare their own hazard mitigation plan. The following jurisdictions have been invited to participate in the multi-jurisdictional process: the Towns of Amenia, Beesman, Dover, Milan, North East, Pawling and Pine Plains and the Villages of Pawling and Millerton.

To be recognized in FEMA's cycle as successfully participating in the multi-jurisdictional plan, jurisdictions must: participate actively in the planning process; develop unique jurisdictional mitigation actions; and formally adopt the final plan. Active participation includes attending meetings, providing feedback, and reaching out to the public and other key stakeholders in the community.

While the primary advantage of having a mitigation plan in place is the jurisdiction's eligibility to apply for FEMA hazard mitigation project grant monies, participation has other advantages as well:

- Because a consulting team has been hired to conduct the analyses and author the plan, participation involves relatively little effort on the part of jurisdictions.
- Because Federal grant monies have been awarded to develop the plan, participation involves little cost to local jurisdictions - only allocation of staff time to participate in the process, and a contribution toward the grant's 25% matching funds.
- Multi-jurisdictional hazard mitigation plans are preferred for administrative issues that do not recognize political boundaries.
- Over time, implementation of the plan will reduce economic damages resulting from future natural disasters.

STAFFING

Elect and appointed government officials, business leaders, volunteers of non-profit organizations, citizens, and other stakeholders who choose to participate will become part of our overall Northern and Eastern Dutchess County Communities Regional Hazard Mitigation Planning Committee. To keep meeting times to workable numbers, the Planning Committee will be broken up into a Core Planning Group (CPG) and Jurisdictional Assessment Teams (JATs).

The CPG will include representatives of any of the jurisdictions who elect to participate in the process. The CPG will manage the overall plan formulation activities and contribute to the decision making process. Representatives on the CPG will coordinate the plan efforts by organizing outreach by means of a team concept through the JATs.

The JATs will include representatives from the individual participating jurisdictions. They will be responsible for local community involvement in the multi-jurisdictional mitigation plan.

Regardless of team, all participating jurisdictions must:

- Coordinate and facilitate local efforts.
- Attend meetings.
- Provide information and feedback.
- Involve the public and community stakeholders in the planning process.
- Assess mitigation alternatives.
- Select a course of action to be followed for their communities.
- Plan implementation, monitoring and updates.

PROCESS

- Research a full range of natural hazards.
- Identify areas of significant hazards; these will be the focus of the plan.
- Identify location and extent of hazard areas.
- Identify assets located within hazard areas.
- Characterize existing and potential future assets at risk.
- Assess vulnerabilities to the identified hazards.
- Evaluate and prioritize goals, objectives, and hazard mitigation actions.
- Implement the Plan and monitor its progress.

SCHEDULE

The mitigation plan development process will occur over approximately one year, beginning in July 2008. A Draft Plan is targeted for completion in May of 2009.

OUR WEBSITE

A Multi-jurisdictional Hazard Mitigation Planning webpage is currently under development. We encourage you to check on your local Town or Village webpages for additional information, or link directly to the overall project webpage at: www.townofdover.us/HMPP.cfm.

FOR MORE INFORMATION

Thank you for your interest! For questions or other feedback, please contact your Town Supervisor or Village Mayor or our local HMPP liaison:

Dr. MIRA FINE-LOUIS
Phone: (845) 877-7433
E-mail: groups@townofdover.us

pg 1 of 2

September 2008

Open Public Meetings

Several participating jurisdictions spoke about the mitigation planning process at regularly scheduled meetings in their respective municipalities (i.e., board meetings), granting the public and other stakeholders an opportunity to participate in the process. See Table 1.6 for more information. In addition, there will be open meetings of local governing bodies before resolutions are passed to formally adopt the plan (see individual resolutions for more information).



Newspaper Coverage

The Core Planning Group worked closely with local newspapers throughout the plan development process to ensure widespread coverage about the plan, specifically the *Millerton News*, *Harlem Valley Times* and *Northern Dutchess News*. The *Millerton News* serves communities in the States of New York and Connecticut (in New York: Amenia, Ancram, Copake, Dover, Millerton, North East, Pine Plains, Rhinebeck, Red Hook, Millbrook, Poughkeepsie and Wassaic; in Connecticut: Sharon, Lakeville and Canaan). The *Harlem Valley Times* area of circulation included Dover, Amenia and Millerton. Both papers have online postings of their articles. The *Northern Dutchess News* targets Amenia, Clinton, Hyde Park, Milan, Millbrook, Pleasant Valley, Pine Plains, Stanford, Rhinebeck and Red Hook. Members of the press also attended the CPG Progress Meeting on January 16, 2009. A summary of newspaper articles is presented below. Copies can be found in Appendix H.

- October 18, 2007. Article in the *Millerton News* alerted readers to the fact that the participating jurisdictions had been awarded a grant from FEMA to prepare a hazard mitigation plan, the purpose of the plan, and the importance of planning ahead for natural hazard events and mitigating their effects.
- October 1, 2008. Article in the *Harlem Valley Times* provided background information about the project, encouraged participation from the public and other stakeholder groups, and provided contact information for more information or to become involved.
- January 22, 2009. Article in the *Harlem Valley Times* regarding the January 16th CPG meeting, overall project progress, and again encouraged participation from the public and other stakeholder groups, and provided contact information for more information or to become involved. A link to the multi-jurisdictional mitigation planning project web page was also provided.
- January 22, 2009. An article appeared in the *Millerton News* regarding the January 16th CPG meeting and overall project progress.
- April 2, 2009. A public notice was published in the *Millerton News* requesting feedback on working chapters of the draft plan [the Risk Assessment Interim Deliverable].
- February 11, 2010. An article appeared in the *Millerton News* providing an overview of the planning project, alerting readers to the fact that municipal mitigation strategies were being expanded upon and that the May 2009 Draft was being revised, and requesting comments and feedback.
- February 24, 2010. An article appeared in the *Northern Dutchess News* for the issue covering the week of February 24th to March 2nd. This article provided an overview of the planning project, alerted readers to the fact that municipal mitigation strategies were being expanded upon and that the May 2009 Draft was being revised, and requested comments and feedback.

Other Outreach Activities

In addition to the web site, fact sheet, and open public meetings held, the Core Planning Group (through their respective JATs) undertook the actions summarized in chronological order in Table 1.6 to raise awareness of the plan development process and provide the public and other stakeholders with a forum for participating in - and providing feedback throughout - the plan development process. While participating jurisdictions have provided comments, to date no feedback from the public or other stakeholders has been received. Comments received in time to be incorporated into the Final Plan will be reviewed by the Consultant and the NEDCC Local Liaison and integrated into the plan as applicable. As this is a living document, other comments will be considered for integration during future maintenance cycles and plan updates.



Date	Jurisdiction	Action
August 2007	NEDCCs	Community Information Presentation to Town of Dover Town Board
October 2007	NEDCCs	Article published in the <i>Millerton News</i> entitled “Dutchess County Granted Disaster Grant”
November 2007	NEDCCs	Community Information Presentation to the Village of Millerton and Town of North East
December 2007	NEDCCs	Community Information Presentation to Town of Beekman
January 2008	NEDCCs	Community Information Presentation to Towns of Pine Plains and Milan
February 2008	NEDCCs, and the Dutchess County Soil and Water Conservation District	Press release posted to municipal websites entitled “Partners In Protecting Our Communities”, also posted on Town of Dover and Town of Amenia websites
	Town of Beekman	“Partners in Protecting our Communities” featured in Town of Beekman community newsletter
May 2008	NEDCCs	Community Information Presentation to Town at Village of Pawling
August 2008	Town of Amenia	Liaison with Highway Superintendent, CEO, Building Inspector, Planning Board
September 2008	NEDCCs	Dedicated mitigation planning project web page developed, hosted on the Town of Dover web site. Other municipalities posted links on their Town/Village web sites to this overall project web page, as well as an informational PowerPoint presentation. Fact Sheet sent to communities for distribution.
	Town of Pine Plains	Created link on Town website to hazard mitigation plan website hosted by Town of Dover, and posted the Kickoff Meeting presentation in both PowerPoint and PDF.
	Village of Pawling	Presentation at village board meeting, liaison with village historian
	NEDCCs	Fact sheets copied and distributed to all communities for display and handout
October 2008	NEDCCs	Article published in the <i>Harlem Valley Times</i> entitled “Communities Develop Hazard Mitigation Plan”
	Town of Pine Plains	Liaison with town representatives regarding hazard mitigation plan and responses to questionnaires (Building Inspector, Town Assessor, CAC, Planning Board, Bank, Fire Chief, Highway Superintendent, School District)
	Town of Milan	Presentation at Town Board meeting
	Town of Amenia	Meetings with town representatives: Building Inspector, Assessor, Town Engineer, Emergency Response Committee
	Village of Pawling	Presentation with village councilmen
	NEDCCs	Article on NEDCC Hazard Mitigation Plan featured in <i>Harlem Valley Times</i>
November 2008	Village of Pawling	Presentation to Mayor and Town Board
	Village of Millerton	OEM spoke about the hazard mitigation plan during a regular public meeting and invited comments.
December 2008	Town of Amenia	Meetings with CEO and Fire Department
	Village of Pawling	Meeting with ZBA/Planning Board Chairs
January 2009	NEDCCs	Article on NEDCC Hazard Mitigation Plan featured in <i>Harlem Valley Times</i> and <i>Millerton News</i>



	Village of Millerton	OEM spoke about the hazard mitigation plan during a regular public meeting and invited comments.
	Village of Pawling	Liaison with ZBA/Planning Board
February 2009	Village of Millerton	OEM spoke about the hazard mitigation plan during a regular public meeting and invited comments.
March 2009	Town of Milan	Meetings with Town Board members, Fire Chief, Highway Superintendent
	Town of Amenia	Presentations at two Town Board meetings
April 2009	NEDCCs	A public notice was published in the <i>Millerton News</i> requesting feedback on working chapters of the draft plan [the Risk Assessment Interim Deliverable].
	Village of Millerton	Conducted a public meeting and discussed in detail the hazard mitigation planning project. Also, with the initiation of a new website for the Village, added a link to the overall mitigation planning project web page.
August 2007 – May 2009	Town of Dover	Regular presentations regarding progress of planning process and outreach at monthly public Town Board meetings.
February 2010	NEDCCs	Two articles published in the <i>Millerton News</i> and <i>Northern Dutchess News</i> . The articles provided an overview of the planning project, alerted readers to the fact that municipal mitigation strategies were being expanded upon and that the May 2009 draft was being revised, and requested comments and feedback.

Involvement of Other Stakeholders in the Plan Development Process

In order to meet Federal requirements, the plan development process must be open to stakeholders beyond planning group members and the general public. That is, opportunities must be available for other stakeholders (such as businesses, neighboring communities, agencies, academia, relevant private and non-profit interests, and other interested parties) to become involved in the planning process.

As with the general public, other stakeholders must be provided with some variety of means to not only learn about the process that the Planning Committee is undertaking, but to voice concerns and to provide input throughout the planning process. With support and guidance from URS, each JAT took the lead in pursuing a range of activities to: (a) alert other stakeholders to the fact that the planning was working to develop this Hazard Mitigation Plan, and (b) provide other stakeholders with a forum to ask questions, and to submit comments and/or suggestions on the process or directly participate.

The Core Planning Group determined that outreach activities to the general public as summarized in the previous section would also reach and provide the same opportunities for other stakeholders such as businesses, neighboring communities, agencies, academia, other relevant private and non-profit interests, and other interested parties.

The following four stakeholder entities participated through attending at least one meeting:

- *NYSEMO Region II*
- *NYS Senate*
- *Dutchess County Soil and Water Conservation District*
- *Dutchess County GIS*



In addition, a coordination letter providing an overview of the project and inviting comments and feedback on the Draft Plan was sent by the NEDCC Local Liaison on February 1, 2010 to the following stakeholder entities:

- *Dover Union Free School District*
- *Webatuck Central School District*
- *Pawling Central School District*
- *Pine Plains Central School District*
- *Harlem Valley Chamber of Commerce*
- *J.H. Ketcham Hose Company*
- *Amenia Fire Company*
- *Wassaic Fire Company*
- *Millerton Fire Company*
- *Pawling Fire Company*
- *Pine Plains Hose Company*
- *Milan Volunteer Fire Department*
- *Northern Dutchess Paramedics*
- *Dutchess County Department of Emergency Response*
- *American Red Cross, Dutchess County*
- *EMS Institute at Sharon Hospital*

A copy of the form letter can be found in Appendix H.

Review and Incorporation of Existing Plans, Studies, Reports, and Technical Information

In the process of preparing this hazard mitigation plan, many other existing plans, studies, reports, and technical information were evaluated. These sources are noted throughout this report as various topics are discussed. In summary, the development of this hazard mitigation plan included the review and incorporation as applicable of data from the following sources:

- Readily available on-line information from federal and state agency web sites including: FEMA, NYSEMO, NY State Department of Environmental Conservation, US Forest Service National Avalanche Center, US Geological Survey, National Oceanic and Atmospheric Administration (including National Weather Service and National Climatic Data Center, and the National Severe Storms Laboratory), U.S. Army Cold Regions Research and Engineering Laboratory USGS National Geomagnetism Program, National Drought Mitigation Center Drought Impact Reporter, USGS National Earthquake Information Center, and the US Department of Transportation Federal Highway Authority.
- New York State Hazard Mitigation Plan (January 2008)
- FEMA Q3 Flood Data and municipal Flood Insurance Studies
- Dutchess County GIS
- USGS Earthquake History of New York State
- NY State Geological Survey NEHRP Soil Class Mapping
- NY State Landslide Inventory Mapping
- USGS National Landslides Program Landslide Mapping
- National Agricultural Statistics Service, Dutchess County Profile
- HAZUS-MH database for emergency facilities and utilities
- Stanford University National Performance of Dams Program web site
- New York State Historic Preservation Office GIS shape files for state and federally listed historic and cultural resources
- FEMA NFIP Community Status Book
- FEMA data for NFIP Repetitive Loss Properties and Community Rating System communities
- FEMA's "NFIP Floodplain Management Requirements: a Study Guide and Desk Reference for Local Officials (FEMA-480)"



- USGS Landslide Overview Map of the Conterminous United States, prepared in hard copy format in 1982 by Dorothy H. Radbruch-Hall, Roger B. Colton, William E. Davies, Ivo Lucchitta, Betty A. Skipp, and David J. Varnes (Geologic Survey Professional Paper 1183), compiled digitally by Jonathan W. Godt (USGS Open File Report 97-289), as viewed on NationalAtlas.gov
- American Society of Civil Engineers (ASCE) Standard 7-98: Minimum Design Loads for Buildings and Other Structures
- FEMA's "Multi-Hazard Identification and Risk Assessment" (1997)
- American Society of Civil Engineers "Wind Zones in the United States" map
- American Meteorological Society "Glossary of Meteorology"
- Section 905(b) Recon Study, Ten Mile River Watershed (USACE, FINAL, Sept. 2008)
- "Greenway Connections" guide to open space development for Dutchess County Communities (March 2000)
- Various municipal emergency response plans, comprehensive plans, open space plans, past disaster event information, and ordinances as provided to the Consultant by CPG members as part of their Wish List responses
- In addition, to conduct their Capability Assessments, local jurisdictions considered relevant plans, codes, and ordinances currently in place such as building codes, zoning ordinances, subdivision ordinances, special purpose ordinances, site plan review requirements, growth management ordinances, comprehensive plans, capital improvements plans, economic development plans, emergency response plans, post-disaster recovery plans, post-disaster recovery ordinances, and real estate disclosure ordinances. For additional information, please see the "Capabilities and Resources" section of this plan.

Regulatory Compliance

This Hazard Mitigation Plan was prepared in a manner consistent with applicable regulations, criteria, and guidance. The Plan's components address the local hazard mitigation planning requirements of the DMA 2000. The Planning Group used FEMA's Multi-Hazard Mitigation Planning Guidance document of March 2004 (with revisions November, 2006, June 2007, January 2008 and July 2008) as a guide. This document contains what is known as a Crosswalk Reference Document for FEMA reviewers to track where in a document various criteria are addressed. Each criteria must be addressed satisfactorily for a plan to be approved by FEMA. There are three exceptions, with regard to assessing vulnerability. They are:

- Assessing Vulnerability: Identifying Structures: §201.6(c)(2)(ii)(A)
- Assessing Vulnerability: Estimating Potential Losses: §201.6(c)(2)(ii)(B)
- Assessing Vulnerability: Analyzing Development Trends: §201.6(c)(2)(ii)(C)

For these three criteria, highlighted in gray in Table 1.7, actions are strongly encouraged by FEMA, though not required by the DMA 2000 Interim Final Rule. While FEMA encourages communities to address such criteria, they are not required for Plan approval. For the NEDCC Regional Natural Hazard Mitigation Plan, these three criteria were addressed to the greatest extent practicable in the time available and using the best readily-available data. The following table summarizes specific requirements in the Interim Final Rule, and whether the regulation implementing DMA 2000 is addressed in this plan. Information in this plan is presented in the order of the plan review criteria for NYSEMO/FEMA reviewer's ease in evaluating compliance.



FEMA Plan Review Criteria	Addressed in this Plan
Prerequisites Adoption by the Local Governing Body: §201.6(c)(5) Multi-Jurisdictional Plan Adoption: §201.6(c)(5) Multi-Jurisdictional Planning Participation: §201.6(a)(3)	Placeholder following page i Placeholder following page i Section 1, Apdx G
Planning Process Documentation of the Planning Process: §201.6(b) and §201.6(c)(1)	Section 1 and Apdx. G, H, I
Risk Assessment Identifying Hazards: §201.6(c)(2)(i) Profiling Hazards: §201.6(c)(2)(i)	Section 2 Section 3, Apdx. J
Assessing Vulnerability: Overview: §201.6(c)(2)(ii) Assessing Vulnerability: Addressing Repetitive Loss Properties: §201.6(c)(2)(ii)	Section 3 and Apdx. A, C, J Section 3
Assessing Vulnerability: Identifying Structures: §201.6(c)(2)(ii)(A)	Section 3 and Apdx. A-C
Assessing Vulnerability: Estimating Potential Losses: §201.6(c)(2)(ii)(B)	Section 3
Assessing Vulnerability: Analyzing Development Trends: §201.6(c)(2)(ii)(C)	Section 3
Multi-Jurisdictional Risk Assessment: §201.6(c)(2)(iii)	Section 3
Mitigation Strategy Local Hazard Mitigation Goals: §201.6(c)(3)(i) Identification and Analysis of Mitigation Actions: §201.6(c)(3)(ii)	Section 5 Sections 6 - 7 and Apdx. D
Identification and Analysis of Mitigation Actions: NFIP Compliance: §201.6(c)(3)(iii)	Sections 6 - 7 and Apdx. F
Implementation of Mitigation Actions: §201.6(c)(3)(iii)	Section 8 and Apdx. E
Multi-Jurisdictional Mitigation Actions: §201.6(c)(3)(iv)	Section 8 and Apdx. D, E, F
Plan Maintenance Process Monitoring, Evaluating, and Updating the Plan: §201.6(c)(4)(i)	Section 9
Incorporation into Existing Planning Mechanisms: §201.6(c)(4)(ii)	Section 9
Continued Public Involvement: §201.6(c)(4)(iii)	Section 9

Document Organization

This Multi-Jurisdictional Hazard Mitigation Plan for the NEDCC is organized into the following major sections.

1. Introduction. Plan purpose, overview of the planning area, summary of plan development process, document organization, and key terms.

2. Identification of Potential Hazards. Documentation of the evaluation of a full range of natural hazards, and indication of which hazards were identified for inclusion in this plan (and why) versus those that were not identified (and why not).

3. Risk Assessment. Hazard profiles, identification and characterization of assets in hazard areas, damage estimates, and summary of land uses and development trends in hazard areas.

4. Capabilities and Resources. Overview of local, state, and federal resources for hazard mitigation.

5. Mitigation Goals. Summary of hazard mitigation goals for the State Hazard Mitigation Plan and also for this multi-jurisdictional hazard mitigation plan.

6. Range of Alternative Mitigation Actions Considered. Summary of mitigation actions considered by participating jurisdictions.



7. Action Item Evaluation and Prioritization. Information regarding the methodology and process followed by participating jurisdictions to evaluate and prioritize unique hazard mitigation actions for their communities.

8. Implementation Strategy. Summary of hazard mitigation actions selected by each participating jurisdiction.

9. Plan Maintenance. Procedures selected for monitoring, evaluating, and updating this mitigation plan; including participation of the public and other stakeholders in plan maintenance, and plan integration.

10. For More Information. Provides contact information for readers who may have any questions or comments on the plan.

Key Terms

For the purpose of clarity throughout this document, the following definitions are briefly outlined:

- **Hazard mitigation** is the method by which measures are taken to reduce, eliminate, avoid or redirect natural hazards in order to diminish or eradicate the long-term risks to human life and property.
- A **natural hazard** is any hazard that occurs or results from acts of nature such as floods, earthquakes, hurricanes, tornadoes and coastal storms, to name a few.
- A **hazard mitigation plan** is a well-organized and well-documented evaluation of the natural hazards and the extent that the events will occur. In addition, the plan identifies the vulnerability to the effects of the natural hazards typically present in a certain area, as well as the goals, objectives and actions required for minimizing future loss of life and property damage as a result of natural hazards.
- **Hazard mitigation planning** is the process of managing actions taken by individual citizens and professional organizations involved in mitigation activities. The process involves carrying out plans to reduce loss of life, injuries and damage to property, as well as reducing the costs associated with losses from natural hazards. It is a long-term process with benefits best realized over time.
- A **disaster** is any catastrophic event that causes loss of life, injuries and widespread destruction to property. For the purpose of this document, a disaster is the result of a natural hazard, whether anticipated (such as flash flood warnings) or fortuitous (such as earthquakes).
- The term **human-caused hazards (or man-made hazards)** refers to technological hazards + terrorism, where “technological hazards” are incidents that arise from human activities such as the manufacture, transportation, storage, and use of hazardous materials, where the incidents are accidental and their consequences unintended; and “terrorism” is the intentional, criminal, and/or malicious acts resulting from the use of Weapons of Mass Destruction (WMD), including biological, chemical, nuclear, and radiological weapons; arson, incendiary, explosive and armed attacks; industrial sabotage and intentional hazardous materials releases; and cyberterrorism.



SECTION 2 - IDENTIFICATION OF POTENTIAL HAZARDS

FEMA’s current regulations and interim guidance require, at a minimum, an evaluation of a full range of natural hazards. An evaluation of “human-caused” hazards (i.e., technological hazards and/or terrorism) is encouraged, though not required, for plan approval under DMA 2000. The nine Dutchess County communities participating in this project have chosen to focus solely on natural hazards at this time. Human-caused hazards can be evaluated in future versions of the plan, as it is a “living document” which will be monitored, evaluated and updated regularly.

After consideration of a full range of natural hazards, the participating jurisdictions have identified several hazards that are addressed in this Multi-Jurisdictional Hazard Mitigation Plan. These hazards were identified through an extensive process that utilized direct input from Core Planning Group members, research of past disaster declarations in the County, and review of the New York State Hazard Mitigation Plan (2008). Readily available online information from reputable sources (such as Federal and state agencies) was also evaluated to supplement information from these key sources.

The following table (Table 2.1) presents the full range of natural hazards considered and provides a brief description of the hazard. Subsequently, Table 2.2 documents the evaluation process for the hazards listed in Table 2.1 to determine the hazards worthy of further consideration in the plan. For each hazard considered, Table 2.2 indicates whether or not the hazard was identified as a significant hazard to be addressed in the plan, how this determination was made (i.e. the sources of information that were consulted while researching each hazard) and why this determination was made. The table summarizes not only those hazards that *were* identified (and why) but also those that *were not* identified (and why not).

Some of these hazards are considered to be interrelated or cascading (e.g., hurricanes can cause wind damage and flooding), but for preliminary hazard identification purposes these individual hazards have been broken out separately. It should also be noted that some hazards, such as earthquakes or winter storms may impact a large area yet cause little damage, while other hazards, such as a tornado, may impact a small area yet cause extensive damage within that area.

Because this Hazard Mitigation Plan is a living document, hazard events not identified for inclusion at this time could be addressed during future evaluations and updates of the plan if deemed necessary by the Core Planning Group at that time.

Lastly, Table 2.3 provides a summary checklist of the hazard identification and evaluation process noting which of the 23 initially identified hazards are considered significant enough for further evaluation through the multi-jurisdictional hazard risk assessment (marked with a “☑”).

RISK ASSESSMENT: IDENTIFICATION OF POTENTIAL HAZARDS



Table 2.1
Descriptions of the Full Range of Initially Identified Hazards

Hazard	Description
ATMOSPHERIC	
Avalanche	A rapid fall or slide of a large mass of snow down a mountainside.
Extreme Temperatures	Extreme heat and extreme cold constitute different conditions in different parts of the country. Extreme cold can range from near freezing in the South to temperatures well below zero in the North. Similarly, extreme heat is typically recognized as the condition whereby temperatures hover ten degrees or more above the average high temperature for a region for an extended period.
Extreme Wind	Wind is air that is in constant motion relative to the surface of the earth. Extreme wind events can occur suddenly without warning. They can occur at any time of the day or night, in any part of the country. Extreme winds pose a threat to lives, property, and vital utilities primarily due to the effects of flying debris and can down trees and power lines. Extreme winds are most commonly the result of hurricanes, tropical storms, nor'easters, severe thunderstorms and tornadoes, but can also occur in their absence as mere "windstorms." One type of windstorm, the downburst, can cause damage equivalent to a strong tornado.
Hailstorm	Any storm that produces hailstones that fall to the ground; usually used when the amount or size of the hail is considered significant. Hail is formed when updrafts in thunderstorms carry raindrops in to parts of the atmosphere where the temperatures are below freezing.
Hurricane and Tropical Storm	Hurricanes and tropical storms are classified as cyclones and defined as any closed circulation developing around a low-pressure center in which the winds rotate counter-clockwise in the Northern Hemisphere (or clockwise in the Southern Hemisphere) and with a diameter averaging 10 to 30 miles across. When maximum sustained winds reach or exceed 39 miles per hour, the system is designated a tropical storm, given a name, and is closely monitored by the National Hurricane Center. When sustained winds reach or exceed 74 miles per hour the storm is deemed a hurricane. The primary damaging forces associated with these storms are high-level sustained winds, heavy precipitation and tornadoes. Coastal areas are also vulnerable to the additional forces of storm surge, wind-driven waves and tidal flooding which can be more destructive than cyclone wind. The majority of hurricanes and tropical storms form in the Atlantic Ocean, Caribbean Sea and Gulf of Mexico during the official Atlantic hurricane season, which extends from June through November.
Lightning	Lightning is a discharge of electrical energy resulting from the buildup of positive and negative charges within a thunderstorm, creating a "bolt" when the buildup of charges becomes strong enough. This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning can reach temperatures approaching 50,000 degrees Fahrenheit. Lightning rapidly heats the sky as it flashes, but the surrounding air cools following the bolt. This rapid heating and cooling of the surrounding air causes thunder. On average, 73 people are killed each year by lightning strikes in the United States.
Nor'easter	Similar to hurricanes, nor'easters are ocean storms capable of causing substantial damage to coastal areas in the Eastern United States due to their associated strong winds and heavy surf. Nor'easters are named for the winds that blow in from the northeast and drive the storm up the East Coast along the Gulf Stream, a band of warm water that lies off the Atlantic coast. They are caused by the interaction of the jet stream with horizontal temperature gradients and generally occur during the fall and winter months when moisture and cold air are plentiful. Nor'easters are known for dumping heavy amounts of rain and snow, producing hurricane-force winds, and creating high surf that causes severe beach erosion and coastal flooding.
Tornado	A tornado is a violently rotating column of air that has contact with the ground and is often visible as a funnel cloud. Its vortex rotates cyclonically with wind speeds ranging from as low as 40 mph to as high as 300 mph. Tornadoes are most often generated by thunderstorm activity when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The destruction caused by tornadoes ranges from light to catastrophic depending on the intensity, size and duration of the storm.
Winter Storm	Winter storms may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Blizzards, the most dangerous of all winter storms, combine low temperatures, heavy snowfall, and winds of at least 35 miles per hour, reducing visibility to only a few yards. Ice storms occur when moisture falls and freezes immediately upon impact on trees, powerlines, communication towers, structures, roads and other hard surfaces. Winter storms and ice storms

RISK ASSESSMENT: IDENTIFICATION OF POTENTIAL HAZARDS



	can down trees, cause widespread power outages, damage property, and cause fatalities and injuries to human life.
HYDROLOGIC	
Coastal Erosion	Landward displacement of a shoreline caused by the forces of waves and currents. Coastal erosion is measured as the rate of change in the position or horizontal displacement of a shoreline over a period of time. It is generally associated with episodic events such as hurricanes and tropical storms, nor'easters, storm surge and coastal flooding but may also be caused by human activities that alter sediment transport. Construction of shoreline protection structures can mitigate the hazard, but may also exacerbate it under some circumstances.
Dam Failure	Dam failure is the collapse, breach, or other failure of a dam structure resulting in downstream flooding. In the event of a dam failure, the energy of the water stored behind even a small dam is capable of causing loss of life and severe property damage if development exists downstream of the dam. Dam failure can result from natural events, human-induced events, or a combination of the two. The most common cause of dam failure is prolonged rainfall that produces flooding. Failures due to other natural events such as hurricanes, earthquakes or landslides are significant because there is generally little or no advance warning.
Drought	A prolonged period of less than normal precipitation such that the lack of water causes a serious hydrologic imbalance. Common effects of drought include crop failure, water supply shortages, and fish and wildlife mortality. High temperatures, high winds, and low humidity can worsen drought conditions and also make areas more susceptible to wildfire. Human demands and actions have the ability to hasten or mitigate drought-related impacts on local communities.
Flood	The accumulation of water within a water body which results in the overflow of excess water onto adjacent lands, usually floodplains. The floodplain is the land adjoining the channel of a river, stream ocean, lake or other watercourse or water body that is susceptible to flooding. Most floods fall into the following three categories: riverine flooding, coastal flooding, or shallow flooding (where shallow flooding refers to sheet flow, ponding and urban drainage).
Ice Jams	A formation of ice over a body of water that limits the flow of the water due to freezing. Ice jam flooding occurs when warm temperatures and heavy rain cause the snow to melt rapidly, causing frozen rivers or lakes to overflow. As the water lifts, the ice that's formed on top of the body of water breaks into small pieces of varying sizes. These pieces or large chunks of ice tend to float downstream and often pile up near narrow passages or near obstructions, such as bridges and dams. This accumulation can impact the integrity of the structures and also cause upstream flooding as water backs up behind the obstruction.
Storm Surge	A storm surge is a large dome of water often 50 to 100 miles wide and rising anywhere from four to five feet in a Category 1 hurricane up to more than 30 feet in a Category 5 storm. Storm surge heights and associated waves are also dependent upon the shape of the offshore continental shelf (narrow or wide) and the depth of the ocean bottom (bathymetry). A narrow shelf, or one that drops steeply from the shoreline and subsequently produces deep water close to the shoreline, tends to produce a lower surge but higher and more powerful storm waves. Storm surge arrives ahead of a storm's actual landfall and the more intense the hurricane is, the sooner the surge arrives. Storm surge can be devastating to coastal regions, causing severe beach erosion and property damage along the immediate coast. Further, water rise caused by storm surge can be very rapid, posing a serious threat to those who have not yet evacuated flood-prone areas.
Wave Action	The characteristics and effects of waves that move inland from an ocean, bay, or other large body of water. Large, fast moving waves can cause extreme erosion and scour and their impact on buildings can cause severe damage. During hurricanes and other high-wind events, storm surge and wind increase the destructiveness of waves and cause them to reach higher elevations and penetrate further inland.
GEOLOGIC	
Earthquake	A sudden, rapid shaking of the Earth caused by the breaking and shifting of rock beneath the surface. This movement forces the gradual building and accumulation of energy. Eventually, strain becomes so great that the energy is abruptly released, causing the shaking at the earth's surface which we know as an earthquake. Roughly 90 percent of all earthquakes occur at the boundaries where plates meet, although it is possible for earthquakes to occur entirely within plates. Earthquakes can affect hundreds of thousands of square miles; cause damage to property measured in the tens of billions of dollars; result in loss of life and injury to hundreds of thousands of persons; and disrupt the social and economic functioning of the affected area.
Expansive Soils	Soils that will exhibit some degree of volume change with variations in moisture conditions. The most important properties affecting degree of volume change in a soil are clay mineralogy and the

RISK ASSESSMENT: IDENTIFICATION OF POTENTIAL HAZARDS



	aqueous environment. Expansive soils will exhibit expansion caused by the intake of water and, conversely, will exhibit contraction when moisture is removed by drying. Generally speaking, they often appear sticky when wet, and are characterized by surface cracks when dry. Expansive soils become a problem when structures are built upon them without taking proper design precautions into account with regard to soil type. Cracking in walls and floors can be minor, or can be severe enough for the home to be structurally unsafe.
Landslide	The movement of a mass of rock, debris, or earth down a slope when the force of gravity pulling down the slope exceeds the strength of the earth materials that comprise to hold it in place. Slopes greater than 10 degrees are more likely to slide, as are slopes where the height from the top of the slope to its toe is greater than 40 feet. Slopes are also more likely to fail if vegetative cover is low and/or soil water content is high.
Land Subsidence	The gradual settling or sudden sinking of the Earth's surface due to the subsurface movement of earth materials. Causes of land subsidence include groundwater pumpage, aquifer system compaction, drainage of organic soils, underground mining, hydrocompaction, natural compaction, sinkholes, and thawing permafrost.
Tsunami	A series of waves generated by an undersea disturbance such as an earthquake. The speed of a tsunami traveling away from its source can range from up to 500 miles per hour in deep water to approximately 20 to 30 miles per hour in shallower areas near coastlines. Tsunamis differ from regular ocean waves in that their currents travel from the water surface all the way down to the sea floor. Wave amplitudes in deep water are typically less than one meter; they are often barely detectable to the human eye. However, as they approach shore, they slow in shallower water, basically causing the waves from behind to effectively "pile up", and wave heights to increase dramatically. As opposed to typical waves which crash at the shoreline, tsunamis bring with them a continuously flowing 'wall of water' with the potential to cause devastating damage in coastal areas located immediately along the shore.
Volcano	A mountain that opens downward to a reservoir of molten rock below the surface of the earth. While most mountains are created by forces pushing up the earth from below, volcanoes are different in that they are built up over time by an accumulation of their own eruptive products: lava, ash flows, and airborne ash and dust. Volcanoes erupt when pressure from gases and the molten rock beneath becomes strong enough to cause an explosion.
OTHER	
Wildfire	An uncontrolled fire burning in an area of vegetative fuels such as grasslands, brush, or woodlands. Heavier fuels with high continuity, steep slopes, high temperatures, low humidity, low rainfall, and high winds all work to increase risk for people and property located within wildfire hazard areas or along the urban/wildland interface. Wildfires are part of the natural management of forest ecosystems, but most are caused by human factors. Over 80 percent of forest fires are started by negligent human behavior such as smoking in wooded areas or improperly extinguishing campfires. The second most common cause for wildfire is lightning.

RISK ASSESSMENT: IDENTIFICATION OF POTENTIAL HAZARDS



**Table 2.2
Documentation of the Hazard Identification Process**

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
ATMOSPHERIC HAZARDS			
Avalanche	NO	<ul style="list-style-type: none"> • Review of US Forest Service National Avalanche Center web site • Review of NY State Hazard Mitigation Plan • Review of FEMA’s Multi-Hazard Identification and Risk Assessment • Input from Core Planning Group 	<ul style="list-style-type: none"> • Avalanches are not included in the NY State Hazard Mitigation Plan, and are not discussed for NY on the US Forest Service Avalanche Center web site. • While avalanches are not unknown in northern New York State, the topography and climate in Dutchess County do not support conditions required for the occurrence of significant avalanches.
Extreme Temperatures	YES	<ul style="list-style-type: none"> • Review of NY State Hazard Mitigation Plan • Review of NOAA National Climatic Data Center (NCDC) Database • Review of FEMA’s Multi-Hazard Identification and Risk Assessment • Input from Core Planning Group 	<ul style="list-style-type: none"> • Extreme heat events are mentioned in the NY State plan as a discrete hazard. Extreme cold is mentioned in the context of winter storms. • The state plan records one significant extreme heat event affecting Dutchess County since 1994 and shows that the percentage of the population most susceptible to extreme heat (under 5yrs and over 65yrs) is 17.6%, which is lower than in most other counties in the state. • NCDC reports 17 significant extreme temperature events for areas including Dutchess County between February 1993 and June 2008 (including three extreme summer heat events, four extreme winter cold events, seven unseasonably warm events and three unseasonably cold events). For these events there are \$50,000 recorded property damages but no attributed deaths, injuries or crop damages across the affected areas.
Extreme Wind	YES	<ul style="list-style-type: none"> • Review of NY State Hazard Mitigation Plan • Review of FEMA’s Multi-Hazard Identification and Risk Assessment • Review of NOAA NCDC Storm Events Database • Review of American Society of Civil Engineers (ASCE) Standard 7-02 (Minimum Design Loads for Buildings and Other Structures) • Review of Wind Zones in the United States as per FEMA Publication 320 – 	<ul style="list-style-type: none"> • Extreme wind events are included in the NY State plan in the context of hurricane and tornado events. • The state plan ranks Dutchess County as fourth out of 62 counties in the state for the threat of extreme wind and vulnerability to extreme wind losses. • Dutchess County is located in a climate region that is highly susceptible to numerous types of extreme wind events including straight line winds, severe thunderstorms, hurricanes, tropical storms, nor’easters and severe winter storms. • According to FEMA-320, Dutchess County is located in a wind zone where extreme wind speeds of 160mph are possible.

RISK ASSESSMENT: IDENTIFICATION OF POTENTIAL HAZARDS



Table 2.2
Documentation of the Hazard Identification Process

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
		Taking Shelter From the Storm <ul style="list-style-type: none"> Input from Core Planning Group 	<ul style="list-style-type: none"> NCDC reports 73 high wind events (wind speed > 50 knots/58 mph) for Dutchess County since 1998. These events have most often been associated with thunderstorms, and have caused more than \$1.5 million in property damage and one injury but no recorded deaths or crop damages. The 3 second wind gust for Dutchess County for building design purposes as per ASCE 7-02 is between 90 and 95 mph. The standard also shows Dutchess County is located in a Special Wind Region, i.e. an area where wind anomalies are known to occur and in which wind speeds may be substantially higher than specified.
Hailstorm	NO	<ul style="list-style-type: none"> Review of NY State Hazard Mitigation Plan Review of FEMA's Multi-Hazard Identification and Risk Assessment Review of NOAA NCDC Storm Events Database and NOAA NSSL website Input from Core Planning Group 	<ul style="list-style-type: none"> The state plan includes hailstorms as a discrete hazard. NCDC reports 78 severe hailstorm events (<u>3/4 inch</u> diameter hail or greater) for Dutchess County between June 1957 and June 2008. For these events there are \$48,000 recorded property damages and \$1.09 million crop damages, but no recorded deaths or injuries. NCDC reports only one event in which "damaging" hail (at least <u>2 inches</u> in diameter) fell in Dutchess County (Pine Plains – September 26, 1998). According to NSSL data Dutchess County is located in a part of the country with the lowest annual number of days with hailstorms (less than 2), and where the annual average number of damaging hail events is less than 0.25. There are minimal hazard mitigation techniques available to reduce hailstorm impacts to property, outside of the emergency preparedness procedures and severe weather warning systems already in place (i.e. mass public notifications that recommend immediate protective actions). There are no known hail mitigation measures for crops, which have incurred by far the greatest hail damages.
Hurricane and Tropical Storm	YES	<ul style="list-style-type: none"> Review of NY State Hazard Mitigation Plan Analysis of NOAA historical tropical cyclone tracks Review of NOAA National Hurricane Center website 	<ul style="list-style-type: none"> Hurricane and tropical storm events are discussed in the state plan, which includes FEMA mapping showing Dutchess County located in a hurricane-prone area where extreme wind speeds of 160 mph are possible. Dutchess County has been included in the

RISK ASSESSMENT: IDENTIFICATION OF POTENTIAL HAZARDS



**Table 2.2
Documentation of the Hazard Identification Process**

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
		<ul style="list-style-type: none"> • Review of NOAA NCDC Storm Events Database and National Hurricane Center web site • Review of FEMA’s Multi-Hazard Identification and Risk Assessment • Input from Core Planning Group 	<p>area covered by major disaster declarations due to hurricanes or tropical storms on two occasions in the last ten years.</p> <ul style="list-style-type: none"> • NOAA historical records indicate four hurricane tracks and 11 tropical storm tracks passing within 65 nautical miles of Dutchess County between 1900 and 2007. • The most recent of these events was Tropical Storm Floyd, which passed over Long Island in September 1999. The most proximate event to Dutchess County Communities Regional Plan area was Tropical Storm Able in September 1952 (the path of which crossed directly over Dutchess County). • According to the NHC the estimated return period for a Category 1 hurricane in the New York City area is 17 years, rising to 370 years for a Category 5 event.
Lightning	YES	<ul style="list-style-type: none"> • Review of NY State Hazard Mitigation Plan • Review of NOAA NCDC Storm Events Database, NOAA lightning statistics, and National Severe Storms Laboratory (NSSL) web site • Review of FEMA’s Multi-Hazard Identification and Risk Assessment • Input from Core Planning Group 	<ul style="list-style-type: none"> • Lightning is not considered as a discrete hazard in the NY State Hazard Mitigation Plan. • According to NOAA and FEMA data, eastern and northern Dutchess County is located in an area of the country that experiences an average of less than 40 thunder events and one lightning flash per square kilometer per year. For comparison, large areas of the country experience more than 120 events per year and more than 10 flashes per square kilometer. • NOAA records that New York State has experienced the fourth most deaths and third most damages from lightning in the United States from 1959 to 1994. • NCDC reports 8 significant lightning events for Dutchess County between August 1996 and May 2008. These events have resulted in one recorded injury and more than \$230,000 in property damage.
Nor’easter	YES	<ul style="list-style-type: none"> • Review of NY State Hazard Mitigation Plan • Review of NOAA NCDC Storm Events Database • Review of FEMA’s Multi-Hazard Identification and Risk Assessment • Input from Core Planning Group 	<ul style="list-style-type: none"> • Nor’easters are discussed in the state plan as a common cause of flooding and snowstorms, particularly in the south eastern part of the state where Dutchess County is located. • NYSEMO has classified nor’easters as a moderate hazard (second only to flooding) in the planning area covering Dutchess County. • Dutchess County has a history of experiencing the impacts of nor’easters, including high wind, heavy rain or snow,

RISK ASSESSMENT: IDENTIFICATION OF POTENTIAL HAZARDS



Table 2.2 Documentation of the Hazard Identification Process			
Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
			and flooding.
Tornado	YES	<ul style="list-style-type: none"> • Review of NY State Hazard Mitigation Plan • Review of NOAA NCDC Storm Events Database and National Severe Storms Laboratory (NSSL) web site • Review of FEMA’s Multi-Hazard Identification and Risk Assessment • Input from Core Planning Group 	<ul style="list-style-type: none"> • The state plan acknowledges that New York State has a definite vulnerability to tornadoes, with an average annual occurrence of 6 tornadoes per year since 1950. • Tornadoes are ranked as a moderate hazard in the planning area covering Dutchess County. • NCDC reports 11 tornado events in Dutchess County between August 1978 and June 2008. These events have resulted in no recorded deaths or injuries but have caused \$3.2 million in property damage. Of the 11 recorded events, six were of magnitude F1 (moderate damage) on the Fujita scale and the remainder were F0 (light damage). • NSSL tornado probability data indicate that while Dutchess County is in an area that experiences 0.2 to 0.4 tornado events per year, life-threatening and damaging tornado events remain a possibility.
Winter Storm	YES	<ul style="list-style-type: none"> • Review of NY State Hazard Mitigation Plan • Review of FEMA’s Multi-Hazard Identification and Risk Assessment • Review of NOAA NCDC Storm Events Database • New York State Climate Office web site • Input from Core Planning Group 	<ul style="list-style-type: none"> • Winter storms including heavy snow and ice storms are discussed in the state plan, which notes that Dutchess County averages approximately 42 inches of snowfall per year. The statewide average is 65 inches, with 60% of the state experiencing at least 70 inches annually. • The state plan ranks winter/ice storms as a moderate risk in the planning area covering Dutchess County. • The NY State plan ranks Dutchess County 10th out of 62 counties in the state for most threatened by snow and vulnerable to snow losses. The plan also ranks Dutchess County 34th out of 62 for most vulnerable to ice storms and ice storm losses. • NCDC reports that Dutchess County has been affected by 84 significant snow and ice events between January 1993 and February 2008. More than \$20 million in property damages are attributed to these events, including damages occurring outside Dutchess County. • NCDC mapping shows Dutchess County to be located in an area with an average of 12-19 hours of freezing rain per year. • According to FEMA, Dutchess County is

RISK ASSESSMENT: IDENTIFICATION OF POTENTIAL HAZARDS



Table 2.2 Documentation of the Hazard Identification Process			
Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
			<p>located in an area where snow depths of 50-75" have a 5% chance of being equaled or exceeded in any given year.</p> <ul style="list-style-type: none"> The website of the New York State Climate Office indicates that the eastern side of Dutchess County experiences higher annual snowfalls than the western side. FEMA records show that Dutchess County has been specifically included in two snow-related declared disasters in the last 30 years and one snow-related emergency declaration.
HYDROLOGIC HAZARDS			
Coastal Erosion	NO	<ul style="list-style-type: none"> Review of NY State Hazard Mitigation Plan Review of FEMA's Multi-Hazard Identification and Risk Assessment Input from Core Planning Group 	<ul style="list-style-type: none"> While coastal erosion is identified as a hazard and discussed in the NY State plan, it does not apply to Dutchess County since the county has no coastline.
Dam Failure	YES	<ul style="list-style-type: none"> Review of NY State Hazard Mitigation Plan Review of New York State Department of Environmental Conservation (NYSDEC) Bureau of Flood Protection and Dam Safety web site Review of U.S. Army Corps of Engineers National Inventory of Dams database (NID) Review of Stanford University's National Performance of Dams Program (NPDP) web site Review of FEMA's Multi-Hazard Identification and Risk Assessment Input from Core Planning Group 	<ul style="list-style-type: none"> Dam Failure is briefly discussed in the state plan as a potential cause of flooding. A study of the USACE NID and Stanford NPDP databases, in conjunction with NYSDEC data indicates that there are 56 dams with a designated hazard potential located within the nine jurisdictions participating in the Dutchess County Communities Regional Plan. Of these, 6 are designated "High" hazard potential, 13 are designated "Significant" hazard, and the remainder are "Low" hazard. According to USACE criteria, of the six "High" hazard potential dams, only one dam in the project area qualifies as a "Major" dam by virtue of having a dam height of more than 50 feet. None of the dams in the project area qualify as "Major" dams by the USACE storage criteria, since none have a normal storage volume of more than 5,000 acre-feet. The largest dam in the project area has a height of 19 feet and a normal storage volume of 4,854 acre-feet. All except two of the "High" hazard potential dams in the planning area have previously developed Emergency Action Plans which include inundation mapping. The NPDP database does not record any dam failure incidents in the planning area since detailed records began in 1868.

RISK ASSESSMENT: IDENTIFICATION OF POTENTIAL HAZARDS



**Table 2.2
Documentation of the Hazard Identification Process**

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Drought	YES	<ul style="list-style-type: none"> • Review of NY State Hazard Mitigation Plan • Review of FEMA’s Multi-Hazard Identification and Risk Assessment • Review of NOAA NCDC Database • Review of National Drought Mitigation Center /NOAA web sites • Input from Core Planning Group 	<ul style="list-style-type: none"> • Drought is discussed in the state plan, which describes two significant local droughts and one statewide drought event to have affected Dutchess County since 1993. • For the purposes of this plan the primary impacts of drought are assumed to fall on agriculture, which is assumed to be economically significant throughout the northern and eastern portions of Dutchess County. • NCDC reports that Dutchess County has been affected by nine drought events of since 1993. One of these events, in August 1993, is recorded as having caused \$50 million in crop damage across the entire southeastern area of New York State. • According to the Palmer Drought Severity Index (PDSI) Map for the USA, Dutchess County is located in an area that experienced drought conditions for 5-10% of the period 1895 to 1995.
Flood	YES	<ul style="list-style-type: none"> • Review of NY State Hazard Mitigation Plan • Review of NOAA NCDC Storm Events Database • Review of FEMA’s Multi-Hazard Identification and Risk Assessment • Review of FEMA’s NFIP Community Status Book and Community Rating System (CRS) • Review of FEMA Q3 flood data for the participating Dutchess County communities • Input from Core Planning Group 	<ul style="list-style-type: none"> • Flooding is described in the state plan as the primary natural hazard in the State of New York and is discussed in comprehensive detail. • One third of all Federal disaster declarations since 1998 covering Dutchess County have involved flooding. • Dutchess County has been affected by five flood-related Presidential disaster declarations since 1953, with one major flood disaster declaration covering areas including Dutchess County since 2004. • NCDC records 73 flood events affecting Dutchess County since June 1994. One fatality and almost \$14.5 million in property damage was attributed to these events. • According to data tabulated in the State Plan, based on FEMA’s Q3 flood mapping, 8% of Dutchess County and 2% of all residential properties lie within the identified 100-year floodplain. Dutchess County ranks as the 14th most threatened and vulnerable to flood loss out of the 62 counties in the state on this basis. • All nine jurisdictions covered by this plan participate in the NFIP but none participate in the CRS. According to data tabulated in the New York State Hazard Mitigation Plan Dutchess County ranks 15th out of 62 for the total number of NFIP policies and 11th for

RISK ASSESSMENT: IDENTIFICATION OF POTENTIAL HAZARDS



Table 2.2 Documentation of the Hazard Identification Process			
Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
			the total dollar amount of NFIP coverage. Dutchess County ranks 20 th in the state for the total number of NFIP claims since 1978, and 23 rd for the total dollar amount of claims paid.
Ice Jams	YES	<ul style="list-style-type: none"> • Review of NY State Hazard Mitigation Plan • Review of FEMA’s Multi-Hazard Identification and Risk Assessment • USACE Cold Regions Research & Engineering Laboratory Ice Jams Database • Input from Core Planning Group 	<ul style="list-style-type: none"> • Ice jams are mentioned as a significant cause of flooding in the state plan – New York State has experienced more ice jam events than any other U.S. state except Montana in the period 1867 through 2007. • The USACE CRREL Ice Jams database records one ice jam incident in total (in the Town of Amenia in January 1999) on all watercourses in the nine participating Dutchess County communities from 1875 to 2007.
Storm Surge	NO	<ul style="list-style-type: none"> • Review of NY State Hazard Mitigation Plan • Review of U.S. Army Corps of Engineers SLOSH model data • Review of FEMA’s Multi-Hazard Identification and Risk Assessment • Input from Core Planning Group 	<ul style="list-style-type: none"> • While storm surge is discussed in the state plan under flood hazard and hurricane/tropical storm hazard, storm surges are considered a coastal phenomenon and since Dutchess County is located more than 30 miles from the nearest coastline, they are not regarded as a hazard for the purposes of this plan.
Wave Action	NO	<ul style="list-style-type: none"> • Review of NY State Hazard Mitigation Plan • Review of FEMA’s Multi-Hazard Identification and Risk Assessment • Input from Core Planning Group 	<ul style="list-style-type: none"> • While waves are discussed in the state plan under flood hazard, damage-causing waves are considered a coastal phenomenon, and since Dutchess County is located more than 30 miles from the nearest coastline, they are not regarded as a hazard for the purposes of this plan.
GEOLOGIC HAZARDS			
Earthquake	YES	<ul style="list-style-type: none"> • Review of NY State Hazard Mitigation Plan • Review of USGS Earthquake Hazards Program web site • Review of New York City Area Consortium For Earthquake Loss Mitigation website • Review of FEMA’s Multi-Hazard Identification and Risk Assessment • Input from Core Planning Group 	<ul style="list-style-type: none"> • Earthquakes are discussed in the state plan, since earthquakes have occurred in and around the State of New York in the past. • The state plan ranks Dutchess County 15th out of 62 counties for potential annualized earthquake losses and 23rd out of 62 for potential annualized earthquake loss per capita. • According to USGS seismic hazard maps, the peak ground acceleration (PGA) with a 10% probability of exceedance in 50 years for the participating communities in Dutchess County is 3% of gravity. FEMA requires that earthquakes be further evaluated for mitigation purposes in areas

RISK ASSESSMENT: IDENTIFICATION OF POTENTIAL HAZARDS



Table 2.2 Documentation of the Hazard Identification Process			
Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
			<p>with a PGA of 3%g or more.</p> <ul style="list-style-type: none"> USGS records show two significant earthquakes affecting Dutchess County, where significant is defined as those that caused deaths and/or property damage, or that were experienced by populations in the epicentral area. One event occurred on 06/07/74 and a second event on 02/26/83 (both with Modified Mercalli Intensities of VI).
Expansive Soils	NO	<ul style="list-style-type: none"> Review of NY State Hazard Mitigation Plan Review of FEMA’s Multi-Hazard Identification and Risk Assessment US Department of Transport Federal Highway Administration (USDOT FHA) Geological Data Review of USDA Natural Resources Conservation Service (NRCS) Soil Websites Input from Core Planning Group 	<ul style="list-style-type: none"> Expansive soils are not identified as a hazard in the NY State plan. According to FEMA and USGS sources, Dutchess County is located in an area that mostly contains “little or no” clay swelling potential. According to USDOT FHA Report No. FHWA-RD-76-82, Dutchess County lies in an area mapped as non-expansive – the occurrence of expansive materials is extremely limited. New York State building codes are based on the International Building Code (2000, with 2001 supplement), in which Chapter 18 includes provisions for building on expansive soils (through design, removal or stabilization) so that new construction will be protected.
Landslide	NO	<ul style="list-style-type: none"> Review of NY State Hazard Mitigation Plan Review of USGS Landslide Incidence and Susceptibility Hazard Map Review of New York State Geological Survey (NYSGS) GIS database of historic landslides in New York Review of FEMA’s Multi-Hazard Identification and Risk Assessment Input from Core Planning Group 	<ul style="list-style-type: none"> Landslides are discussed in the NY state plan, which gives Dutchess County as a whole a weighted rank of 12th out of 62 counties in the state for susceptibility to landslides, and 23rd out of 62 for vulnerability to losses from landslides. However, this is predominantly due to mapped high risk areas along the Hudson River, outside of our planning area. USGS landslide hazard maps indicate that the Northern and Eastern Dutchess County Communities project area is identified as being of “Low landslide incidence” (less than 1.5% of the area is at risk). Using NYSGS data and mapping records, the State Plan reports no noteworthy landslide events in the Dutchess County Communities Regional Plan project area for a period of record beginning in 1963.

RISK ASSESSMENT: IDENTIFICATION OF POTENTIAL HAZARDS



Table 2.2 Documentation of the Hazard Identification Process			
Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Land Subsidence	NO	<ul style="list-style-type: none"> • Review of NY State Hazard Mitigation Plan • Review of FEMA’s Multi-Hazard Identification and Risk Assessment • Review of USGS Fact Sheet 165-00 Land Subsidence in the U.S. • Input from Core Planning Group 	<ul style="list-style-type: none"> • The state plan delineates certain areas that are susceptible to land subsidence hazards in New York. While mapping in the state plan indicates that much of the project area is underlain by carbonate karst rock such as limestone (in which there can be the potential for subsidence caused by sinkholes) no collapses that have resulted in structural damage have been recorded in the project area. • USGS-165-500 indicates that Dutchess County is located in an area where subsidence caused by compaction of aquifers or drainage of organic soils is not likely. • While there is some history of mining in Dutchess County, relatively little has been carried out underground and it is assumed that there is no significant risk of land subsidence due to mine collapse.
Tsunami	NO	<ul style="list-style-type: none"> • Review of NY State Hazard Mitigation Plan • Review of FEMA’s Multi-Hazard Identification and Risk Assessment • Input from Core Planning Group 	<ul style="list-style-type: none"> • Tsunamis are not discussed in the state plan. Since the southernmost border of Dutchess County is located more than 30 miles from the ocean, and no record exists of a catastrophic Atlantic basin tsunami impacting the mid-Atlantic coast of the United States, FEMA mitigation planning guidance suggests that locations in the eastern U.S. north of Virginia have a relatively low tsunami risk and need not conduct a tsunami risk assessment at this time.
Volcano	NO	<ul style="list-style-type: none"> • Review of NY State Hazard Mitigation Plan • Review of USGS Volcano Hazards Program web site • Input from Core Planning Group 	<ul style="list-style-type: none"> • No volcanoes are located within approximately 2,000 miles of Dutchess County.
OTHER HAZARDS			
Wildfire	YES	<ul style="list-style-type: none"> • Review of NY State Hazard Mitigation Plan • Review of NOAA NCDC Storm Events Database • Review of NYSEMO and NYSDEC web sites • Review of FEMA’s Multi-Hazard Identification and Risk Assessment • Input from Core Planning Group 	<ul style="list-style-type: none"> • While NYSEMO and NCDC records do not record any significant wildfire events in Dutchess County since January 1950, wildfires are discussed in the state plan as a hazard of concern, and wildfires are ranked as a moderate risk in the planning area covering Dutchess County. • According to available GIS data, almost two thirds of the project area is forested, and wildfire hazard risks are expected to increase as development along the

RISK ASSESSMENT: IDENTIFICATION OF POTENTIAL HAZARDS



Table 2.2 Documentation of the Hazard Identification Process			
Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
			urban/wildland interface increases.

Table 2.3 Summary Results of the Hazard Identification and Evaluation Process	
<p><u>ATMOSPHERIC</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Avalanche <input checked="" type="checkbox"/> Extreme Temperatures <input checked="" type="checkbox"/> Extreme Wind <input type="checkbox"/> Hailstorm <input checked="" type="checkbox"/> Hurricane and Tropical Storm <input checked="" type="checkbox"/> Lightning <input checked="" type="checkbox"/> Nor'easter <input checked="" type="checkbox"/> Tornado <input checked="" type="checkbox"/> Winter Storm <p><u>HYDROLOGIC</u></p> <ul style="list-style-type: none"> <input type="checkbox"/> Coastal Erosion <input checked="" type="checkbox"/> Dam Failure <input checked="" type="checkbox"/> Drought <input checked="" type="checkbox"/> Flood <input checked="" type="checkbox"/> Ice Jams <input type="checkbox"/> Storm Surge <input type="checkbox"/> Wave Action 	<p><u>GEOLOGIC</u></p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Earthquake <input type="checkbox"/> Expansive Soils <input type="checkbox"/> Landslide <input type="checkbox"/> Land Subsidence <input type="checkbox"/> Tsunami <input type="checkbox"/> Volcano <p><u>OTHER</u></p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Wildfire

= Hazard considered significant enough for further evaluation through the multi-jurisdictional hazard risk assessment.

SECTION 3a- RISK ASSESSMENT: HAZARD PROFILES**Overview**

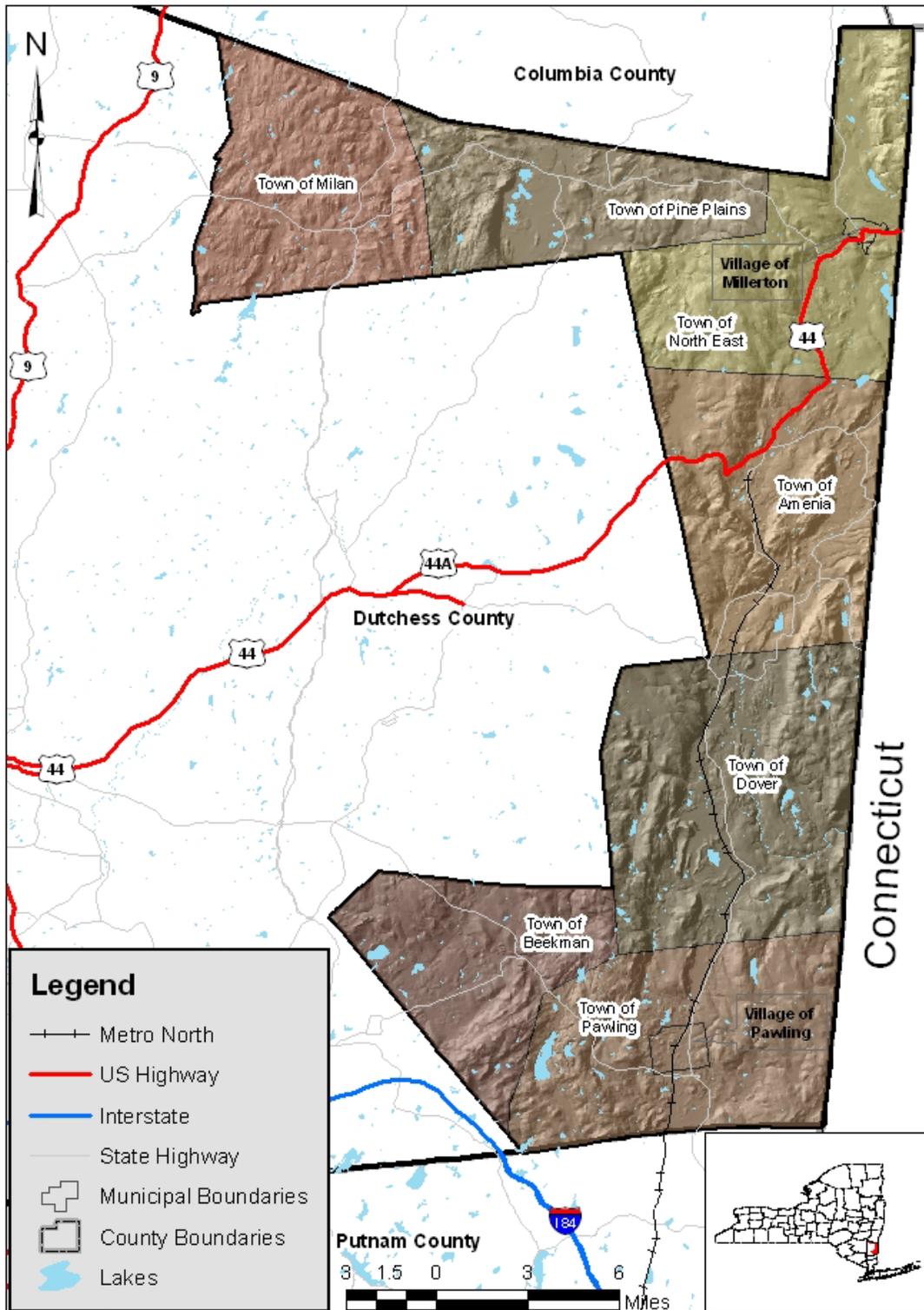
Detailed profiles of hazards identified in the previous section as worthy of further evaluation in the overall risk assessment are provided in this section. Each hazard profile includes a description of the hazard and its causes and impacts, the location and extent of areas subject to the hazard, known historical occurrences, and the probability of future occurrences. The profiles also include specific information noted by members of the planning committee and other stakeholders, including unique observations or relevant anecdotal information regarding individual historical hazard occurrences and individual jurisdictions.

The following table summarizes each hazard, and whether or not it has been identified as a hazard worthy of further evaluation for each of the nine participating jurisdictions. Following Table 3a.1, Figure 3a.1 presents a base map of the planning area for reference, including the most significant transport links and the location and boundaries of each participating jurisdiction.

Jurisdiction	Extreme Temperatures	Extreme Wind	Hurricane / Tropical Storm	Lightning	Nor'easter	Tornado	Winter Storm	Dam Failure*	Drought	Flood	Ice Jams	Earthquake	Wildfire
Amenia, Town of	■	■	■	■	■	■	■	■	■	■	■	■	■
Beekman, Town of	■	■	■	■	■	■	■	■	■	■	■	■	■
Dover, Town of	■	■	■	■	■	■	■		■	■	■	■	■
Milan, Town of	■	■	■	■	■	■	■		■	■	■	■	■
Millerton, Village of	■	■	■	■	■	■	■		■	■	■	■	■
North East, Town of	■	■	■	■	■	■	■		■	■	■	■	■
Pawling, Town of	■	■	■	■	■	■	■	■	■	■	■	■	■
Pawling, Village of	■	■	■	■	■	■	■		■	■	■	■	■
Pine Plains, Town of	■	■	■	■	■	■	■		■	■	■	■	■

*Dam Failure Exposure: based on available inundation mapping for “High Hazard” dams only (see later Dam Failure Hazard Profile Section).

Figure 3a.1: NEDCCR Base Map



Source: US Census Borough, Putnam, Dutchess, and Columbia counties area hydrography, 2007; Real Property Tax Service Agency, Municipal Boundaries - Towns, Cities, Villages, 2008; ESRI, US Counties, 2005; ESRI, NY Major Roads, 2007; USGS DEMs, NY State; US Census Borough, Railroads, NY State, 2001

Extreme Temperatures

Extreme temperatures principally affect the health and safety of the human population, although they can also impact livestock, agricultural crops, and may also cause damage to infrastructure and property. This section provides detailed profiles of both extreme high and extreme low temperatures.

Description – Extreme Temperatures

Extreme Cold

According to National Oceanic and Atmospheric Administration’s (NOAA) National Weather Service (NWS), the term “extreme cold” constitutes different conditions in different parts of the country, ranging from near freezing in the South to temperatures well below zero in the North.

In the South, temperatures near or just below freezing can cause pipes to burst in homes that are poorly insulated or without heat. In the North, where most buildings are insulated to a degree that can protect against most common winter temperatures for the area, long spells of below zero temperatures can result in increased numbers of people using space heaters and fireplaces to stay warm, thus increasing the risk of household fires and carbon monoxide poisoning. In addition, extreme cold can cause rivers to freeze, and ice jams to form, leading to flooding. Regardless of location, freezing temperatures can cause severe damage to crops and other vegetation; increased strain on community shelter facilities providing refuge from the cold to homeless populations and others in need; and an increased likelihood that automobiles/buses will fail to start. Local sources also report that fire departments are called to a noticeably higher number of chimney fires during periods of extreme cold.

Extreme cold can have severe negative impacts on human beings, including frostbite (an injury to the body that is caused by freezing) and hypothermia (the unintentional lowering of the body’s core temperature to below 95 degrees Fahrenheit, which typically causes uncontrollable shivering, memory loss, disorientation, incoherence, slurred speech, drowsiness, and apparent exhaustion). The NWS reports that extreme cold causes the death of roughly 26 people per year nationwide (based on a 10-year average). High winds during a period of extreme cold can exacerbate these affects, as the winds work to carry heat away from the body.

According to the New York State Climate Office, extreme cold events in New York State occur regularly, and are most common between October and March. They are most likely to occur in the northern and western portions of the state, and occur less often as one travels south toward New York City and Long Island. The record coldest temperature in New York State is -52° at Stillwater Reservoir (northern Herkimer County) on February 9, 1934 and also at Old Forge (also northern Herkimer County) on February 18, 1979. Some 30 communities have recorded temperatures of -40° or colder, most of them occurring in the northern one-half of the state and the remainder in the Western Plateau Division and in localities just south of the Mohawk Valley.

Extreme Heat

FEMA defines the term “extreme heat” as the condition whereby temperatures hover ten degrees or more above the average high temperature for a region, and last for several weeks. Extreme heat can also contribute to increased demand on energy supplies resulting from increased air conditioning usage, and an associated increased potential for power shortages or outages; and increased demand on medical offices, hospitals, etc. as individuals suffering from various heat related health effects seek medical attention or shelter in air conditioned facilities.

The National Oceanic and Atmospheric Administration's (NOAA) National Weather Service (NWS) has reported that heat waves occur during most summers in at least some part(s) of North America. East of the Rocky Mountains, high temperatures are often combined with high humidity. Highest temperatures of record and average relative humidity would be sufficient to cause heat-related health effects in all states. Health effects associated with extreme heat can begin with air temperatures as low as 80 degrees Fahrenheit and concurrent relative humidity of at least 40 percent.

Extreme heat can have severe negative impacts on human beings, including heat-related illnesses such as sunburn, fatigue, and heat cramps, heat exhaustion, and heat strokes. The NWS reports that heat waves cause the death of roughly 175 people per year nationwide. High humidity levels during a period of extreme heat can exacerbate these affects. Similarly, periods of extreme heat in urban areas can also result in magnified impacts on human health. This is primarily due to the combined affects of pollutant concentrations, high temperatures/humidity, and poor air circulation.

According to the New York State Climate Office, extreme heat events in New York State occur regularly, and are most common between May and mid-September. They are least likely to occur in the northern and western portions of the state, and occur more often as one travels south toward New York City and Long Island. The New York City area and most of the Hudson Valley record an average of from 18 to 25 days with such temperatures during the warm season, but in the Northern and Southern Plateaus the normal quota does not exceed 2 or 3 days. While temperatures of 100° are rare, many long-term weather stations, especially in the southern one-half of the State, have recorded maximums in the 100° to 105° range on one or more occasions. The highest temperature of record in New York State is 108° at Troy on July 22, 1926. Temperatures of 107° have been observed at Lewiston, Elmira, Poughkeepsie, and New York City.

Location and Extent – Extreme Temperatures

Dutchess County is located in a region of the country that is susceptible to extreme heat and extreme cold. During periods of extreme temperature conditions the effects will be felt over widespread geographic areas, and it is generally assumed that all of the participating municipalities are uniformly exposed to extreme heat and extreme cold. The effects of extreme temperatures will be primarily limited to the elderly and homeless populations, with occasionally minor, sporadic property damages (i.e., bursting pipes) and damages to crops and other vegetation.

Historical Occurrence – Extreme Temperatures

Extreme Cold

NOAA's National Climatic Data Center (NCDC) records details for extreme temperature events in Dutchess County from February 1993 onwards. Between February 1993 and June 2008 there were a total of 56 extreme cold events in New York State (or an average of about 3.5 extreme cold events per year), to which 13 deaths and more than \$500,000 in property damages were attributed. Of these, seven were located in Dutchess County, resulting in \$50,000 in property damages. All but two of these events occurred between October and March, the time of year when extreme cold events are most common in the area. The two outstanding events occurred only days apart in late April and early May of 2002, where temperatures fell to or below 32 degrees across portions of Ulster and Dutchess Counties where the growing season had already started. Despite the freeze, no crop or plant damages were reported to the National Weather Service.

New York State has received no Federal Disaster or Emergency Declarations due solely to extreme temperatures.

Some recent notable extreme cold events as reported by the NCDC include:

April 27, 2002

A cold high pressure system settled into the Mid Hudson Valley during the overnight hours of April 26-27. Under a mostly clear sky, and light wind, temperatures fell to or below 32 degrees across portions of Dutchess and Ulster Counties where the growing season had already started. No damage has been reported to the National Weather Service with this freeze.

January 15, 2004

A period of gusty north to northwest winds in the 15 to 30 mph range, with higher gusts. This wind, combined with ambient temperatures ranging from zero to 15 below zero, resulted in dangerous wind chills across eastern New York during the night of January 15 through the morning of the 16th. Equivalent wind chill readings ranged from 25 to 30 below zero in the Mid Hudson Valley, to as low as 50 below zero across the Western Adirondacks. The brutal cold spell resulted in many closed schools and businesses on the 16th. The cold also resulted in a scattering of frozen and broken water pipes.

January 25-26, 2007

An arctic airmass moved into east central New York State late Thursday night on January 25th, and remained in place into Friday, January 26th. Early morning low temperatures on Friday ranged between zero and ten degrees below zero, with some temperatures as low as 15 degrees below zero across higher elevations of the Adirondacks. In addition, northwest winds of 10 to 15 mph produced wind chills as low as 25 to 30 degrees below zero early Friday morning, especially across higher elevations.

Extreme Heat

According to NOAA's National Climatic Data Center (NCDC), there were a total of 38 extreme or unseasonal heat events in New York State between February 1993 and June 2008 (or an average of about 2.5 extreme heat events per year), to which 86 deaths and 51 injuries were attributed. Of these events, ten were located in Dutchess County. Of the ten located in Dutchess County, seven were unseasonably warm temperatures occurring during the winter months between October and March. No deaths, injuries, property or crop damages were reported.

Some recent notable extreme heat events affecting Dutchess County as reported by the NCDC include:

July 15, 1995

High pressure over the Mid-Atlantic states produced a southerly flow of hot and humid air across the Northeast. Poughkeepsie established a new record high for the date when the temperature reached 106 degrees. Binghamton reached 96 degrees which tied the previous record high set in 1983.

July 4-6, 1999

An intense Bermuda high pumped heat along with very high humidity across eastern New York, especially on July 5 and 6. Temperatures soared to 90 or higher most everywhere while dewpoints climbed well into the 70s. At the Albany International airport, the temperature peaked

at 94 on July 5 and 95 on July 6. However, after combining humidity values, the heat index reached as high as 105 on both days. At the Dutchess County airport near Poughkeepsie, the temperature crested at 99 degrees both days. On July 5, the dewpoint reached 79 to produce a heat index of 119 degrees! The heat index peaked around 110 degrees on July 6. The sultry air mass set the stage for a large severe thunderstorm outbreak during the afternoon of July 6 across eastern New York.

August 8-9, 2001

A strong Bermuda high developed early in August and brought the most extensive heat wave of the summer to eastern New York and adjacent New England between August 6 and 9. Officially, at the Albany International Airport, there were four consecutive days of 90 degrees or higher, the longest such stretch in over 6 years. The heat wave reached its peak on August 8 and 9. During those days, the high reached 100 and 102 at Poughkeepsie respectively. On those same days the Albany International Airport reached 93 and 96. The 96 was a new daily maximum record for August 9, eclipsing the old record of 94 set in 1949. Humidity levels were also high, which produced heat indices between 105 and 110 near Albany, and 110 to 115 closer to Poughkeepsie. The high heat indices did cause some heat related problems. St. Clare's Hospital in Schenectady reported 9 cases of heat-related symptoms. The victims were all children campers at the Pattersonville Camp also in Schenectady County. Four more campers were treated at the campsite. While there no other heat related problems reported to the National Weather Service, the heat led to record state electricity consumption, three days in a row! Governor Pataki closed down the State government at 2:00 PM on August 9 to conserve power. Hot weather also caused the railroad bridge to malfunction between the cities of Albany and Rensselaer, resulting in delays for four of Amtrak's passenger trains on August 9.

Probability of Occurrence – Extreme Temperatures

Extreme temperature events will remain a very frequent occurrence in the planning area, and the probability of future occurrences is certain (somewhat higher for extreme heat than extreme cold).

Based on historical records over the last 16 years, in New York State, extreme temperature events can be expected to occur approximately 6 times per year, with extreme cold events more likely to occur than extreme heat events (extreme cold events can be expected to occur approximately 3.5 times per year while extreme heat events can be expected approximately 2.5 times per year). This trend continues in the Dutchess County community planning area, where extreme temperature events can be expected to occur approximately 1.1 times per year, with extreme heat events more likely to occur than extreme cold events (extreme heat events can be expected to occur approximately 0.7 times per year while extreme cold events can be expected approximately 0.5 times per year).

While the impact of such occurrences on people and property is typically minimal, it is anticipated that the threat to human lives and safety is increasing due to relatively high percentages of elderly populations in many of the planning area's municipal jurisdictions (ranging from a minimum of 6.6 percent in the Town of Milan to a maximum of 22.2 percent in the Village of Pawling, with an average of 13.6 percent).

Extreme Wind

Description – Extreme Wind

Wind, as defined by the American Meteorological Society, is air that is in constant motion relative to the surface of the earth. Since vertical components of atmospheric motion are relatively small, especially near the surface of the earth, meteorologists use the term “wind” to denote almost exclusively the horizontal component. Extreme winds are most commonly the result of tornadoes, hurricanes, tropical cyclones, extratropical cyclones (northeasters), destructive wind, and thunderstorms, but can also occur in their absence as mere “windstorms”.

Extreme wind events might occur over large, widespread areas or in a very limited, localized area. They can occur suddenly without warning. They can occur at any time of the day or night, at any location within Dutchess County. Extreme winds pose a significant threat to lives, property, and vital utilities due to flying debris, such as rocks, lumber, fuel drums, sheet metal and loose gear of any type that can be picked up by the wind and hurled with great force. Extreme winds also bring down trees and power lines, often resulting in power outages across the affected area.

(1) Tornadoes: Tornadoes are the most commonly known type of windstorm causing the most damage to property and life and all is due to severe winds. As researched by FEMA, there are, on average, 10 severe windstorms, classified as tornadoes, in the United States defined as F4 or F5 on the Fujita scale. (The Fujita scale reflects how much wind damage results from a tornado expressed in wind speeds. For example, wind speeds can vary between 50 and 250 mph in a typical F5 tornado.)

(2) Hurricanes: A hurricane is a tropical storm with winds that have reached a constant speed of 74 mph or more. Hurricane winds blow in a large spiral around a relative calm center known as the "eye." The "eye" is generally 20 to 30 miles wide.

(3) Coastal Storms: Coastal storms include both tropical cyclones and extratropical cyclones. The National Weather Service defines these terms as follows:

- Cyclone: An area of low pressure around which winds blow counterclockwise in the Northern Hemisphere. Also the term used for a hurricane in the Indian Ocean and in the Western Pacific Ocean.
- Tropical Cyclone: A cyclone that forms over tropical or sub-tropical waters around centers of low barometric pressure. Tropical cyclones derive their energy from the ocean. Tropical cyclones can be further broken down according to maximum sustained winds, as follows:

Tropical Depression:	Winds < 39mph
Tropical Storm:	39 mph ≤ Winds < 74 mph
Hurricane: *	Winds ≥ 74 mph

** Note that “hurricanes” are tropical cyclones that develop over the Atlantic Ocean, northeast Pacific Ocean, or south Pacific Ocean. Similar storms that develop over the western North Pacific Basin are referred to as “typhoons” (or, if maximum sustained winds are at least 150 mph, “super typhoons”).*

- **Extratropical Cyclone:** A non-tropical cyclone that forms around a center of low barometric pressure and derives its energy from the atmosphere. Extratropical cyclones are more commonly referred to as “winter storms.” Extratropical storms can be experienced on both the East and West Coasts of the United States. On the East Coast, extratropical cyclones are often called “Nor’easters” due to the direction of the storm winds.
- (4) **Destructive Wind:** Destructive wind is a windstorm that poses a significant threat to life and property and destroying everything in its path. Destructive wind can also cause damage by flying debris, such as rocks, lumber, fuel drums, sheet metal and loose gear of any type which can be picked up by the wind and hurled with great force.
- (5) **Thunderstorms:** A thunderstorm is a combination of moisture, rapidly rising warm air and forceful winds capable of lifting air that’s either warm or cold. They also contain lightning and thunder.

Location – Extreme Winds

Extreme wind events are experienced in every region of the United States. A useful tool for determining the location of the extreme wind hazard area in a jurisdiction is depicted in Figure 3a.2 - Wind Zones in the United States. This map of design wind speeds was developed by the American Society of Civil Engineers. It divides the United States into four wind zones, geographically representing frequency and magnitude of potential extreme wind events. The figure shows that a single wind zone covers all jurisdictions within Dutchess County; Zone II – Hurricane Susceptible, with a design wind speed for shelters of 160 miles per hour.

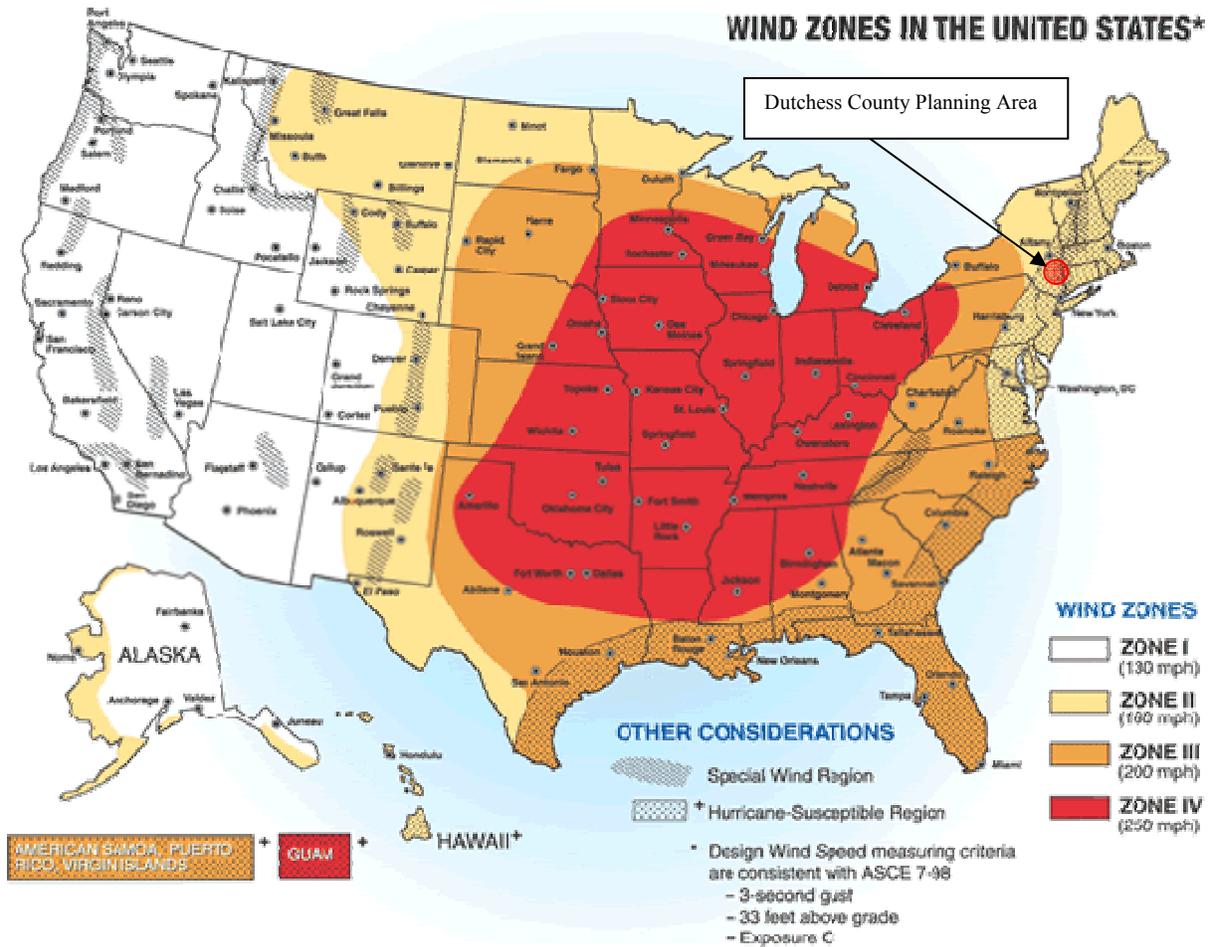


Figure 3a.2 - Wind Zones in the United States

Extent – Extreme Winds

The severity of a severe wind event depends upon the maximum sustained winds experienced in any given area. Extreme winds pose a significant threat to lives, property and infrastructure due to direct wind forces but also flying debris, such as rocks, lumber, fuel drums, sheet metal and loose gear of any type that can be picked up by the wind and hurled with great force. Extreme winds also down trees and power lines that often result in power outages across an affected area. Table 3a.2 illustrates the severity and typical effects of various wind speeds, as obtained from the NOAA NCDC web site.

Table 3a.2
Severity and Typical Effects of Various Speed Winds

Maximum Wind Speeds	Equivalent Saffir-Simpson Scale* (Hurricanes)	Equivalent Fujita Scale (Tornadoes)	Severity	Typical Effects
40-72 mph (35-62 kt)	Tropical Storm = 39-73 mph	F0	Minimal	Some damage to chimneys; breaks twigs and branches off trees; pushes over shallow-rooted trees; damages signboards; some windows broken; hurricane wind speed begins at 73 mph.
73-112 mph (63-97 kt)	Cat 1 = 74-95mph Cat 2 = 96-110 mph Cat 3 = 111-130 mph	F1	Moderate	Peels surfaces off roofs; mobile homes pushed off foundations or overturned; outbuildings demolished; moving autos pushed off the roads; trees snapped or broken.
113-157 mph (98-136 kt)	Cat 3 = 111-130 mph Cat 4 = 131-155 mph Cat 5 > 155 mph	F2	Considerable	Roofs torn off frame houses; mobile homes demolished; frame houses with weak foundations lifted and moved; boxcars pushed over; large trees snapped or uprooted; light-object missiles generated.
158-206 mph (137-179 kt)	Cat 5 > 155 mph	F3	Severe	Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forests uprooted; heavy cars lifted off the ground and thrown; weak pavement blown off roads.
207-260 mph (180-226 kt)	? Cat 5 > 155 mph	F4	Devastating	Well constructed homes leveled; structures with weak foundations blown off some distance; cars thrown and disintegrated; large missiles generated; trees in forest uprooted and carried some distance away. The maximum wind speeds of hurricanes are not likely to reach this level.
261-318 mph (227-276 kt)	N/A	F5	Incredible	Strong frame houses lifted off foundations and carried considerable distance to disintegrate; automobile-sized missiles fly through the air in excess of 300 ft (100 m); trees debarked; incredible phenomena will occur. The maximum wind speeds of hurricanes are not expected to reach this level.
Greater than 319 mph (277 kt)	N/A	F6	N/A	The maximum wind speeds of tornadoes are not expected to reach this level. The maximum wind speeds of hurricanes are not expected to reach this level.

* The Saffir-Simpson Scale is a five-category wind speed / storm surge classification scale used to classify Atlantic hurricane intensities. The Saffir-Simpson values range from Category 1 to Category 5. The strongest SUSTAINED hurricane wind speeds correspond to a strong F3 (Severe Tornado) or possibly a weak F4 (Devastating Tornado) value. Whereas the highest wind gusts in Category 5 hurricanes correspond to moderate F4 tornado values, F5 tornado wind speeds are not reached in hurricanes.

Previous Occurrences – Extreme Winds

Our planning area has experienced numerous types of damaging extreme wind events in the past including severe thunderstorms, tornadoes, hurricanes, tropical storms and nor'easters.

According to NOAA's NCDC, 85 recorded high wind events have affected Dutchess County between January 1950 and October 2008 (data includes wind events greater than 50 knots, with the exception of tornado events which are addressed separately within this section). These incidents resulted in a reported total of one injury and caused an estimated \$1.53 million in property damages. Some recent notable events in our planning area include the following:

September 11, 2002

A high wind event occurred across portions of eastern New York including the Counties of Dutchess, Greene, Rensselaer, Ulster, Warren and Columbia. The Town of Pine Plains was particularly hard hit, with several large trees and power lines down.

July 27, 2005

Severe thunderstorms formed late in the afternoon from the mid Hudson Valley northward across Columbia and Rensselaer counties. Dutchess County damages including downed trees in Pawling.

January 18, 2006

On January 18, county government officials had numerous reports of high winds bringing down trees and power lines across eastern Dutchess County.

August 1 and 3, 2006

On August 1st, fire and rescue personnel reported trees and wires were blown down onto Depot Road in Amenia. On August 3rd, law enforcement personnel reported that trees were down throughout Beacon due to severe thunderstorms with damaging wind gusts.

October 28-29, 2006

Passage of a low pressure system produced strong winds with some gusts locally reaching or slightly exceeding 60 mph, particularly across the higher elevations, and within channeled valley locations.

July 6, 2007

Scattered strong to severe thunderstorms across the region, beginning around midday, and persisting through the late afternoon hours. Wires were reported down due to strong thunderstorm winds in Pine Plains.

July 19, 2007

Isolated strong to severe thunderstorms developed over the lower mid Hudson Valley into western New England. Trees and wires were reported down in Beekman due to strong thunderstorm winds, on Gardiner Hollow Road and Beekman Road. Trees and wires were also reported down on Sprague Road and Furlong Road in Wingdale.

Probability of Occurrence – Extreme Winds

Extreme wind events will remain a very frequent occurrence in Dutchess County overall, including the planning area, and the probability of future occurrences is certain. The entire planning area is susceptible to a wide variety of recurring events that cause extreme wind conditions including severe thunderstorms (most frequent), tornadoes, hurricanes, tropical storms and nor'easters.

Table 3a.3 illustrates a summary of wind-related events in both New York and Dutchess County based on historic occurrences reported in NOAA's NCDC Storm Events Database during the 58 year period of record from 1950 to 2008, and provides an associated average annual number of storms. It shows an average annual number of high wind events in Dutchess County of 1.5 based on historical occurrences, which is slightly lower than the NOAA National Severe Storms Laboratory's estimate of the mean number of days per year with one or more severe wind events in the Dutchess County area of between 4 and 5. Table 3a.3 does not include hurricanes, tropical storms, tornadoes or extratropical storms.

Table 3a.3
Average Annual Number of Wind Events (Statewide vs. Dutchess County)
High Wind Speeds > 57.5 miles per hour
 (Source: NOAA's NCDC Storm Events Database
 for the period January 1950 – October 2008)

Event Type	Total Number of Events in New York State	Total Number of Events in Dutchess County	Average Annual Number of Events in New York State	Average Annual Number of Events in Dutchess County
Thunderstorm and High Wind Events	3,472	85	59.86	1.47

Extreme winds are a probabilistic natural phenomenon: it is impossible to predict in what years windstorms will occur or how severe the winds will be. Wind hazards are often expressed in terms of wind frequencies or recurrence intervals, such as a 10-year wind or a 100-year wind. A “100-year wind” means that there is a 1 percent chance in any given year of a wind at the 100-year or higher wind speed. A 10-year wind means that there is a 10 percent chance in any given year of a wind at the 10-year or higher wind speed. Wind recurrence intervals don’t mean that windstorms occur exactly at these intervals; rather, they express probabilities of winds. Thus, a given location may experience two 100-year windstorms in a short time period or go several decades without experiencing a 10-year windstorm.

Extreme winds can occur during tornadoes, hurricanes, tropical cyclones, extratropical cyclones (northeasters), destructive wind, and thunderstorms, but can also occur in their absence as mere “windstorms.” Extreme winds have a history of occurrence throughout Dutchess County, and are certain to occur in the future.

The degree of wind hazard risk at a particular site is characterized by the wind speeds expected at the site with recurrence intervals of 10-, 25-, 50-, 100-, and 2000- years. The FEMA Benefit-Cost Module for Wind Hazard Risk (Version 1.0, 01/20/95) provides wind speed data for various return periods at a series of mileposts located along US Gulf and Atlantic coastlines. The data is provided for locations at the coast and for locations 200 km (approximately 125 miles) inland. For the purposes of estimating wind data applicable for Dutchess County, milepost 2550 was assumed to most closely resemble conditions in Dutchess County. This milepost is located midway between milepost 2500 (located on the New Jersey shore) and milepost 2600 (located on the east end of Long Island). Table 3a.4 illustrates wind speed data for Dutchess County and the surrounding area. The FEMA Hurricane Benefit Cost Analysis module was then used to obtain wind speeds at distances between 70 miles inland (southern Dutchess County) to 105 miles inland (northern Dutchess County).

Table 3a.4
Wind Speed Probabilities for Dutchess County and Surrounding Area
 (Milepost 2550, as per FEMA B-C Module – Wind, Version 1.0, January 20, 1995)

Recurrence Interval	Annual Probability of Occurrence (%)	Wind Speed At the Coast – New York City approx. (mph)	Wind Speed At 70 Miles Inland - Southern Dutchess County (mph)	Wind Speed At 80 Miles Inland (mph)	Wind Speed At 90 Miles Inland (mph)	Wind Speed At 100 Miles Inland (mph)	Wind Speed At 105 Miles Inland – Northern Dutchess County (mph)
10	10	51	40	39	37	36	35
25	4	77	68	67	65	64	64
50	2	92	83	82	80	79	79
100	1	101	95	94	93	92	92
2000	0.05	138	134	133	132	132	131

Importing this data into FEMA’s Hurricane Benefit Cost Analysis module allows the user to generate the estimated annual number of wind events that reach various strengths. These estimates are calculated from the wind recurrence interval data, wind speed data, and the number of miles inland the site is from the nearest milepost. “Expected annual number” of windstorms does not mean that this number of windstorms occurs every year, but rather “expected” indicates the long-term statistical average number of windstorms per year. Table 3a.5 illustrates the expected annual number of wind events of various magnitudes at various distances from the coast for Dutchess County and surrounding areas, while Table 3a.6 illustrates the associated annual probability of occurrence.

Table 3a.5 Expected Annual Number of Wind Events of Various Magnitudes At Various Distances from the Coast For Dutchess County and Surrounding Areas <i>(Milepost 2550, as per FEMA B-C Module – Wind, Version 1.0, January 20, 1995)</i>						
Storm Class (Saffir-Simpson Scale)	Wind Speed (mph)	Expected Annual Number of Wind Events				
		Wind Speed At 70 Miles Inland - Southern Dutchess County (mph)	Wind Speed At 80 Miles Inland (mph)	Wind Speed At 90 Miles Inland (mph)	Wind Speed At 100 Miles Inland (mph)	Wind Speed At 105 Miles Inland – Northern Dutchess County (mph)
0	60-73	0.0200	0.0198	0.0196	0.0195	0.0194
1	74-95	0.0209	0.0198	0.0188	0.0179	0.0175
2	96-110	0.0065	0.0059	0.0055	0.0050	0.0048
3	111-130	0.0019	0.0018	0.0017	0.0016	0.0015
4	131-155	0.0005	0.0004	0.0004	0.0004	0.0004
5	>155	0.0001	0.0001	0.0001	0.0001	0.0001

Table 3a.6 Annual Probability of Wind Events of Various Magnitudes At Various Distances from the Coast For Dutchess County and Surrounding Areas <i>(Milepost 2550, as per FEMA B-C Module – Wind, Version 1.0, January 20, 1995)</i>						
Storm Class (Saffir-Simpson Scale)	Wind Speed (mph)	Annual Probability of Wind Events				
		Wind Speed At 70 Miles Inland - Southern Dutchess County (mph)	Wind Speed At 80 Miles Inland (mph)	Wind Speed At 90 Miles Inland (mph)	Wind Speed At 100 Miles Inland (mph)	Wind Speed At 105 Miles Inland – Northern Dutchess County (mph)
0	60-73	2.00%	1.98%	1.96%	1.95%	1.94%
1	74-95	2.09%	1.98%	1.88%	1.79%	1.75%
2	96-110	0.65%	0.59%	0.55%	0.50%	0.48%
3	111-130	0.19%	0.18%	0.17%	0.16%	0.15%
4	131-155	0.05%	0.04%	0.04%	0.04%	0.04%
5	>155	0.01%	0.01%	0.01%	0.01%	0.01%

Hurricanes and Tropical Storms

Hazards Associated with Hurricane and Tropical Storm Events

Hurricanes and tropical storms are particular types of *events*. The *hazards* associated with a hurricane or tropical storm event are: high winds, flooding (including storm surge), coastal erosion, and wave action. Each of the unique hazards associated with hurricane and tropical storm events are summarized briefly below, and addressed specifically elsewhere in the plan. Hurricane and tropical storm events are discussed in the remainder of this section.

- Winds. After making landfall, hurricane winds can remain at or above hurricane force well inland (sometimes more than 100 miles). In addition, hurricanes can also spawn tornadoes. Typically, the more intense a hurricane is, the greater the tornado threats. High winds are addressed separately in this document.
- Flooding. Upon making landfall, a hurricane rainfall can be as high as 20 inches or more in a 24-hour period, with amounts in the 10 to 15 inch range being most common. If the storm is large and moving slowly, the rainfall amounts can be much higher. Heaviest rainfall tends to be along the coastline, but sometimes there is a secondary maximum further inland. Following a hurricane, inland streams and rivers can flood and trigger landslides. Flooding can also be caused when drainage system capacities are exceeded. Flooding is addressed separately in this document.
- Storm Surge. Even more dangerous than the high winds of a hurricane is the storm surge, a dome of ocean water that is basically pushed ashore by the hurricane winds. Hurricane storm surge can be as much as 20 feet at its peak and 50 to 100 miles wide, depending on hurricane strength and depth of offshore waters. Generally, the stronger the hurricane and the shallower the offshore water depths, the higher the storm surge. Most hurricane fatalities and coastal damages are attributable to storm surge, as opposed to hurricane winds. Storm surge can cause the most damage when it occurs during high tides. Storm surge can come ashore as much as five hours in advance of the time that a hurricane makes landfall. While the Hudson River is tidal along the western boundary of Dutchess County, there is no shoreline in the planning area, and storm surge is not identified as a significant hazard for the purposes of this plan.
- Coastal Erosion. The currents created by the tide and storm surge, combined with wave action, can severely erode coastlines. Many buildings withstand hurricane force winds until their foundations, undermined by erosion, are weakened and fail. Since there are no shorelines in the planning area coastal erosion is not a significant hazard for the purposes of this plan.
- Wave Action. Hurricanes and tropical storms are also associated with significant wave action, which can damage not only buildings but infrastructure and protective features along ocean shorelines. There are no ocean shorelines in Dutchess County, and wave action is not a hazard.

Description – Hurricanes and Tropical Storms

A **hurricane** is a severe tropical cyclone with winds that have reached a constant speed of 74 miles per hour or more. Hurricane winds blow in a large spiral around a relative calm center known as the "eye." The "eye" is generally 20 to 30 miles wide, and the system can extend outward from the eye by up to 400 miles. In the Northern Hemisphere, circulation is in a counterclockwise motion around the eye. These storms are usually short in duration but are extremely powerful and cause the greater amount of damage due to significant storm surges and high winds. If these systems have wind speeds of between 39 and 73 miles per hour, they are classified as **tropical storms**.

In the Atlantic basin, hurricanes and tropical storms are most likely to occur between June 1st and November 30th, with the peak number of events typically occurring between mid-August and late October.

Location – Hurricanes and Tropical Storms

No one jurisdiction within our planning area is any more likely to have the path of such a system traverse within its borders than any other location. Because of the size of hurricane and tropical storm systems, areas within Dutchess County can still be affected even when the eye makes landfall outside of Dutchess County. The hazards associated with hurricane and tropical storm events have distinct hazard area locations, discussed in other sections of this report. For Dutchess County, these include wind and flood hazards.

Extent – Hurricanes and Tropical Storms

The magnitude or severity of hurricanes is categorized by the Saffir-Simpson scale. The Saffir-Simpson Scale is a five-category wind speed / storm surge classification scale used to classify Atlantic hurricane intensities. The scale is used to give an estimate of the potential property damage and flooding that can be expected. The Saffir-Simpson values range from Category 1 to Category 5, as shown in Table 3a.7. Wind speed is the determining factor in the scale, as storm surge values are highly dependent on the slope of the continental shelf in the landfall region.

Note that, for tropical storms (not represented on the scale), winds are between 39 and 73 miles per hour and typical effects include breakage of twigs and branches off trees, toppling of shallow-rooted trees, and some damage to signboards and windows.

Category	Wind Speed (miles per hour)	Storm Surge (feet above normal sea level)	Expected Damage	Photo Example
1	74-96 mph	4-5 ft	<u>Minimal</u> : Damage is done primarily to shrubbery and trees, unanchored mobile homes are damaged, some signs are damaged, no real damage is done to structures	
2	96-110 mph	6-8 ft	<u>Moderate</u> : Some trees are toppled, some roof coverings are damaged, and major damage is done to mobile homes.	
3	111-130 mph	9-12 ft	<u>Extensive</u> : Large trees are toppled, some structural damage is done to roofs, mobile homes are destroyed, and structural damage is done to small homes and utility buildings.	
4	131-155 mph	13-18 ft	<u>Extreme</u> : Extensive damage is done to roofs, windows, and doors; roof systems on small buildings completely fail; some curtain walls fail.	
5	Greater than 155 mph	Greater than 18 ft	<u>Catastrophic</u> : Roof damage is considerable and widespread, window and door damage is severe, there are extensive glass failures, and entire buildings could fail.	

* Source: FEMA's How-To #2, page 2-23

The magnitude or severity of hurricane and tropical storm events will increase under the following conditions:

- as the storm category increases;
- as the diameter of the storm system increases;
- as the system’s forward speed decreases;
- as rainfall amounts increase;
- as the quantity of people, structures and infrastructure in the affected areas increases.

For the sake of clarity, we will also point out that, for communities with mapped erosion, surge, or wave action zones, the magnitude or severity will also increase with increasing degree of erosion, surge and/or wave action. However, there are no mapped erosion, surge or wave action hazard areas in Dutchess County.

Previous Occurrences – Hurricane and Tropical Storm Events

Hurricanes and tropical storms have impacted Dutchess County and its participating jurisdictions in the past, and will continue to do so in the future.

Dutchess County has an active history of hurricanes and tropical storms. According to NOAA historical records, 15 hurricane or tropical storm tracks have passed within 65 miles of Dutchess County since 1900. This includes three Category 2 hurricanes; one Category 1 hurricane; and 11 tropical storms. Of those 15 recorded storm events, one traversed directly through the planning area (Tropical Storm Able in 1952).

Local sources report that parts of Dutchess County were extensively damaged by an unnamed Category 2 hurricane in 1938 and by Tropical Storm Diane in 1955, although neither storm is recorded as having traversed directly across the planning area.

Dutchess County was more recently impacted by the remnants of and Hurricane Floyd in September 1999, both of which had become a Tropical Storm by the time it reached Dutchess County. Dutchess County was included in the area covered by Federal Disaster Declaration 1296, during which communities in the county were eligible for individual assistance from FEMA.

Probability of Occurrence – Hurricane and Tropical Storm Events

Internet resources on NOAA’s Atlantic Oceanographic and Meteorological Laboratory (AOML) web site were researched to gain an understanding of the relative likelihood of Dutchess County being impacted by a coastal storm as compared to other locations in the Atlantic Basin (see Figure 3a.3). NOAA studies also indicate that the expected return periods for various categories of hurricanes striking the New York City and Lower Hudson Valley Region are as follows:

Category 1	17 Years
Category 2	39 Years
Category 3	68 Years
Category 4	150 Years
Category 5	370 Years

Based upon a review of this data, it was determined that the Dutchess County Planning Area and its jurisdictions have roughly a six to 12 percent chance of being impacted by a named coastal storm in any given year.

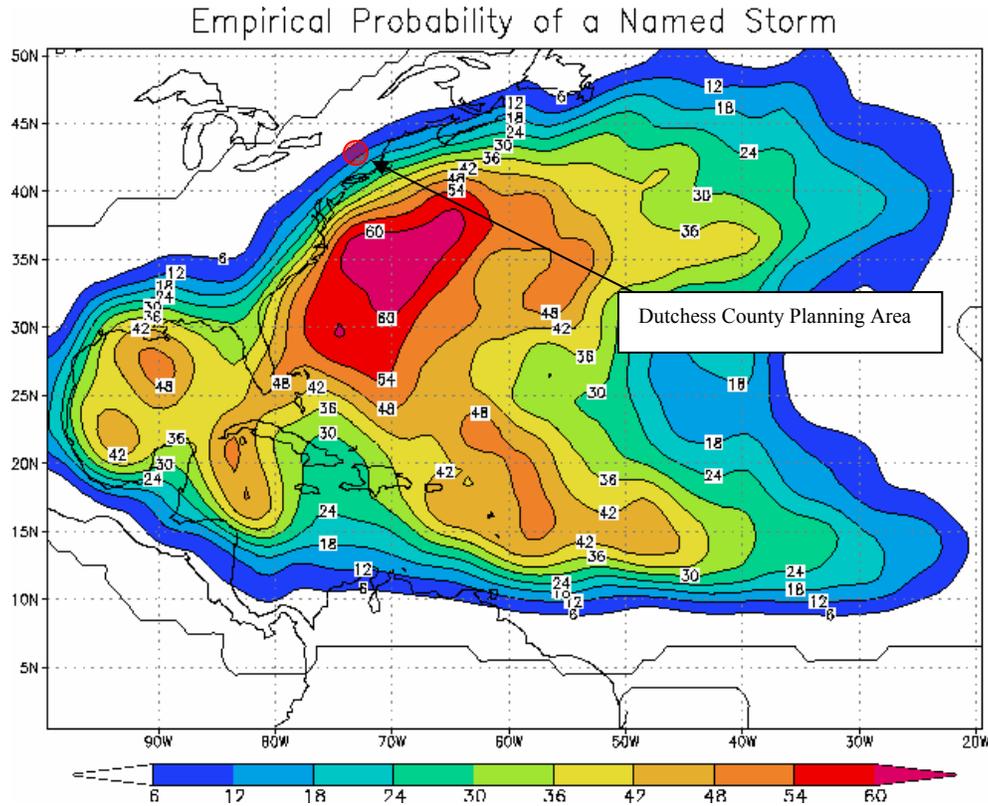


Figure 3a.3 - Empirical Probability of a Named Storm (Atlantic Basin)

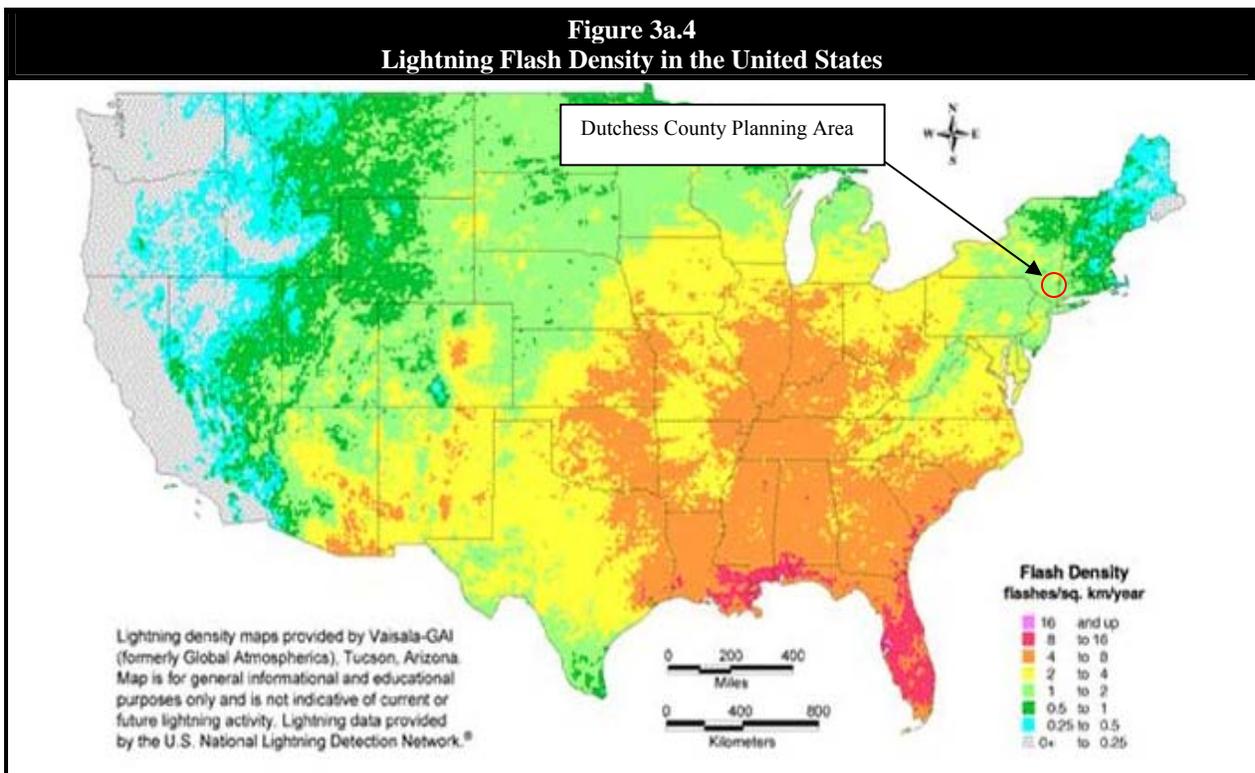
Lightning

Description – Lightning

Lightning is a discharge of electrical energy resulting from the buildup of positive and negative charges within a thunderstorm, creating a “bolt” when the buildup of charges becomes strong enough. This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning can reach temperatures approaching 50,000 degrees Fahrenheit. Lightning rapidly heats the sky as it flashes, but the surrounding air cools following the bolt. This rapid heating and cooling of the surrounding air causes thunder. On average, 73 people are killed each year by lightning strikes in the United States.

Location - Lightning

Dutchess County is located in a region of the country that is susceptible to lightning strike, though not as susceptible as southeastern states. Figure 3a.4 shows a lightning flash density map for the years 1996-2000 based upon data provided by Vaisala’s U.S. National Lightning Detection Network (NLDN®). The map indicates that the planning area can expect approximately 1-2 lightning flashes per square kilometer per year (approximately 3-5 lightning flashes per square mile).



Source: Vaisala U.S. National Lightning Detection Network

Extent - Lightning

All areas of Dutchess County are considered equally susceptible to lightning strike. While lightning occurs randomly anywhere and anytime, the most common location for lightning fatalities and injuries to

people is in open areas such as parks, beaches, golf courses and other recreational areas. Dutchess County remains susceptible to lightning deaths and injuries due to the large number of people who engage in outdoor activities, particularly more so along the shoreline of its coastal jurisdictions.

Previous Occurrences – Lightning

NOAA records that New York State has experienced the fifth most deaths from lightning in the United States from 1959 to 1994.

The NCDC records details for lightning events in Dutchess County since August 1993, and reports eight lightning events causing injury or property damage for Dutchess County between August 1993 and May 2008. These events have resulted in one recorded injuries and \$231,000 in property damage. Of these events, three were recorded in the planning area:

June 30, 1998

A house in the Town of Milan suffered severe damage due to a lightning strike.

August 2, 2002

Lightning struck a house in the Union Vale area of Millerton, causing minor damage. During the same event up to 20,000 customers in the mid Hudson Valley were temporarily without power due to lightning strikes.

August 21, 2004

A house on Hurds Corners Road in the Town of Pawling was struck by lightning, causing in \$1,000 in recorded damages.

Probability of Future Occurrences – Lightning

The probability of occurrence for future lightning events in the planning is certain. According to NOAA, Dutchess County is located in an area of the country that experiences an average of 3 to 5 lightning flashes per square mile per year (in the order of 750 to 1,500 flashes per year over the nine jurisdictions in the planning area). Given this regular frequency of occurrence, it can be expected that future lightning events will continue to threaten life and cause minor property damages throughout the planning area.

Nor'easters

Description – Nor'easters

Similar to hurricanes, nor'easters are ocean storms capable of causing substantial damage in the Eastern United States due to their associated strong winds and heavy precipitation. Nor'easters are named for the winds that blow in from the northeast as the storm rotates and travels up the East Coast along the Gulf Stream, a band of warm water that lies off the Atlantic coast. They are caused by the interaction of the jet stream with horizontal temperature gradients and generally occur during the fall and winter months when moisture and cold air are plentiful.

Nor'easters are known for dumping heavy amounts of rain and snow, producing hurricane-force winds, and creating high surf that causes severe beach erosion and coastal flooding. There are two main components to a nor'easter: (1) a Gulf Stream low-pressure system (counter-clockwise winds) generated off the southeastern U.S. coast, gathering warm air and moisture from the Atlantic, and pulled up the East Coast by strong northeasterly winds at the leading edge of the storm; and (2) an Arctic high-pressure system (clockwise winds) which meets the low-pressure system with cold, arctic air blowing down from Canada. When the two systems collide, the moisture and cold air produce a mix of precipitation and have the potential for creating dangerously high winds and heavy seas. As the low-pressure system deepens, the intensity of the winds and waves will increase and cause serious damage to coastal areas as the storm moves northeast. Nor'easters can be extremely large (up to 1,000 miles in diameter) and their duration can last for days and multiple tidal cycles, often causing major coastal flooding, erosion and damages that might even exceed the impacts of shorter-term hurricane events.

While there are a variety of indicators for nor'easter intensity, Table 3a.8 describes the Dolan-Davis Nor'easter Intensity Scale which is based on coastal storm erosion, degradation and property damage.

Storm Class	Beach Erosion	Dune Erosion	Overwash	Property Damage
1 WEAK	Minor changes	None	No	No
2 MODERATE	Modest; mostly to lower beach	Minor	No	Modest
3 SIGNIFICANT	Erosion extends across beach	Can be significant	No	Loss of many structures at local level
4 SEVERE	Severe beach erosion and recession	Severe dune erosion or destruction	On low beaches	Loss of structures at community-scale
5 EXTREME	Extreme beach erosion	Dunes destroyed over extensive areas	Massive in sheets and channels	Extensive at regional-scale; millions of dollars

Source: Federal Emergency Management Agency

Location– Nor'easters

Nor'easters threaten the entire Atlantic Coast of the United States, and while coastal areas are most directly exposed to the damaging forces of such storm systems their impact is often felt far inland. Dutchess County is located in an area that is extremely susceptible to nor'easters. No one jurisdiction within the planning area is any more likely to have the path of such a system traverse within its borders than any other location.

Extent – Nor’easters

All areas throughout the planning area are susceptible to the nor’easter hazard effects of extreme wind, flooding and heavy snowfall. Nor’easters are most notable for snow accumulations in excess of nine inches, accompanied by high, sometimes gale force winds and storm surge in coastal areas. Major property damages and power outages are also common.

NYSEMO has classified nor’easters as a moderate hazard (second only to flooding) in the planning area covering Dutchess County.

Historical Occurrences – Nor’easters

Dutchess County has a lengthy history of devastating impacts wrought by nor’easters. This includes damages caused by the effects of extreme wind, heavy snowfall and flooding. Some notable examples include:

Blizzard of 1993

The Storm of the Century, also known as the ’93 Superstorm, No-Name Hurricane, the White Hurricane, or the (Great) Blizzard of 1993, was a large cyclonic storm that occurred on March 12–March 15, 1993, on the East Coast of North America. It is unique for its intensity, massive size and wide-reaching effect. At its height the storm stretched from Canada to Central America, but its main impact was on the Eastern United States and Cuba.

January 7-9, 1996

This nor’easter resulted in heavy snowfall across southern New York State, with more than 20 inches being recorded in some parts of the region. This event prompted Federal Disaster Declaration 1083, under which communities in Dutchess County were eligible for both Individual and public Assistance from FEMA.

April 14-17, 2007

This nor’easter caused heavy rainfall in coastal areas and unseasonal snowfalls in inland areas. This event prompted Federal Disaster Declaration 1692, under which communities in Dutchess County were eligible for both Individual and public Assistance from FEMA. In the Town of Dover this event resulted in a week-long town-declared state of emergency with over \$2 million in public and private property and infrastructure damages.

Probability of Future Occurrences

Nor’easters will remain a very frequent occurrence for Dutchess County, and the probability of future occurrences affecting all jurisdictions in the planning area is certain.

Tornado

Hazards Associated with Tornado Events

Tornadoes are particular types of events. The hazard associated with a tornado event is high winds. The high wind hazard is addressed specifically elsewhere in the plan. Tornado events are discussed in the remainder of this section.

Description – Tornado Events

The American Meteorological Society, “Glossary of Meteorology” defines a tornado as violently rotating column of air that has contact with the ground and extends downward from a cumulonimbus cloud. Tornado wind speeds can range from as low as 40 mph to as high as 318 mph. Tornadoes often accompany thunderstorms and hurricanes. Tornadoes can occur at any time of the year but are more prevalent during the spring and summer months.

Location – Tornado Events

Tornadoes can occur anywhere in the US. They have struck in all 50 states, with the highest concentration on the central plains and in the southeastern states, such as Oklahoma, Texas, and Florida. No one jurisdiction within Dutchess County is any more likely to have a tornado touch down within its borders than any other location. The hazard associated with tornado events (high winds) have distinct hazard area locations, discussed in other sections of this plan.

Extent – Tornado Events

The magnitude or severity of a tornado is dependent upon wind speed and is categorized by the Fujita Scale, presented in Table 3a.9. Tornadoes are typically considered to be “significant” for F2 or F3 on the Fujita Scale and “violent” for F4 and F5.

Scale	Wind Estimate (mph)	Damage Type	Damage Description
F0	< 73	Light	Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
F1	73 - 112	Moderate	Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
F2	113 - 157	Considerable	Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
F3	158 - 206	Severe	Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
F4	207 - 260	Devastating	Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated.
F5	261 - 318	Incredible	Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yards); trees debarked; incredible phenomena will occur.

Previous Occurrences – Tornado Events

The NOAA NCDC database records 11 tornadoes in Dutchess County between August 1978 and June 2008. These events caused a reported \$3.2 million in property damage in total, but no deaths, injuries or crop damage. Of these events, four were recorded as having occurred wholly or partially in the planning area, causing more than \$2.8 million in property damage, as shown in Table 3a.10. Local sources also report a tornado of unknown magnitude that downed numerous trees on Route 38 near the Town of Milan, on December 1st, 2006.

Date	Affected Municipality	Attributed Property Damage	Magnitude	Length (Miles)	Width (Yards)	Additional Details
7/25/1987	Amenia	\$250,000	F0	unknown	17	None recorded
7/31/1992	North East	\$2,500,000	F1	23	73	This Tornado touched down in the Poughkeepsie area and travelled 23 miles to the north east before dispersing near the boundary between North East and Amenia.
5/31/2002	Pawling (Town)	\$35,000	F1	1	100	The Tornado touched down near Whaley Lake, with a wind speed estimated at 75mph. Damage was mostly restricted to downed trees but one tree fell on a lake house and damaged the roof.
6/16/2002	Pawling (Town)	\$20,000	F1	1	125	This Tornado had an estimated wind speed of 100mph. Damage was mostly restricted to downed trees but one residential garage was damaged by a falling tree.

Source: NOAA's National Climatic Data Center

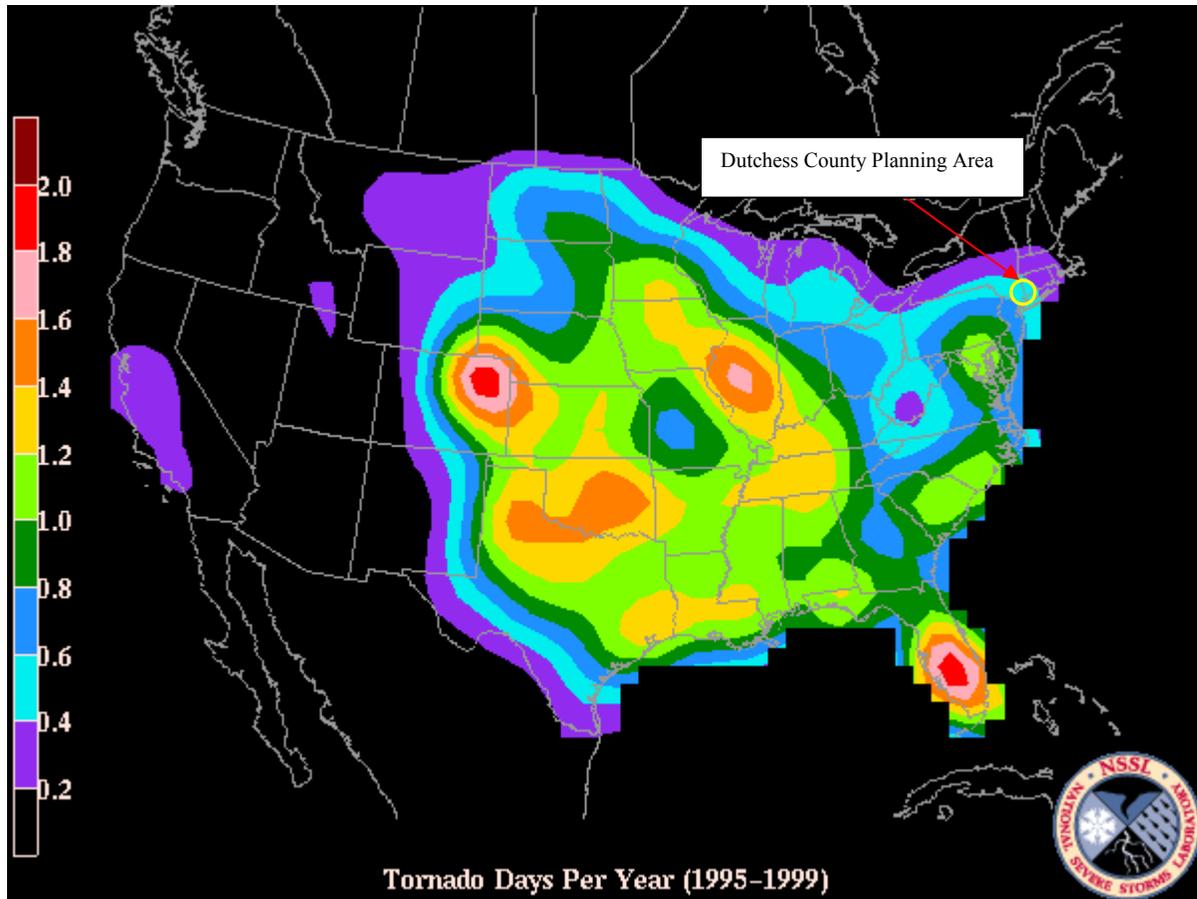
Notes: Casualty and damage information are the total reported for the event, not necessarily the total for the planning area.
Magnitude refers to the Fujita Scale. *Includes damage in Sullivan County

Probability of Occurrence – Tornado Events

For tornado events, this plan indicates the probability of future occurrences in terms of frequency based on historical events. According to the NOAA National Climatic Data Center, Dutchess County has experienced 11 recorded tornadoes in the 30 year period between 1978 and 2008, or an average of 0.37 tornadoes per year in that period.

Mapping compiled by the National Severe Storms Laboratory (See Figure 3a.5) indicates that the Northern and Eastern Dutchess County Communities are located in an area experiencing 0.4 to 0.6 tornado days per year, or approximately one every one and a half to two and a half years, which is reasonably consistent with the NOAA NCDC record, and can be expected to continue for the foreseeable future.

Figure 3a.5: Tornado Occurrence Probability



Winter Storm / Ice Storm

Hazards Associated with Winter Storm / Ice Storm

Severe winter storms are particular types of events. They are characterized by the hazards of high winds, extreme cold, heavy precipitation (in the form of snow and/or ice), and sometimes wave action, coastal erosion and flooding. Dutchess County has no identified areas of mapped coastal erosion or wave action hazards. Winter storm and ice storm events are discussed in general terms in this section of the document; their specific hazards are discussed elsewhere in the plan.

Description – Winter Storms / Ice Storms

Winter storms consist of cold temperatures and heavy snow or ice. Because winter storms are regular, annual occurrences in Dutchess County, they are considered hazards only when they result in damage to specific structures and/or overwhelm local capabilities to handle disruptions to traffic, communications, and electric power.

Winter storms and ice storms typically occur in New York from late October until mid-April. Peak months for these events for Dutchess County and its jurisdictions would be December through March.

Northeasters are one type of winter storm that is common in Dutchess County. These storms usually form off the US East Coast near the Carolinas then follow a track northward along the coast, with leading winds impacting land from the northeast, until they blow out to sea, hence the term “northeaster”. Occasionally they are large enough to cover a majority of the state. Northeasters are most notable for snow accumulations in excess of nine inches accompanied by high winds (sometimes gale force) and storm surges.

Statewide, according to NOAA data average annual snowfall ranges from a low of approximately 10 – 20 inches in the New York City / Long Island area, to over 200 inches in the north of the State, in the Adirondack Mountains (See Figure 3a.6). For most of Dutchess County, average annual snowfall ranges from 30 to 50 inches per year, although this can vary greatly from one year to the next, particularly if several major extended-period storms impact the area (during which snowfall totals can approach or exceed annual averages).

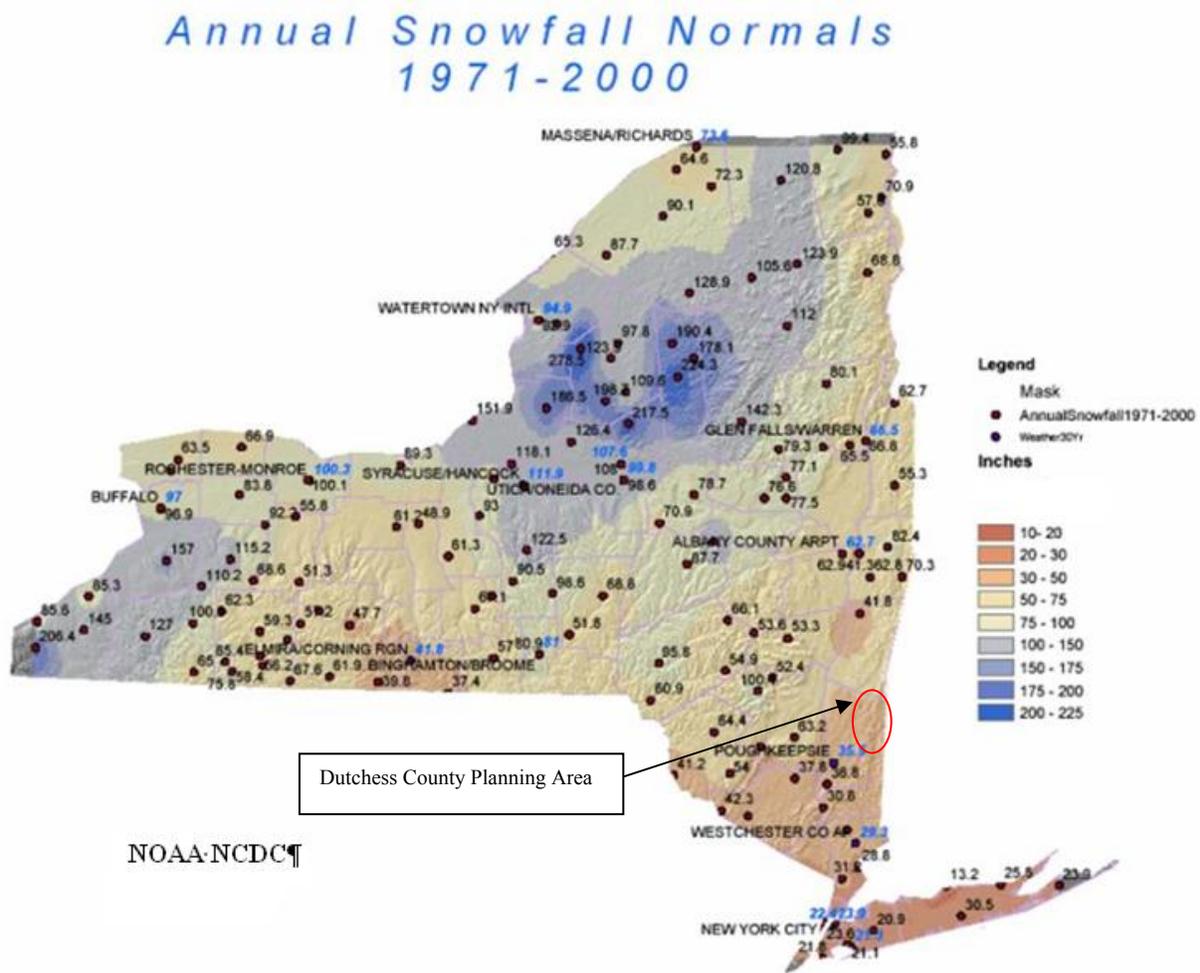
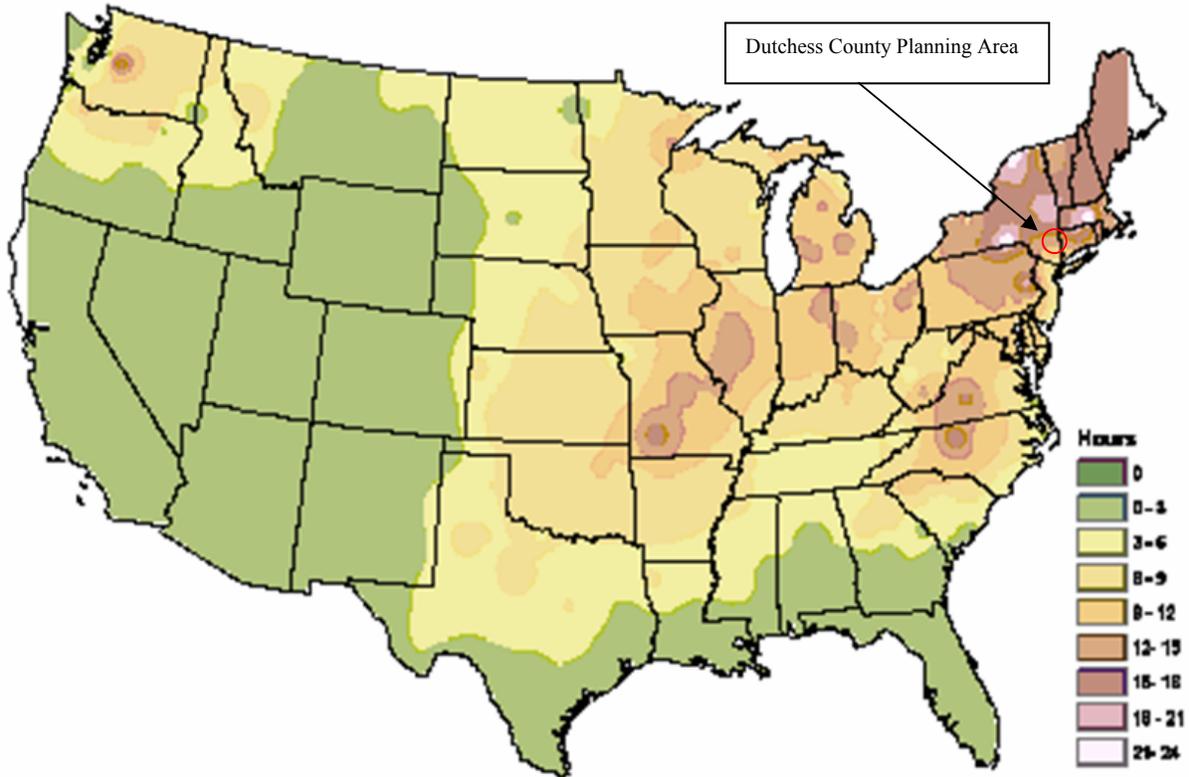


Figure 3a.6: New York State Snowfalls

Freezing rain is another common manifestation of winter storms: This occurs when precipitation that begins as snow at high altitude melts as it falls through zones with an air temperature above freezing, before encountering a colder layer prior to ground impact, causing it to freeze on contact with any object it encounters at ground level. Freezing rain frequently causes travel problems on roadways, breaks off tree limbs and brings down power and telephone cables. The Dutchess County Regional Communities Planning Area lies within an area which experiences an average of 12 to 15 hours of freezing rain per year, while much of New York State further north experiences 15 to 18 hours, and in some areas more than 20 hours, of freezing rain per year (See Figure 3a.7). Freezing rain is comparatively uncommon in the USA outside the northeastern states.

Average number of hours per year with freezing rain in the United States.



Source: "FREEZING RAIN EVENTS IN THE UNITED STATES", National Climatic Data Center, Asheville, North Carolina

Figure 3a.7: Freezing Rain Zones Nationwide

Location – Winter Storms / Ice Storms

Severe winter storms and ice storms can occur anywhere in the County; generally no single jurisdiction within the Dutchess County planning area is any more likely to be impacted by a severe winter storm or ice storm within its borders than any other location. The hazards associated with this event have distinct hazard area locations, discussed in other sections of this report.

Extent – Winter Storms / Ice Storms

A severe winter storm can adversely affect roadways, utilities, business activities and can cause loss of life, frostbite, or freezing. The most common effect of winter storms and ice storms is traffic accidents, interruptions in power supply and communications; and the failure of inadequately designed and/or maintained roofing systems. Power outages and temperatures below freezing for extended periods of time can cause pipes to freeze and burst. Heavily populated areas tend to be significantly impacted by losses of power and communications systems due to downed lines. Distribution lines can be downed by the weight of snow or ice, or heavy winds. When limbs and lines fall on roadways, transportation routes can be adversely affected and buildings, automobiles can be damaged. Heavy snow loads can cause roof collapse for residential, commercial, and industrial structures in cases of inadequate design and/or maintenance. Severe winter storms can also cause extensive coastal flooding, coastal erosion, and wave damage. If significant snowfall amounts melt quickly, inland flooding can occur as bankfull conditions are exceeded or in areas of poor roadway drainage.

The severity of the effects of winter storms and ice storms increases as the amount and rate of precipitation increase. In addition, storms with a low forward velocity are in an area for a longer duration and become more severe in their affects. Storms that are in full force during the morning or evening rush hours tend to have their affects magnified because more people are out on the roadways and directly exposed. Storms that arrive at high tide can also have exacerbated affects in coastal areas.

The magnitude of a severe winter storm or ice storm can be qualified into five main categories by event type, as shown below:

- Heavy Snowstorm: Accumulations of four inches or more of snow in a six-hour period, or six inches or more of snow in a twelve-hour period.
- Sleet Storm: Significant accumulations of solid pellets which form from the freezing of raindrops or partially melted snowflakes causing slippery surfaces posing hazards to pedestrians and motorists.
- Ice Storm: Significant accumulations of rain or drizzle freezing on objects (tress, power lines, roadways, etc.) as it strikes them, causing slippery surfaces and damage from the sheer weight of ice accumulation.
- Blizzard: Wind velocity of 35 miles per hour or more, temperatures below freezing, considerable blowing snow with visibility frequently below one-quarter mile prevailing over an extended period of time.
- Severe Blizzard: Wind velocity of 45 miles per hour, temperatures of 10 degrees Fahrenheit or lower, a high density of blowing snow with visibility frequently measured in feet prevailing over an extended period of time.

Previous Occurrences – Winter Storms / Ice Storms

In Dutchess County, severe winter snow and ice storms are normal and expected.

A review of the New York State Hazard Mitigation Plan in conjunction with data from NOAA and FEMA shows that Dutchess County has been specifically included in two snow-related declared disasters in the last 50 years (DR-1083, 1/12/1996, and DR-0801, 11/10/1987) and one snow-related emergency declaration (EM-3184, 3/27/2003).

In addition to this information, a review of the NOAA National Climatic Data Center's database yielded more than 1,000 significant snow and ice events reported in the State of New York between 1996 and February 2008. Of these, 84 are reported as having affected Dutchess County. These events are reported as being responsible for property damage totaling almost \$21 million, although this includes damage reported in areas outside Dutchess County that were affected by the same events. The NCDC database attributed no deaths or injuries in Dutchess County to these events.

Event descriptions given by the NCDC for most of the 84 events recorded in the County are generic, but are summarized in Table 3a.12.

Probability of Occurrence – Winter Storms / Ice Storms

This plan indicates the probability of future occurrences in terms of frequency based on historical events. Using the historical data presented above, and the generic descriptions of the events recorded in Dutchess County by the NCDC, Table 3a.11 summarizes the occurrence of winter storm events and their annual

occurrence Dutchess County has experienced 84 winter storms / ice storms between 1996 and 2008, – an average of 7 events per year.

Table 3a.11
Occurrence of Winter Storms/Ice Storms, Dutchess County
(Source: NOAA's NCDC Storm Events Database)

Type	Total Number of Events	Average Annual Number of Events
Winter Storm	38	3.2
Snow/Heavy Snow	23	1.9
Winter Weather	12	1.0
Snow/Freezing Rain	6	0.5
Freezing Rain	5	0.4
Total	84	7.0

Winter storm events will remain a very frequent occurrence in the Dutchess County Communities Regional Planning Area, and the probability of future occurrences in the County is certain, but the impacts of snow and ice storms are more likely to be major disruptions to transportation, commerce and electrical power as well as significant overtime work for government employees, rather than large scale property damages and/or threats to human life and safety.

Dam Failure

Description – Dam Failure

Dam failure is the breakdown, collapse or other failure of a dam structure characterized by the uncontrolled release of impounded water that results in downstream flooding. In the event of a dam failure, the energy of the water stored behind even a small dam is capable of causing loss of life and severe property damage if development exists downstream. There are varying degrees of failure, and an unexpected or unplanned dam breach is considered one type of failure. A breach is an opening through a dam which drains the water impounded behind it. A controlled breach is a planned, constructed opening and not considered a dam failure event, while an uncontrolled breach is the unintentional discharge from the impounded water body and considered a failure.

Dam failure can result from natural events, human-induced events or a combination of the two. Natural occurrences that may cause dam failure include hurricanes, floods, earthquakes and landslides; human-induced actions may include the deterioration of the foundation or the materials used in dam construction. In recent years, dams have also received considerably more attention in the emergency management community as potential targets for terrorist acts.

Dam failure presents a significant potential for disaster, in that significant loss of life and property would be expected in addition to the possible loss of power and water resources. The most common cause of dam failure is prolonged rainfall that produces flooding. Failures due to other natural events such as hurricanes, earthquakes or landslides are significant because there is generally little or no advance warning. The best way to mitigate dam failure is through the proper construction, inspection, maintenance and operation of dams, as well as maintaining and updating Emergency Action Plans for use in the event of a dam failure.

Federal guidelines for dam Safety issued by FEMA classify dams into three categories of Low, Significant, and High hazard potential, based on the probable loss of human life and the impacts on economic, environmental, and lifeline interests that would result from failure or misoperation of the dam. These categories are not intended to imply any judgment regarding the structural condition of the dam or the probability of failure.

Low Hazard Potential: Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

Significant Hazard Potential: Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

High Hazard Potential: Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life and extensive property damage.

Northern and Eastern Dutchess County Dams

Databases maintained by the U.S. Army Corps of Engineers (USACE), the Stanford University National Performance of Dams Program (NPDP), and the New York State Department of Environmental Conservation (NYSDEC) record 56 dams in the Dutchess County Planning Area which are classified as having “High”, “Significant”/“moderate”, or “Low” hazard potential. There are a number of additional dams in the area which are classified as having no hazard potential. The locations of all identified dams are presented in Figure 3a.8.

Table 3a.12
High/Significant Hazard Potential Dams, Dutchess County Planning Area
(Source: USACE NID)

Dam Name	Municipality	River/Stream	Owner	Storage (Acre-Feet)	Hazard Potential	Recorded by
Whaley Lake Dam	Pawling (Town)	Tr - Whaley Lake Stream	Not recorded	4,854	High	USACE, NPDP, NYDEC
Green Haven Correctional Facility Dam	Beekman	Gardner Hollow Brook	NY State Department of Correctional Services	322	High	NID, NYDEC
Harlem Valley State Hospital Reservoir Dam	Dover	Tr - Swamp River	Dover Knolls Development II, Wingdale, NY	222	High	NID, NPDP, NYDEC
Nuclear Lake Dam	Pawling (Town)	Whaley Lake Stream	Appalachian National Scenic Trail	208	High	NID, NYDEC
Brady Pond Dam	Pawling (Town)	Not recorded	Getaway LLC	113	High	NID, NYDEC
Thornes Dam	Amenia	Wassaic Creek	Turkey Hollow Inc./Allan P. Shore	44	High	NID, NPDP, NYDEC
Chestnut Ridge Rod & Gun Club Dam	Dover	Coopertown River	Chestnut Ridge Rod & Gun Club	430	Significant	NID, NPDP, NYDEC
All-American Sports City Rec. Dam	Pine Plains	Tr - Cold Spring Creek	Carvel Estera/1133n Taconic LLC	352	Significant	NID, NPDP, NYDEC
Green Mountain Lake Dam	Pawling (Town)	Swamp River	Town of Pawling	204	Significant	NID, NPDP, NYDEC
Lake Weil Dam	Dover	Tr - Tenmile River	John Fila	185	Significant	NID, NPDP, NYDEC
Harmony Lake Dam	Pawling (Town)	Tr – East Branch Croton	David M. Katz	112	Significant	NPDP, NYDEC
Mayer Pond Dam	Pawling (Town)	Tr – East Branch Croton	Harold Lepler	76	Significant	NID, NPDP, NYDEC
Vogts Dam	Dover	Tr - Burton Brook	Pawling Lake Community Center	69	Significant	NID, NPDP, NYDEC

Table 3a.12
High/Significant Hazard Potential Dams, Dutchess County Planning Area
(Source: USACE NID)

Dam Name	Municipality	River/Stream	Owner	Storage (Acre-Feet)	Hazard Potential	Recorded by
Pawling Reservoir Dam	Pawling (Town)	Tr - Hiller Brook	Village of Pawling	51	Significant	NID, NPDP, NYDEC
Ryder Pond Dam	Beekman	TR - Stump Pond Brook	Girl Scouts of America - Westchester & Putnam	40	Significant	NID, NYDEC
Pawling Reservoir Diversion Dam	Pawling (Town)	Hiller Brook	Village of Pawling	8	Significant	NYDEC
Holmes Mill Dam	Pawling (Town)	Tr – Middle Branch Croton	Eaton & Kelly Company	6	Significant	NYDEC
Rock City Saw Mill Dam	Milan	Tr- Lakes Kill	Edward Kovach	5	Significant	NID, NPDP, NYDEC
Pawling Properties West Pond Dam	Pawling (Town)	Not recorded	Pawling Properties Associates	Not recorded	Significant	NYDEC

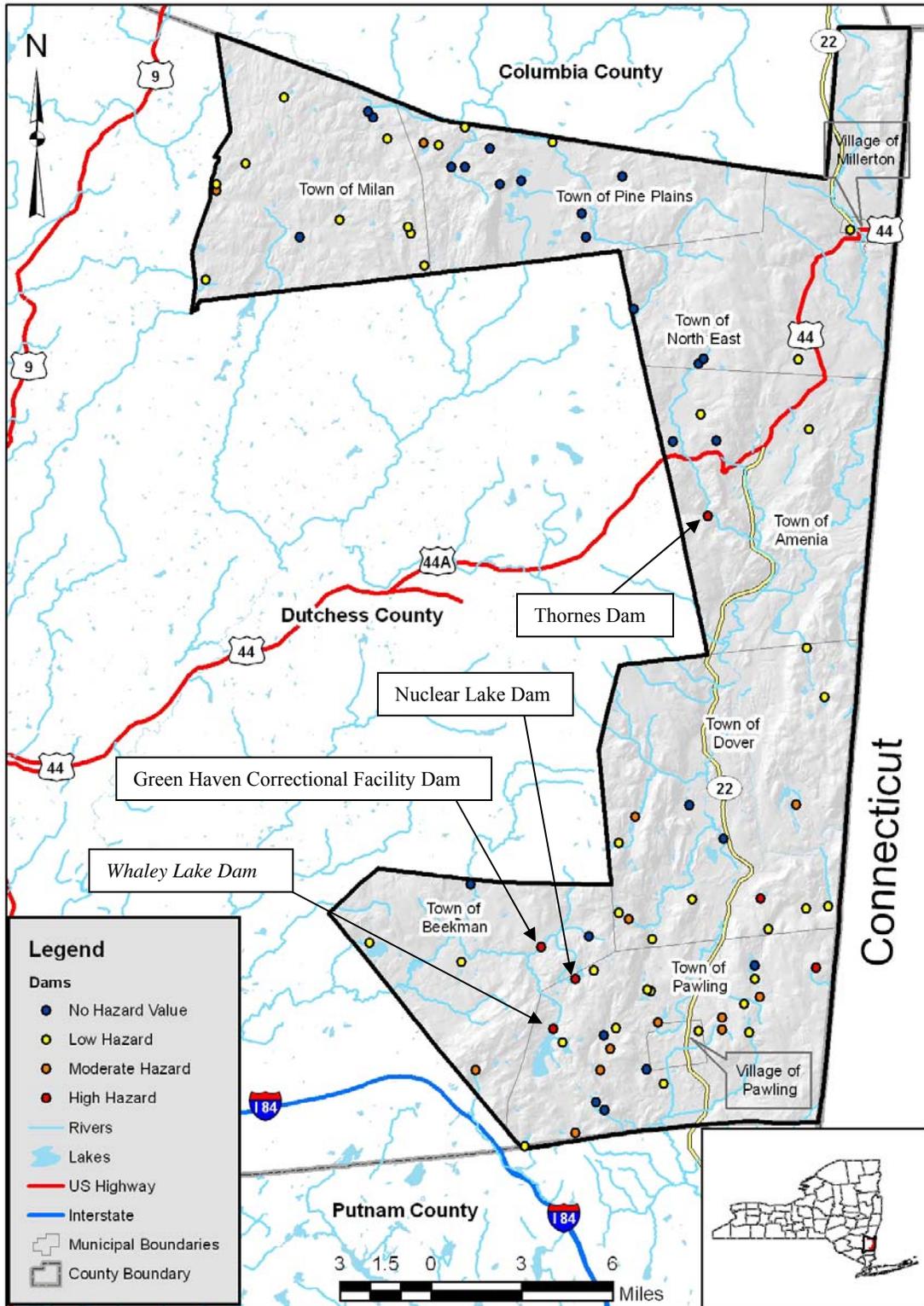
Tr - : Tributary of

Local sources also indicate that there are concerns regarding a small former dam structure slightly to the north west of the intersection of North Center Street and Church Street in the Village of Millerton. It is reported that the present opening in this structure is frequently blocked by debris, in which circumstances ponding water has been observed leaking through and around the structure, prompting fears that impounded water could in future breach the structure, causing a significant wave to flow through center of Millerton Village.

The most accurate method to estimate exposure to and potential losses from the dam failure hazard uses data produced through detailed dam failure inundation studies. These studies are often prepared by the owners of dam facilities as part of their own emergency action plans. Such plans have been previously completed for the four of the high hazard dams identified in the planning area as presented above, and the associated inundation maps were obtained from the New York State Department of Environmental Conservation (NYSDEC). Inundation maps for Nuclear Lake Dam, Green Haven Correctional Facility Dam, and Thornes Dam are presented in Figures 3a.9 through 3a.11. Inspection of the inundation mapping for the Brady Pond Dam indicated that any failure of this dam would essentially only affect property in neighboring Fairfield County, Connecticut, therefore failure of this dam has not been considered to be a hazard for the purposes of the Northern and Eastern Dutchess County Communities Plan. Inundation maps for the Whaley Lake and Harlem Valley State Hospital Dams were not available.

These maps were developed by digitizing the inundation envelope resulting from dam failures under wet weather conditions from scanned hard copies of the original mapping, supplied by NYSDEC, who were unable to provide the original source GIS files. The areas shown as vulnerable to inundation in Figures 3a.9 through 3a.11 should be regarded as approximate indications of the possible consequences of events subject to a great deal of hydrologic uncertainty.

Figure 3a.8: Identified Dams in the Planning Area



Source: NYSDEC, Inventory of Dams, 2007; US Census Borough, Putnam, Dutchess, and Columbia counties area hydrography, 2007; ESRI, NY Rivers, 2001, Property Tax Service Agency, Municipal Boundaries - Towns, Cities, Villages, 2008; ESRI, US Counties, 2005; ESRI, NY Major Roads, 2007; USGS DEMs. NY State

Figure 3a.9: Potential Dam Failure Inundation Area: Green Haven Correctional Facility Dam

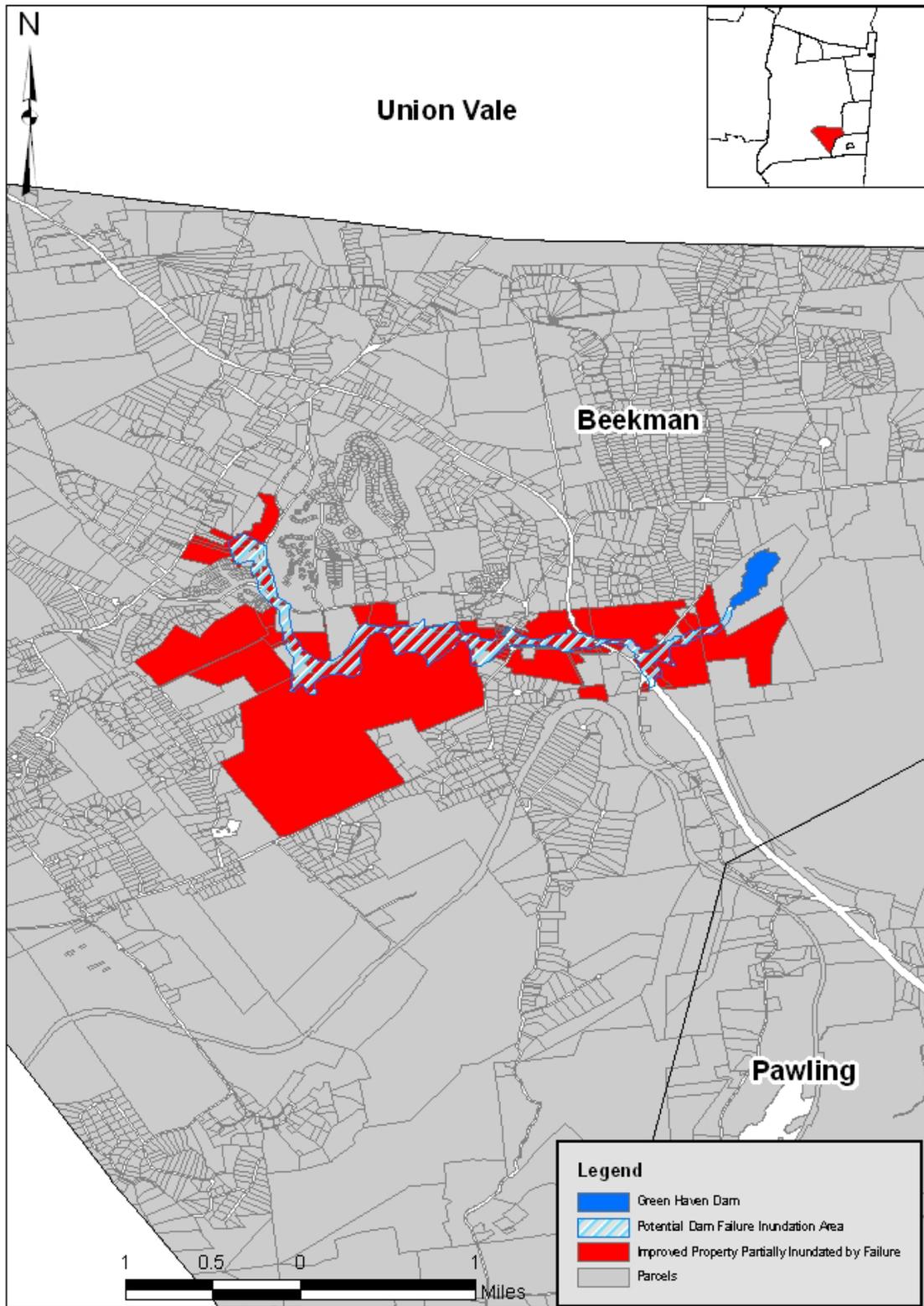


Figure 3a.10: Potential Dam Failure Inundation Area: Nuclear Lake Dam

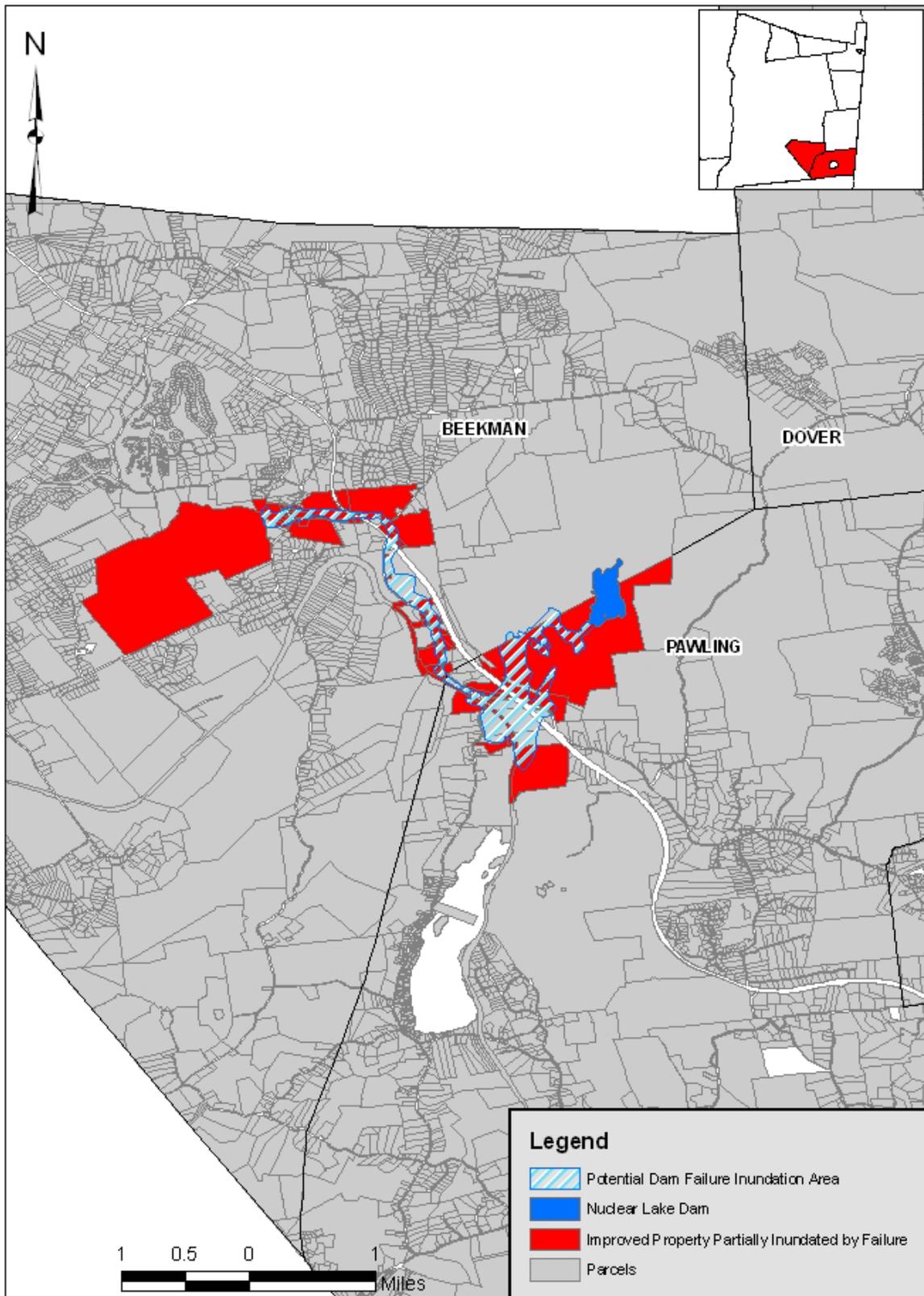
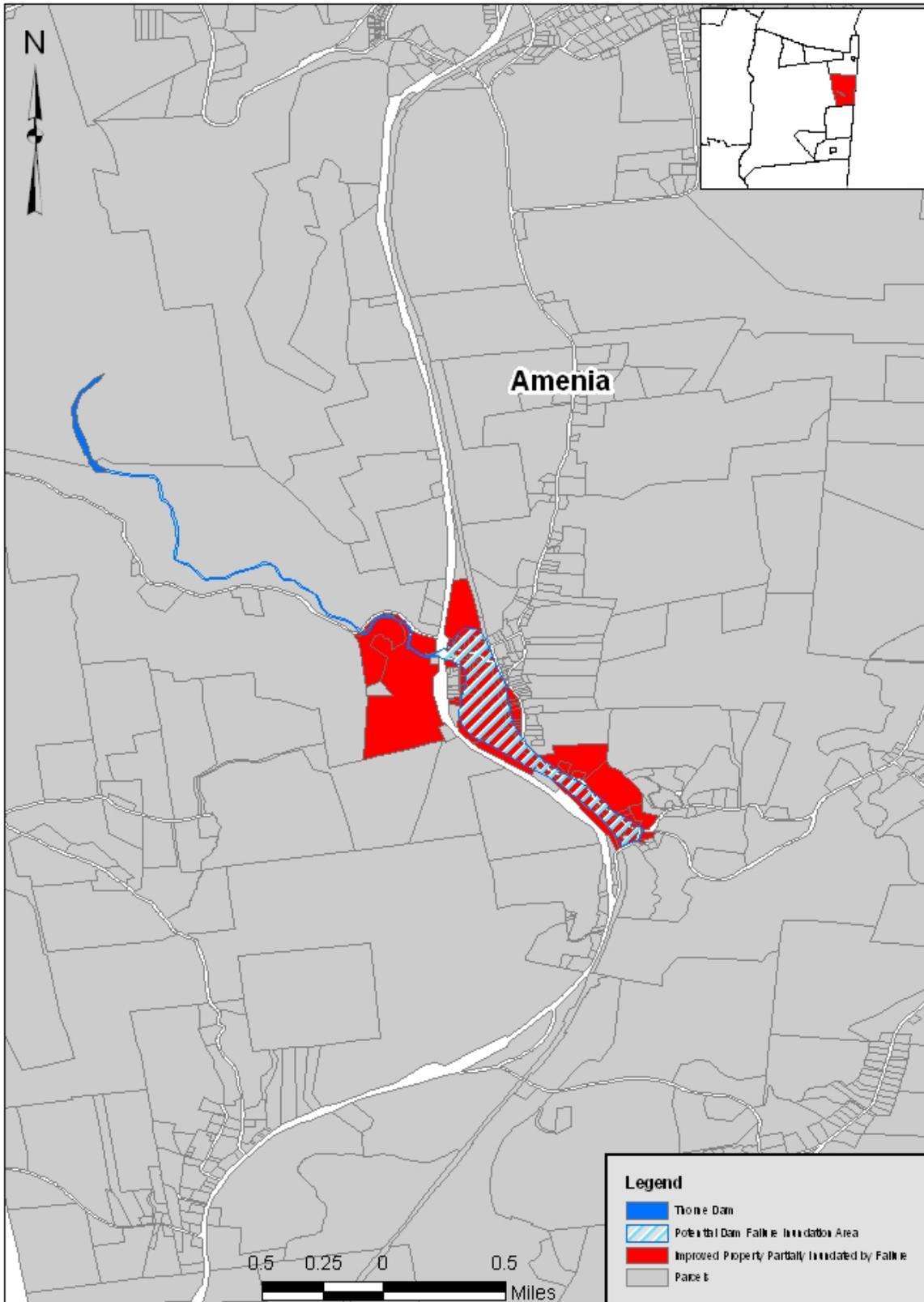


Figure 3a.11: Potential Dam Failure Inundation Area: Thornes Lake Dam



The potential exposure to damage or loss caused by failure of these three dams has been estimated using GIS to compute the value of improved property that is potentially affected by the dam failure inundation envelopes presented in Figures 3a.9 through 11. The potential exposures are presented by municipality in Table 3a.13. The proportion of structure values actually realized as damage following a dam failure will depend on the depth and velocity of the floodwaters, which in turn will depend on the hydrologic conditions leading up to the failure.

Table 3a.13			
Estimated Potential Exposure of Improved Property to Dam Failure*			
Thornes Dam			
Municipality	Exposed Improved Value	Total Municipal Improved Value	Exposed Value as % of Municipal Total
Amenia	\$7,742,275	\$404,121,634	1.9%
Nuclear Lake Dam			
Municipality	Exposed Improved Value	Total Municipal Improved Value	Exposed Value as % of Municipal Total
Beekman	\$7,226,113	\$1,196,340,238	0.6%
Pawling (Town)	\$3,529,156	\$1,218,720,414	0.3%
<i>Total</i>	<i>\$10,755,269</i>	<i>\$2,415,060,652</i>	<i>0.4%</i>
Green Haven Correctional Facility Dam			
Municipality	Exposed Improved Value	Total Municipal Improved Value	Exposed Value as % of Municipal Total
Beekman	\$6,793,464	\$1,196,340,238	0.6%

*Exposure has been estimated only for the three high hazard dams in the planning area for which inundation areas inside Dutchess County have been mapped and are available.

Table 3a.13 indicates that while there appears to be relatively little risk of damage to structures (in terms of the proportion of structures that are exposed in any one jurisdiction) from a failure of the any of the three dams profiled, it should be borne in mind that any such dam failure is likely to be accompanied by catastrophic damage to roads, bridges and other infrastructure, as well as prompting substantial emergency resource mobilizations, all of which are difficult to quantify economically within the scope of this plan.

Historical Occurrences – Dam Failure

According to NPDP records, there have been 43 dam failures in New York State since 1868, of which only one occurred in Dutchess County – failure of the Melzingah Dam near Beacon in 1897. A significant dam failure is recorded as having occurred at Lake Amenia in the Town of Amenia in August 1955, although there are no details and descriptions of damage and the dam was not reconstructed.

Probability of Occurrence – Dam Failure

The probability of a dam failure occurrence in the planning area is relatively low due to routine inspection, repair and maintenance programs carried out by the NYSDEC, which serves to ensure the safety and integrity of dams in New York and, thereby, protect people and property from the consequences of dam failures. However, the possibility of a future failure event is likely increasing due to aging dam structures that may be in need of repair or reconstruction, and occasional problems related to private dam owners' degree of cooperation with State regulatory agencies.

Drought

Description – Drought

The general term “drought” is defined by the US Geological Survey (USGS) as, “a prolonged period of less-than-normal precipitation such that the lack of water causes a serious hydrologic imbalance.” As stated in FEMA’s, “Multi-Hazard Identification and Risk Assessment “ (1997), drought is the consequence of a natural reduction in the amount of precipitation expected over an extended period of time, usually a season or more in length.

According to the National Oceanic and Atmospheric Administration’s (NOAA’s) Drought Information Center, there are four types of drought:

- Meteorological Drought – A measure of precipitation departure from normal.
- Agricultural Drought – When the amount of moisture in soil does not meet the needs of a particular crop.
- Hydrological Drought – When both surface and subsurface water supplies are below normal.
- Socioeconomic Drought - When a water shortage begins to affect people.

Meteorological droughts are typically defined by the level of “dryness” when compared to an average, or normal amount of precipitation over a given period of time. Agricultural droughts relate common characteristics of drought to their specific agricultural-related impacts (when the amount of moisture in soil does not meet the needs of a particular crop). Hydrological drought is directly related to the effect of precipitation shortfalls on surface and groundwater supplies. Human factors, particularly changes in land use, can alter the hydrologic characteristics of a basin. Socio-economic drought is the result of water shortages that affect people and limit the ability to supply water-dependent products in the marketplace.

Drought conditions typically do not cause property damages or threaten lives, but rather drought effects are most directly felt by agricultural sectors. At times, drought may also cause community-wide impacts as a result of acute water shortages (regulatory use restrictions, drinking water supply and salt water intrusion). The magnitude of such impacts correlates directly with local groundwater supplies, reservoir storage and development densities. In general, impacts of drought can include significant adverse consequences to:

- Public water supplies for human consumption
- Rural water supplies for livestock consumption and agricultural operations
- Water quality
- Natural soil water or irrigation water for agriculture
- Water for forests and for fighting forest fires
- Water for navigation and recreation.

The severity of these impacts depends not only on the duration, intensity, and geographic extent of a specific drought event, but also on the demands made by human activities and vegetation on regional water supplies.

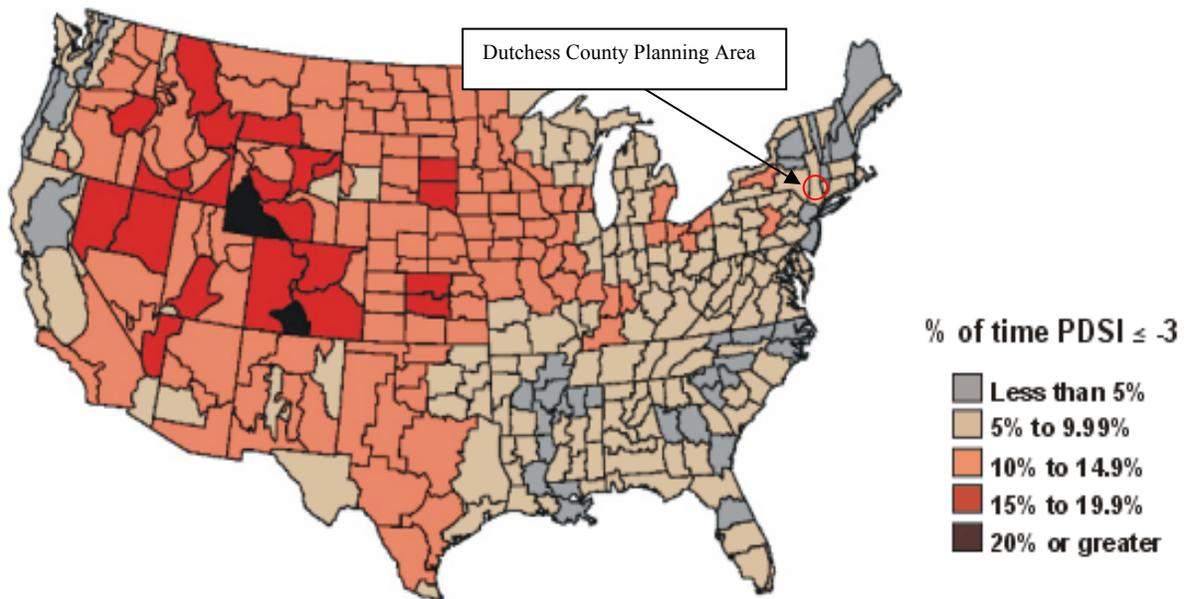
Location and Extent – Drought

Droughts occur in all parts of the country and at any time of year, depending on temperature and precipitation over time. Arid regions are more susceptible to long-term or extreme drought conditions,

while other areas (including Dutchess County) tend to be more susceptible to short-term, less severe droughts.

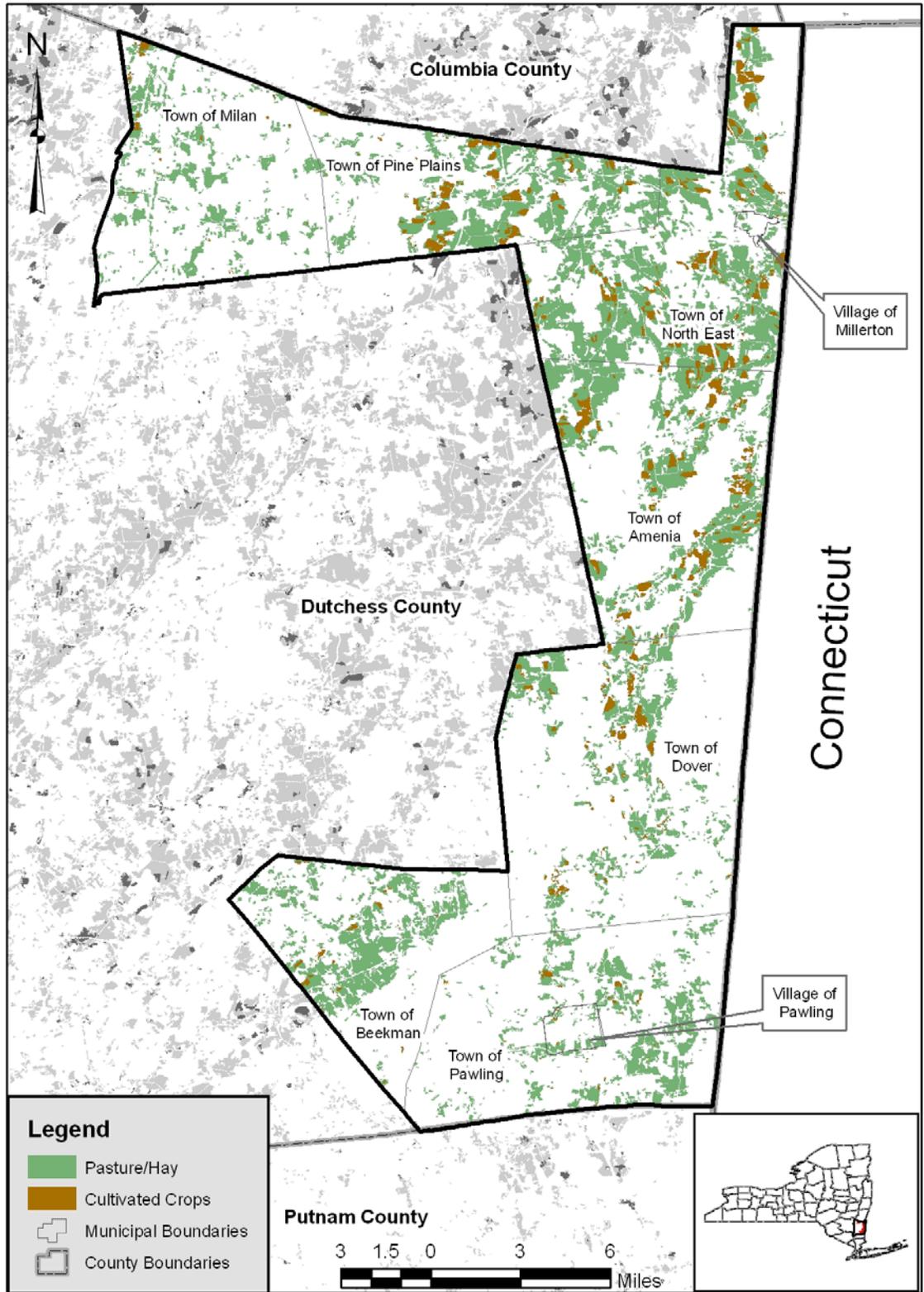
Figure 3a.12 shows the Palmer Drought Severity Index (PDSI) Summary Map for the United States from 1895 to 1995. PDSI drought classifications are based on observed drought conditions and will range from -0.5 (incipient dry spell) to -4.0 (extreme drought). According to the PDSI map, Dutchess County is in a zone that experienced severe drought conditions between 5 and 10 percent of the 100-year period during 1895 to 1995, meaning that severe drought conditions are a relatively low risk for Dutchess County. However, short term droughts of less severity are more common and may occur several times in a decade.

Figure 3a.12: Palmer Drought Severity Index Summary Map for the United States



While the extent of drought impacts for the planning area may include all of the issues listed above, the most severe effects of drought are likely to be experienced by farmers, who can suffer heavy financial losses due to crop damage or loss. Figure 3a.13 shows the extent, location and distribution of agricultural land across the planning area, and Table 3a.14 presents a breakdown of agricultural land by municipality. It is evident from the figure and the table that municipalities in the north eastern part of the planning area are most at risk from agricultural losses due to drought, with the Towns of Amenia, North East, and Pine Plains the municipalities most vulnerable to agricultural losses. Although at first glance the proportions of municipality areas devoted to agriculture may not appear to be significant, local sources regard agriculture as one of the most important sectors of the County economy.

Figure 3a.13: Northern and Eastern Dutchess County Agricultural Land



Source: USGS NLCD Zone 65 Land Cover Layer, 2003; ESRI, US Counties, 2005; Property Tax Service Agency, Municipal Boundaries - Towns, Cities, Villages, 2008;

Table 3a.14
Distribution of Agricultural Land in Northern and Eastern Dutchess County
(Source: Dutchess County GIS)

Municipality	Total Area (Acres)	Cultivated Cropland (Acres)	Cultivated Cropland (%)	Pasture Land (Acres)	Pasture Land (%)
Amenia	27,951	1,535	5.5%	6,909	25%
Beekman	19,653	162	0.8%	4,418	22%
Dover	36,025	669	1.9%	4,329	12%
Milan	23,395	134	0.6%	3,346	14%
Millerton	385	1	0.2%	54	14%
North East	27,544	1,726	6.3%	10,044	36%
Pawling (Town)	27,696	114	0.4%	4,159	15%
Pawling (Village)	1,259	11	0.9%	252	20%
Pine Plains	19,921	986	5.0%	5,728	29%
<i>Planning Area Total</i>	<i>183,829</i>	<i>5,338</i>	<i>2.9%</i>	<i>39,238</i>	<i>21%</i>

Previous Occurrences – Drought

Historical occurrences of drought in Dutchess County have been identified using the New York State Hazard Mitigation Plan. New York State Emergency Management Office records of disaster declarations, and the NOAA NCDC database. Details regarding some of the drought events known to have affected Dutchess County are as follows:

- *August 18, 1965:* A Federal Disaster was declared (DR 0204) due to water shortages in the New York region which included Dutchess County among the affected areas.
- *August - December, 1993:* A prolonged period of drought during the summer and fall of 1993 decimated much of the agriculture in southeast New York. A drought alert advisory was issued on August 5, 1993 by the New York State Drought management Task Force for Delaware, Dutchess, Sullivan and Ulster Counties. The advisory was upgraded to drought warning in November 1993. Other counties hit hard by drought included Albany, Rensselaer, Columbia and Greene. Estimates of feed grain losses in these counties were well over 40 percent and in some cases nearly 100 percent. Especially hard hit were hay and corn crops as well as other fruits and vegetables. Some preliminary estimates of total crop damage were \$8 million in Columbia County and \$4 million in Greene County.
- *August 9, 1995:* the New York State Drought Task force declared a "Drought Watch" for the Catskills (Delaware, Greene, Otsego, Schoharie, Sullivan and Ulster counties), and the Hudson-Mohawk Region (Albany, Columbia, Dutchess, Fulton, Oneida, Herkimer, Montgomery, Rensselaer, Saratoga, Schenectady, and Washington Counties). The Hudson and Mohawk Valleys including the Catskills experienced extreme drought conditions while areas north of the Mohawk Valley and north of Saratoga County in the Hudson Valley saw severe drought conditions. At the end of August precipitation deficits of six to 12 inches were common in the extreme drought area. The drought produced a reduction in corn yield due to the shorter and slender ears. Hay yields were also down as many areas saw a very small second cutting or none at all. Wells ran dry in many communities and a Water Emergency was declared in Herkimer County and the Town of Deerfield in Oneida County.
- *April 1, 1999:* April 1999 was officially the second driest April on record in Albany and the driest of this century. Only 0.60 inches of rain fell at the Albany International Airport and only 0.56 inches at the N.W.S. office located on the University at Albany (SUNY) Campus. Rainfall

amounts were a little bit higher to the south of Albany, but still fell well short of normal. The combination of low rainfall, along with frequent gusty winds, turned the underbrush into very dry tinder. This scenario led to numerous brush fires during the month across the Berkshires.

- *August 1, 1999:* August 1999 was the peak of the long term drought across Eastern New York that began in July of 98. The fourteen month stretch, ending in August, saw rainfall and melted snowfall throughout the region only tallying up to about 80 percent of normal. At the Albany International Airport 35.41 inches of water equivalent was recorded from July 98 through August 99, compared to the thirty year normal of 42.82 inches. The long term drought combined with the heat of the summer, resulted in a drought warning across much of the region as well as a declaration of agricultural disaster. The Mohawk Valley and Western Adirondacks were especially hard hit. The drought resulted in record low levels of the Mohawk River, numerous forest fires across the Adirondacks, and many wells going completely dry. Most communities implemented voluntary or mandatory water restrictions.

Probability of Occurrence – Drought

If the occurrences mentioned above are considered to be separate events, Dutchess County has experienced four droughts during the 15 year period from 1993 through early 2008, as reported in the NOAA NCDC database, or an average of 0.27 drought events per year.

Past drought occurrences can be expected to be a sound indicator of the probability of future drought occurrences for the Dutchess County Planning Area. Certain parts of the country are more susceptible to being impacted by a drought than others are. Arid parts of the country tend to be at greater risk of experiencing long-term droughts, while more humid parts of the country tend to be more susceptible to short-term droughts. According to the USGS Division of Water Resources, the Dutchess County Planning Area and its jurisdictions fall within what is described as a “humid region” and is more likely to experience a short-term drought.

Floods

Description – Floods

FEMA's NFIP defines the general term "flooding" as "a general and temporary condition of partial or complete inundation...from overflow of inland or tidal waters, unusual and rapid accumulation or runoff of surface waters from any source, or a mudflow." According to FEMA's *NFIP Floodplain Management Requirements: a Study Guide and Desk Reference for Local Officials* (FEMA-480), most floods fall into the following three categories:

- **Riverine Flooding** – Flooding that occurs along a channel (where a "channel" is defined as a feature on the ground that carries water through and out of a watershed, whether natural channels such as rivers and streams, or man-made channels such as drainage ditches).
 - Overbank flooding occurs along a channel as excess flows overflow channel banks. Overbank flooding occurs when downstream channels receive more rain or snowmelt from their watershed than normal, or a channel is blocked by an ice jam or debris.
 - Flash floods are a type of riverine flooding typically caused when a significant amount of rainfall occurs in a very short duration. Flash flooding is characterized by a rapid rise in water level and high velocity flows. Flash floods can also be caused by ice jams (ice jam flooding, which can be upstream of an intact jam or downstream of a jam that has broken downstream) or dam breaks.
- **Coastal Flooding** – Flooding that occurs along the coasts of oceans, the Gulf of Mexico, and large lakes (i.e., the Great Lakes). Hurricanes and severe storms cause most coastal flooding, including "Nor'easters" which are severe storms that occur in the Atlantic basin that are extratropical in nature with winds out of the northeast.
 - Storm surge is one characteristic of coastal flooding caused as persistent high winds and changes in air pressure work to push water on shore, often on the order of several feet.
- **Shallow Flooding** – Flooding that occurs in flat areas where a lack of channels means water cannot drain away easily.
 - Sheet flow occurs when there are inadequate or no defined channels, and floodwaters spread out over a large area at a somewhat uniform depth. Sheet flow occurs after intense or prolonged rainfalls during which rain cannot soak into the ground.
 - Ponding occurs when runoff collects in a depression and cannot drain out. Ponding floodwaters do not move or flow away; they will remain until the water infiltrates into the soil, evaporates, or is pumped away.
 - Urban drainage flooding occurs when the capacity of an urban drainage system is exceeded. An urban drainage system comprises the ditches, storm sewers, retention ponds and other facilities constructed to store runoff or carry it to a receiving stream, lake or the ocean. Urban drainage flooding can also occur in areas protected by levees, as water collects on the protected side of the levee when pump capacities are exceeded during severe storms.

Floods are considered hazards when people and property are affected. Historically, development in floodplains was often a necessity, as water bodies provided a means of transportation, electricity, water supply, and often supported the livelihood of local residents (i.e., fishing, farming, etc.). Today, development in floodplains is more often spurred by the aesthetic and recreational value of the floodplain. Flooding is widely regarded as the most common major natural hazard in New York State.

The **National Flood Insurance Program (NFIP)** was established by Congress with the passage of the National Flood Insurance Reform Act of 1968. Through this program, Federally-backed flood insurance is made available to homeowners, renters, and businesses in a community if that community adopts and enforces a floodplain management ordinance to reduce future flood damages within its floodplains. This includes not only preventative measures for new development, but also corrective measures for existing development. FEMA also administers the Community Rating System (CRS), a program under which communities choosing to implement floodplain management actions that go beyond the minimum requirements of the NFIP become eligible for discounts on flood insurance premiums for properties within that community. At present, every individual municipality in Dutchess County is an active member of the NFIP, although none have so far become eligible for the CRS (See Table 3a.18 on page 3a-47 for more details).

In addition to providing flood insurance, the NFIP also studies and maps the nation’s floodplains, preparing its findings in Flood Insurance Rate Maps (FIRMs) and Flood Insurance Studies (FISs). FEMA also prepares digital Q3 Flood Data files, and Digital Flood Insurance Rate Maps (DFIRMs – see below) which contain digital flood hazard mapping. Using GIS, these digital maps can be overlaid upon a community’s existing GIS base map. FEMA Q3 Flood Data and the Dutchess County GIS formed the basis of this analysis of the flood hazard for northern and eastern Dutchess County.

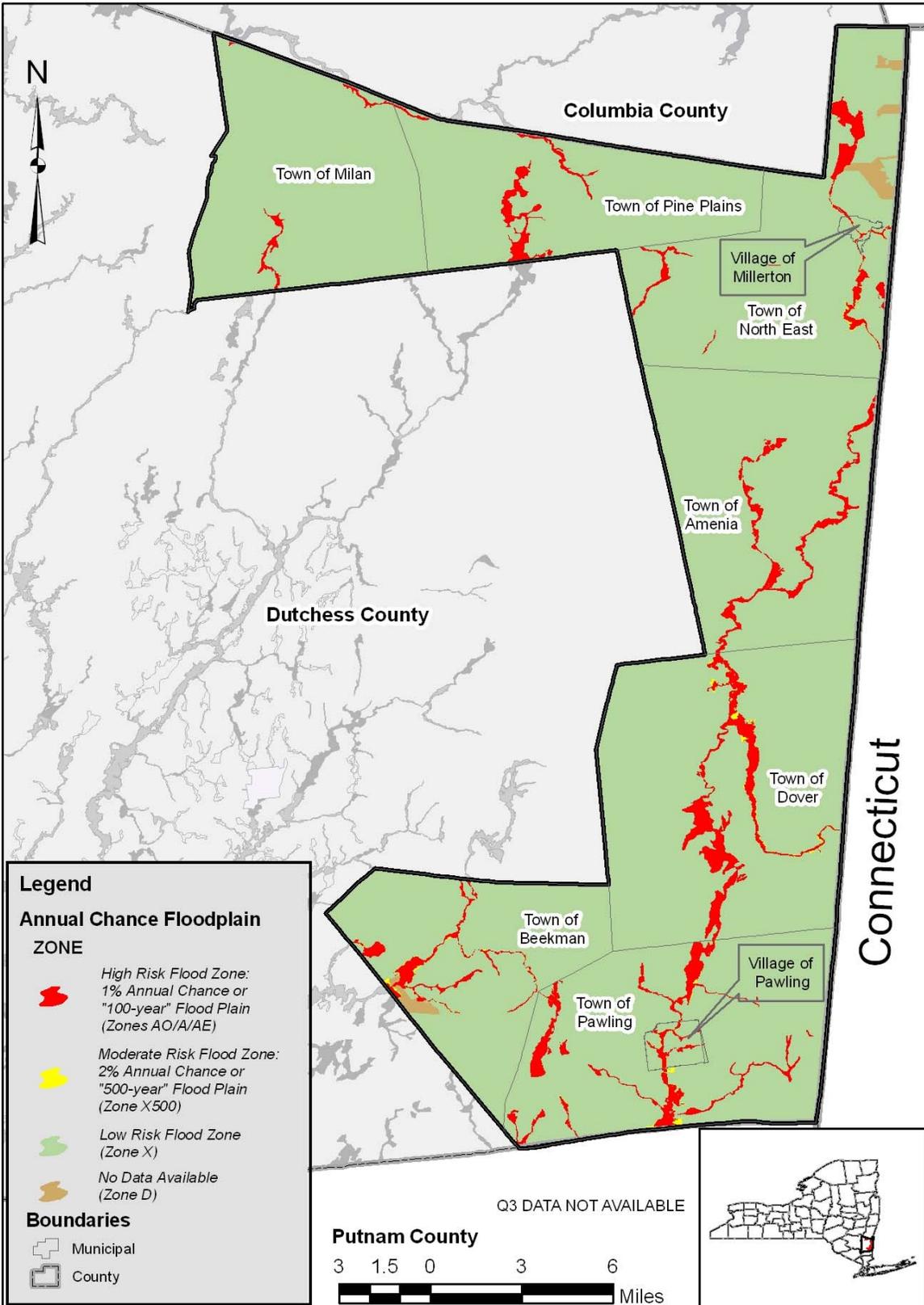
Location and Extent – Floods

Flooding in northern and eastern Dutchess County is caused by from riverine flooding, shallow flooding resulting from urban drainage issues, and ice jams. Flooding from ice jams is considered a separate hazard under this mitigation plan and is addressed in a separate plan section. Since the planning area has no tidal shoreline, coastal flooding is not a hazard of concern.

The extent of flooding associated with a 1 percent probability of occurrence – the “100-year flood” or “base flood” – is used as regulatory boundaries by a number of federal, state and local agencies. Also referred to as the “special flood hazard area”, this boundary is a convenient tool for assessing vulnerability and risk in flood prone. FEMA’s Q3 Flood Data was used to identify the location of flood hazard areas in the planning area. According to the Q3 data, high/moderate flood risk zones exist in all nine planning area County communities, as shown in Figure 3a.14. This Figure illustrates the mapped flood risk using FEMA zone designations, which are explained in more detail below:

- High Risk Areas** Zones A and AE: These are areas with a 1% chance of being flooded in any given year (the “100-year” floodplain). AE zones are those areas where the Base Flood Elevation (BFE – the “100-year flood) has been determined analytically. A Zones are areas where the base floodplain has been mapped by approximate methods and the BFE has not been determined.
- Moderate Risk Areas** Zone X500: These are areas lying between the “100-year” and “500-year” (0.2% annual chance of flooding) floodplain limits. They also include areas of shallow flooding with average depths of less than one foot, or drainage areas less than one square mile.
- Low Risk Areas** Zone X: These are areas outside of the 500-year floodplain, where the flood hazard is minimal. They may include areas of ponding or with local drainage problems not significant enough to warrant detailed study or designation as base floodplain.
- Possible Risk Areas** Zone D: Areas where there are possible but undetermined flood hazards. There are several small D Zones in two of the participating jurisdictions.

Figure 3a.14: Northern and Eastern Dutchess County Flood Hazard Areas



Source: FEMA Q3 Data; ESRI, US Counties, 2005; Property Tax Service Agency, Municipal Boundaries - Towns, Cities, Villages, 2008;

The mapped Q3 flood data is not exact, and in some cases flood hazard area boundaries may not match landform boundaries. While limitations in the data should be recognized, this represents best readily available GIS data at the time of the study and is generally deemed suitable for mitigation planning purposes. Updates should be made in the future when revised data and mapping becomes available for the whole County.

FEMA's Q3 flood mapping was overlaid upon the Dutchess County GIS Base Map to summarize the Q3 flood mapping and flood risk areas for all nine municipalities in the planning area, and the collated data is presented in Tables 3a.15 and 3a.16. More detailed breakdowns by land/parcel use can be found in Appendix A.

Municipality	Total Land Area (Acres)	High Flood Risk Areas (Acres)	Moderate Flood Risk Areas (Acres)	Land in High Flood Risk Areas %	Land in Moderate Flood Risk Areas %
Amenia	27,951	1,310	0	4.7%	0.0%
Beekman	19,653	816	81	4.2%	0.4%
Dover	36,025	2,315	154	6.4%	0.4%
Milan	23,395	296	0	1.3%	0.0%
Millerton	385	26	4	6.7%	1.0%
North East	27,544	1,209	52	4.4%	0.2%
Pawling (T)	27,696	1,857	106	6.7%	0.4%
Pawling (V)	1,259	197	15	15.6%	1.2%
Pine Plains	19,921	888	0	4.5%	0.0%
<i>Planning Area Total</i>	385	26	4	6.7%	1.0%

Municipality	Total Improved Value (millions)	Value in High Flood Risk Areas (millions)	Number of Residential Properties in High Flood Risk Areas*	Value in Moderate Flood Risk Areas (millions)	Value in High Flood Risk Areas %	Value in Moderate Flood Risk Areas %
Amenia	\$404,121,634	\$28,291,482	45	\$0	7.0%	0.0%
Beekman	\$1,196,340,238	\$19,071,891	50	\$3,613,243	1.6%	0.3%
Dover	\$718,519,830	\$46,532,915	115	\$10,230,581	6.5%	1.4%
Milan	\$260,081,800	\$2,259,370	12	\$0	0.9%	0.0%
Millerton	\$61,541,706	\$2,387,749	9	\$925,494	3.9%	1.5%
Northeast	\$307,271,704	\$9,272,429	50	\$973,911	3.0%	0.3%
Pawling (T)	\$1,218,720,414	\$29,879,521	35	\$2,143,833	2.5%	0.2%
Pawling (V)	\$323,281,916	\$38,388,885	33	\$1,891,741	11.9%	0.6%
Pine Plains	\$312,013,435	\$5,285,665	13	\$0	1.7%	0.0%
<i>Planning Area Total</i>	<i>\$4,801,892,677</i>	<i>\$181,369,907</i>	<i>362</i>	<i>\$19,778,803</i>	<i>3.8%</i>	<i>0.4%</i>

*Source: New York State Hazard Mitigation Plan, NYSEMO, January 2008

Additionally, there are just over 1,000 acres in the towns of Beekman and North East where no data is available (“possible risk areas”). Of this land, 770 acres are in North East, the remainder in Beekman. The mapped “possible” risk area in Beekman contain approximately \$14.7 million in improvements (1.2% of the total improved value in the Town), while the “possible” risk areas in North East contain just over \$900,000 in improvements (0.3% of the total in the Town).

The GIS analysis indicates that the towns of Amenia and Dover, along with the Village of Pawling, have the greatest proportions of improvement property values in high flood risk zones, with approximately 7 to 12 % of all the total improved property value affected in each case. The Town of Dover also has the highest total dollar value of improved property within the high flood risk zone.

Preliminary Digital Flood Insurance Rate Maps (DFIRMs) for Dutchess County were released by FEMA in August 2008, and were subject to a subsequent appeals and protests period. A Letter of Final Determination was sent out in Jan 2010. As of May 2010, FEMA expects that the DFIRMS will become effective in July 2010. As such they are not strictly suitable for inclusion in this plan, and should be fully incorporated at the first plan update (though they have been added to Appendix J for reference). However, the most up to date GIS shape files for the Dutchess County DFIRMs have been obtained, which allow a preliminary assessment of differences to be made. The differences in the total value of exposed improved property between the Q3 and DFIRM datasets is presented in Table 3a.17. While the overall effect of incorporating the DFIRM data will be a reduction of exposure by around six percent in terms of improved value, the more recent studies have identified significant additional areas exposed to flood risk in the Towns of Milan and Pine Plains.

Table 3a.17
Comparison of Q3 and Post-Preliminary DFIRM Datasets
(Source: FEMA)

Municipality	Q3	Post-Preliminary DFIRM	Change from Q3 to DFIRM	
Amenia, Town of	\$28,291,482	\$26,215,475	\$2,076,007	-7%
Beekman, Town of	\$19,071,891	\$17,167,696	\$1,904,196	-10%
Dover, Town of	\$46,532,915	\$41,473,933	\$5,058,982	-11%
Milan, Town of	\$2,259,370	\$2,730,251	-\$470,881	21%
Millerton, Village of	\$2,387,749	\$2,582,311	-\$194,561	8%
Northeast, Town of	\$9,272,429	\$8,578,977	\$693,453	-7%
Pawling, Town of	\$29,879,521	\$27,052,970	\$2,826,552	-9%
Pawling, Village of	\$38,388,885	\$33,702,463	\$4,686,421	-12%
Pine Plains, Town of	\$5,285,665	\$11,319,793	-\$6,034,128	114%
<i>Total</i>	<i>\$181,369,907</i>	<i>\$170,823,868</i>	<i>\$10,546,039</i>	<i>-6%</i>

In addition to the forthcoming DFIRM data, Appendix 1 of the New York State Hazard Mitigation Plan of January 2008 contains estimates of exposed improved property values similar to those presented in Table 3a.16. State Plan exposure information was considered for use in this plan but was ultimately not selected because of the availability of more recent local data, and its use of an alternate methodology (see Appendix J for additional information). The methodology used to compile the NYSHMP figures differed from that used in this plan in that it was based on the inclusion of the full improved value of all parcels whose center points fell inside the Q3 flood hazard zones, while the analyses presented in Table 3a.16 counted all parcels which were intersected at any point by the hazard area shape files and applied the percentage of the parcel area within the hazard area to the total improved value associated with that value, since without building footprint data it cannot be automatically assumed that all improvements lie exactly at the center of their home parcels. Considering that the two analyses used different approaches and

possibly different assessed values and equalization rates, the results are quite consistent (within 10% overall) as Table 3a.17 shows.

It should be noted that while future versions of the NYSHMP may use the same approach for compiling the value of exposed property, DFIRM data will be used where available in place of the current Q3 data.

Table 3a.18
Comparison of Exposed Improved Property Values: NEDCCR/NYSEMO

Municipality	NEDCCR		NYSEMO	
	Total	Residential	Total	
Amenia, Town of	\$28,291,482	\$12,105,664	\$25,365,164	\$13,707,718
Beekman, Town of	\$19,071,891	\$15,321,856	\$24,936,022	\$18,030,225
Dover, Town of	\$46,532,915	\$28,095,993	\$56,649,745	\$31,135,900
Milan, Town of	\$2,259,370	\$1,617,815	\$4,931,800	\$4,305,400
Millerton, Village of	\$2,387,749	\$1,287,213	\$3,629,500	\$1,574,500
Northeast, Town of	\$9,272,429	\$4,640,877	\$16,981,577	\$9,400,577
Pawling, Town of	\$29,879,521	\$21,073,528	\$32,133,557	\$16,479,446
Pawling, Village of	\$38,388,885	\$9,641,501	\$28,361,040	\$8,845,278
Pine Plains, Town of	\$5,285,665	\$4,435,873	\$4,169,425	\$3,295,025
<i>Total</i>	<i>\$181,369,907</i>	<i>\$98,220,320</i>	<i>\$197,157,830</i>	<i>\$106,774,069</i>

Previous Occurrences – Floods

Floods have occurred in the Northern and Eastern Dutchess County Communities in the past, and will continue to do so in the future. The Planning Area and its component municipalities have generally been impacted by riverine flooding and shallow flooding. A picture of the flooding history of the planning area in terms of damage to private property over the last three decades or so can be derived from the recorded flood losses and payments data from the NFIP. This data is presented in Table 3a.19, along with the total number of current policies, the total coverage values, and key dates associated with the municipalities' participation in the NFIP. At the time of writing, none of the municipalities in the planning area were eligible for participation in FEMA's Community Rating System (CRS), under which municipalities implementing and enforcing floodplain management measures above beyond the NFIP minimum requirements are rewarded with discounted flood insurance premiums. All data in Table 3a.19 is current as of June 30, 2008.

The table shows that NFIP insured flood losses in the planning area have totaled more than \$1.6 million since 1979, or more than \$53,000 per year. Annualized total losses in communities other than Town of Milan, which joined the NFIP significantly before the other participating communities, are more than \$64,000 per year. Actual flood losses community-wide are likely to be higher, since this value only includes NFIP payouts and does not include losses incurred by non-policy holders, losses for which a claim was not submitted, or losses for which payment on a claim was denied.

Table 3a.19
FEMA NFIP Policy and Claim Information for Planning Area Jurisdictions

Source: www.fema.gov / www.bsa.nfipstat.com

NFIP Participating Communities in N & E Dutchess County, NY	Community Number	Date Entered NFIP	Current Effective FIRM Date	NFIP Policies In Force	Insurance in Force (\$)	Total Number of Paid Losses	Total Payments (\$)
Amenia	361332	9/24/1984	11/15/1989	26	\$6,256,600	3	\$23,329
Beekman	361333	9/5/1984	9/5/1984	35	\$7,105,500	0	\$0
Dover	361335	7/4/1988	7/4/1988	46	\$9,486,800	27	\$310,146

Table 3a.19
FEMA NFIP Policy and Claim Information for Planning Area Jurisdictions

Source: www.fema.gov / www.bsa.nfipstat.com

NFIP Participating Communities in N & E Dutchess County, NY	Community Number	Date Entered NFIP	Current Effective FIRM Date	NFIP Policies In Force	Insurance in Force (\$)	Total Number of Paid Losses	Total Payments (\$)
Milan	361339	8/10/1979	*8/10/1979	9	\$2,405,400	2	\$8,525
Millerton	360220	1/3/1985	1/3/1985	8	\$1,632,800	1	\$973
Northeast	361340	9/5/1984	9/5/1984	13	\$3,134,600	2	\$6,317
Pawling (T)	361341	1/3/1985	1/3/1985	21	\$5,168,800	8	\$31,527
Pawling (V)	361547	8/1/1984	8/1/1984	14	\$3,711,300	6	\$1,229,352
Pine Plains	361141	10/5/1984	*10/5/1984	1	\$350,000	1	\$2,170
<i>Planning Area Total</i>	--	--	--	173	\$39,251,800	50	\$1,612,339

*Base Flood Elevations have not been definitively calculated for FIRMS in these municipalities

The average NFIP payment for the planning area overall was approximately \$23,000 per individual loss. Numerically, while just over 50% of all NFIP losses in the planning area have occurred in the Town of Dover, the majority of losses in dollar terms have been incurred in the Village of Pawling: The Town of Dover has recorded 27 paid losses totaling \$310,146 in payments (an average of approximately \$15,000 per loss), while in the Village of Pawling there have been six paid losses totaling more than \$1,229,000, or 75% of the total NFIP payments for the whole planning area, with an average payment of approximately \$205,000 per loss. Despite having the second highest number of NFIP policies currently in force (35) in the planning area, the Town of Beekman has suffered no paid losses in almost 25 years, although NFIP records show two claims in the town for which no payment was made.

Repetitive Losses

FEMA defines a repetitive loss property as any insurable building for which two or more claims of more than \$1,000 were paid by the NFIP within any rolling 10-year period, since 1978. A repetitive loss (RL) property may or may not be currently insured by the NFIP. Currently there are over 122,000 repetitive loss properties nationwide, and approximately 7,000 in New York State.

According to FEMA repetitive loss property records, there are currently four “non-mitigated” repetitive loss properties located in the planning area as of July 31, 2008. These properties are associated with a total of 13 individual losses and more than \$123,000 in NFIP claims payments under since September 1999 (the earliest recorded date of loss). The approximate locations of RL properties are plotted in Figure 3a.15 in comparison with the extent of the mapped A/AE Zones (the Base/100-year floodplain). Three of the RL properties are located in the FIRM “A” Zone (the “100-Year Floodplain”), while the fourth is located in the 500-Year floodplain.

Figure 3a.15 does not intend to show the precise location of any RL property, since the associated address/owner/loss data is subject to the 1974 Privacy Act. This legislation prohibits the public release of any information regarding individual NFIP claims or information which may lead to the identification of associated individual addresses and property owners. However, while this information is not available to the general public, the County may subsequently obtain comprehensive RL property data from FEMA for the purposes of targeted mitigation of RL areas or individual RL structures.

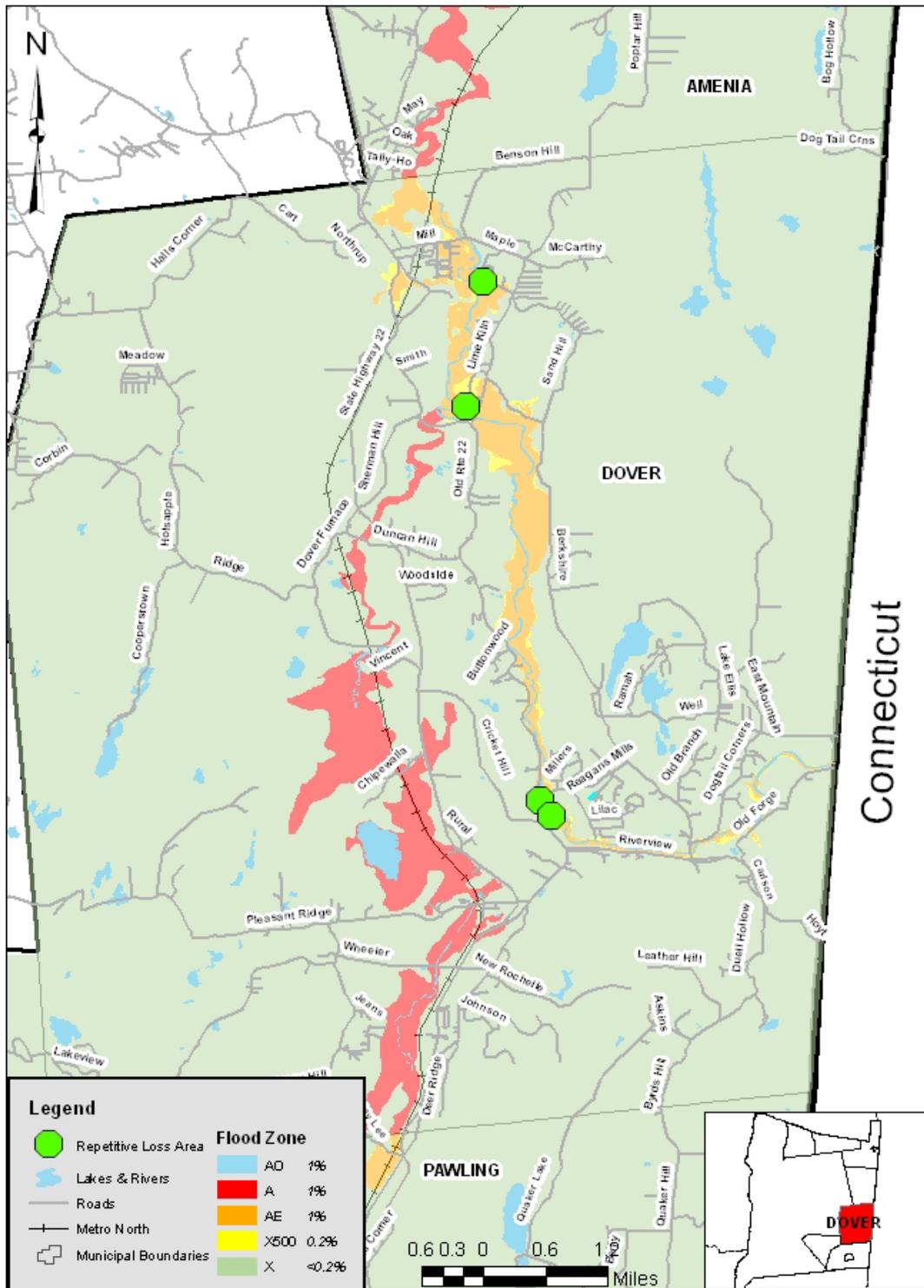
All four of the identified RL properties in the planning area are single family residences in the Town of Dover. More than half of the total dollar losses associated with RL properties were incurred by just one

of these properties, which suffered paid losses on three separate occasions. Two of the other identified RL properties each suffered losses on two occasions and the fourth RL property has suffered six paid losses. Overall these four RL properties (2% of NFIP insured properties) have been associated with 8% of the total paid flood losses in the planning area.

In response to weather events during 2005, 2006 and the April 2007 Nor'easter (FEMA-1692-DR-NY) that resulted in repetitive flooding of some properties in the 100-Year Floodplain, the Town of Dover submitted a project application in December 2007 entitled "Dover Tenmile River Floodplain Restoration Project- Phase 1" (FEMA application NY-2008-009) for Repetitive Flood Claims (RFC) Program consideration. At the time of application, the Town of Dover did not have a FEMA-approved All Hazards Mitigation Plan. The project application was not funded.

In response to site visits to inspect flooding-related damage at that time, NYS Senator Vincent Leibell convened a meeting in June 2007 of elected officials in the nine Northern and Eastern Dutchess County communities of his district to investigate the feasibility of a multi-jurisdictional All Hazards Mitigation Planning Grant. The seven townships (Town of Amenia, Beekman, Dover, North East, Pawling, Pine Plains and Milan) and two villages (Millerton and Pawling) all agreed to participate. In August 2007, the communities received a FEMA AHMP planning grant for the development of the Dutchess Communities Regional All Hazards Mitigation Plan.

Figure 3a.15: Northern and Eastern Dutchess County NFIP Repetitive Loss Properties: Approximate Locations



Source: US Census Borough, Putnam, Dutchess, and Columbia counties area hydrography, 2007; Real Property Tax Service Agency, Municipal Boundaries - Towns, Cities, Villages, 2008; ESRI, US Counties, 2005; ESRI, NY Major Roads, 2007; USGS DEMs, NY State; US Census Borough, Railroads, NY State, 2001

None of the four identified Repetitive Loss Properties in the planning area have been identified as “Severe” Repetitive Loss Properties, where a Severe RLP is defined by FEMA as a residential property

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

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

Flood Disaster Declarations

The New York State Hazard Mitigation Plan reports Dutchess County as having been affected by six Presidential Disaster Declarations related to flooding from 1953 to December 2008, as summarized in Table 3a.20. The Table also indicates which form of post-disaster assistance the County became eligible for after the declaration, and the estimated total damages attributed to the event, where known.

Through the Public Assistance (PA) Program, FEMA 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 (PNP) organizations. The Individual Assistance Program (IA) provides money or direct assistance to individuals, families and businesses in an area whose property has been damaged or destroyed and whose losses are not covered by insurance. It is meant to assist with critical expenses that cannot be covered in other ways, rather than to restore damaged property to its condition before the disaster.

Disaster #	Description (Eligible Federal Assistance)	Declared Date (Incident Period)	Damages*
DR-0311	Severe storms and flooding (Dutchess County – PA only)	September 13, 1971	?
DR-0401	Severe storms and flooding (Dutchess County – PA and IA)	July 20, 1974	?
DR-1095	Severe flooding (Dutchess County – PA and IA)	January 24, 1996 (1/19/1996 – 1/30/1996)	\$160m
DR-1296	Flooding – Hurricane Floyd (Dutchess County – IA only)	September 19, 1999 (9/15/1999 – 9/18/1999)	\$62m
DR-1335	Flooding (Dutchess County – PA only)	July 21, 2000 (5/3/2000 – 8/12/2000)	\$35m
DR-1692	Severe Storms and Flooding (Dutchess County – IA and PA)	April 27, 2007 (4/14/2007 – 4/18/2007)	\$13

*Includes damages in areas outside Dutchess County

According to data made available by the National Climatic Data Center (NCDC), there have been 33 recorded flood events affecting Dutchess County between June 1994 and June 2008 (including those in Table 3a.20), causing one death and reported damages totaling just over \$14 million, including damages incurred outside Dutchess County. Table 3a.21 presents significant flood events recorded in Dutchess

County in the NCDC database for which some detailed information was available regarding the impacts felt by municipalities in Northern and Eastern Dutchess County, supplemented with information found in the individual communities' Flood Insurance Studies (FIS) and reports received from local sources.

Table 3a.21			
Selected Flood Events affecting Northern and Eastern Dutchess County			
<i>(Source: NOAA NCDC, FEMA FIS, Local Sources)</i>			
Date	Affected Municipalities	Description	Reported Property Damage*
8/1955	Amenia	The August 1955 flood resulted in a dam failure at Lake Amenia and the closure of five bridges and State Route 343.	Not Recorded
5/1984	Amenia	Flooding impacted the upper reach of the Tenmile River, resulting in extensive damage to commercial and residential areas of the town. Flooding along Amenia Stream was also experienced during this event, including partial inundation of Church Street, Main Street, and State Route 343, and forced the evacuation and closure of Calsi's Market.	Not Recorded
10/28/1995	Amenia	Heavy rains produced flash floods across several streams in Dutchess County which caused mudslides and flooded roads in Amenia.	\$10,000
1/19/1996	Amenia North East Pawling (Town)	An intense area of low pressure which was located over the Mid-Atlantic region on Friday morning January 19th produced unseasonably warm temperatures, high dewpoints and strong winds. This resulted in rapid melting of one to three feet of snow. In addition to the rapid snowmelt one to three inches of rain fell as the system moved northeast along the coast. This resulted in widespread flooding across Dutchess County. Federal Disaster Assistance was made available by presidential declaration. Small streams flooded across the entire county which resulted in many roads being washed out. Extensive flooding also occurred along the Hudson River and Wappingers Creek. In the higher terrain of eastern Dutchess County road washouts were more numerous. In the Town of Pawling 50% of town roads were washed out. In the Towns of North East and Amenia widespread and severe damage also occurred to local roads.	\$7,000,000
1/18/1999	Amenia	Mild weather and rain resulted in Wassaic Creek overflowing its banks from January 18 to January 19. County Route 81 was inundated with water resulting in several homes having to be evacuated.	\$10,000
9/16/1999	Dover	The remnants of Hurricane Floyd moved up the eastern seaboard on September 16 and during the early hours on September 17. The storm brought both high winds and exceptionally heavy rainfall to eastern New York, which included a large swath of 3 to 6 inch amounts. Locally higher amounts of rainfall, exceeding a foot, fell in these areas. Specific rainfall amounts included 6.12 inches at Albany International Airport, the highest ever officially recorded from any given storm. The rain produced widespread flooding across the region, which	\$900,000

SECTION 3a - RISK ASSESSMENT: HAZARD PROFILES

Table 3a.21 Selected Flood Events affecting Northern and Eastern Dutchess County <i>(Source: NOAA NCDC, FEMA FIS, Local Sources)</i>			
Date	Affected Municipalities	Description	Reported Property Damage*
		proved very destructive and in one case, deadly. A nine-year-old girl in Wingdale (Town of Dover), Dutchess County, drowned attempting to cross a flooded driveway, which had become a raging torrent. Many communities and counties declared a State of Emergency during the overnight of September 16 and 17.	
12/17/2000	Pine Plains	A complex storm system began to evolve on Saturday December 16 across the Mississippi Valley. A surface low tracked north into the Eastern Great Lakes by December 17. At the same time, the associated upper level trough became negatively tilted as it moved toward the northeast on Sunday. This allowed for rapid cyclogenesis. Unseasonably warm and moist air was transported northward from the Gulf of Mexico. This scenario brought a record breaking rainstorm to eastern New York. On average, rainfall ranged between 2 and 4 inches with some locally higher amounts. At Albany International Airport, the 2.79 inch rainfall for December 17 easily shattered the previous daily precipitation record of 1.34 inches set back in 1970. This was also the third wettest day ever in recorded December history. A few other specific localities included 3.97 inches at Stormville in Dutchess County. Street flooding was reported in many Dutchess County communities including Pine Plains.	\$35,000
10/19/2005	Dover, Beekman, Pawling, Milan	A stalled rainy weather front caused flooding of the Ten Mile River which affected the Towns of Dover, Pawling, and Beekman. This event caused \$468,000 in public and private property damage in the Town of Dover, according to local sources. Local sources also report that flooding in the Town of Milan caused unspecified damages for which repair costs were estimated at \$32,794.	Not Recorded
3/29/2005	North East	In the Town of North East, Mill Road was closed due to flooding.	Not Recorded
4/16/2007	Dover, Milan	Heavy rain led to widespread flooding of small streams and creeks across the county, which began during the early morning hours of Monday, April 16th, and persisted into Wednesday morning on the 18th. Moderate flooding also was recorded along the Tenmile River at Webatuck (Town of Dover), which crested at 11.23 feet at 16:45 EST on the 16th. Widespread flooding led to numerous road closures, which included large stretches of the Taconic State Parkway in both directions throughout the county. Flood damage in the Town of Milan resulted in an application to FEMA for Public Assistance, from which the Town received \$30,377.	\$5,700,000
10/2007	Eastern	A stalled weather front of rain and wind in eastern	\$470,000

Table 3a.21			
Selected Flood Events affecting Northern and Eastern Dutchess County			
<i>(Source: NOAA NCDC, FEMA FIS, Local Sources)</i>			
Date	Affected Municipalities	Description	Reported Property Damage*
	Dutchess County	Dutchess County caused significant flooding and damages to public and private property.	
3/3/2008	Millerton Pawling (Town)	Heavy rainfall led to flooding across portions of Dutchess county. Several roads were closed, including Route 199 near Red Hook, Route 292 in Pawling, and Route 22 in Millerton.	\$10,000

*May include damage incurred outside the Northern and Eastern Dutchess County Communities Planning Area

For some individual municipalities, the Flood Insurance Studies also contain some more general information pertaining to the sources and extent of flooding:

Town of Beekman (FIS dated 1984): Community representatives identified Fishkill Creek, a tributary to Fishkill Creek, Sylvan Lake Outlet, Frog Hollow Brook, and Whaley Lake Stream as having caused flood damage in the past. The three greatest floods [prior to the compilation of the FIS in 1984] occurred in September 1938, August 1955, and October 1955, all the result of severe coastal storms. Seasonal residential properties have been subject to flooding from Sylvan Lake Outlet. The most highly flood-prone areas along Frog Hollow Brook extend from the Hamlet of Greenhaven to the confluence with Fishkill Creek. Along Whaley Lake Stream, the downstream areas between its confluence and the Hamlet of Poughquag are subject to inundation.

Town of Dover (FIS 1988): There have been a number of major floods in the Tenmile River basin in the last 50 years [prior to 1988]. The three greatest floods occurred in September 1938, August 1955, and October 1955. Residential development along the Tenmile River near Dover Plains, South Dover, and Dogtail Corners are subject to inundation. The area near Dover Plains along Wells Brook is also subject to inundation. This area contains industrial and residential developments.

Village of Millerton (FIS 1984): Highly flood-prone areas exist along Webatuck Creek throughout its entire length. Some commercial and residential developments are presently situated in these floodplain areas. The area most often inundated by Webatuck Creek is located between State Route 22 and North Center Street. Kelsey Brook flows through an area developed mostly with single-family residences. Areas adjacent to Kelsey Brook are subject to inundation, with the most flood-prone areas existing in the eastern portion of the village along US Route 44.

Town of North East (FIS 1984): The steep overbanks of Webatuck Creek produce very rapid runoff and place a heavy burden on low-lying channel areas. As a result, the creek is frequently flooded throughout its entire length. The most heavily developed area subject to inundation is located north of Millerton, adjacent to State Route 22. Along Kelsey Brook, low-lying areas adjacent to US Route 44 are also subject to inundation.

Town of Pawling (FIS 1984): The East Branch Croton River and its surrounding wetland area contain industrial and commercial developments that have experienced periodic inundation from the river after heavy rainfall. Residential development in the hamlet of Holmes and industrial development near Holmes are subject to flooding from a tributary to the East Branch Croton River. Near the corporate limits with the Town of Dover, a number of commercial establishments have suffered flood damage from

rising waters of the Swamp River. The steep overbank areas of Whaley Lake Stream promote rapid runoff rates and place a heavy burden on low-lying areas adjacent to the streambed areas.

Village of Pawling (FIS 1984): Both the East Branch Croton River and the Swamp River have wide and relatively poorly drained floodplains. These flat areas, which are subject to frequent inundation, contain primarily residential developments that have suffered flood damage in the past after heavy rainfalls.

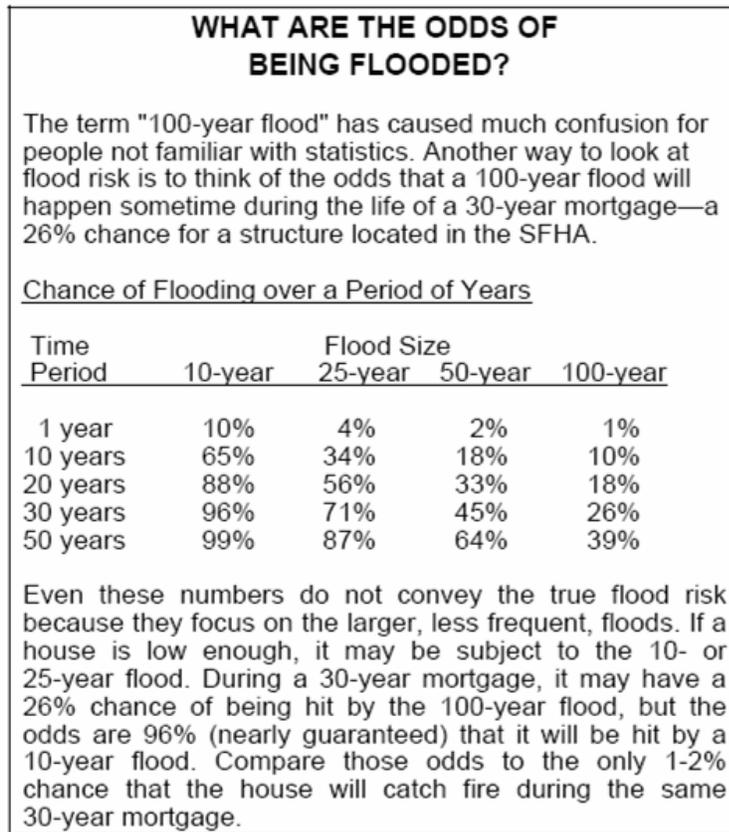
Probability of Occurrence – Floods

The probability of occurrence of a flood at a given location (the odds of being flooded) is expressed in percentages as the chance of a flood of a specific magnitude occurring in any given year. The “100-year flood” has a 1% chance of occurring in any given year. The 100-year flood is often also referred to as the “base flood”. This probability of occurrence might imply that a 100-year flood would reoccur only once every 100 years; in reality, this is not the case. A 100-year flood can happen multiple times in a single year, or not at all for more than 100 years. Properties located in FEMA-mapped A- and V-Zones are within the footprint of the 100-year floodplain. FEMA A-Zones represent the 100-year floodplain. For all floodplains, there is an associated water surface elevation. This elevation is unique to any given location on the map (in other words, 100-year flood levels vary from one community to the next in the Northern and Eastern Dutchess County Planning Area, and also within individual communities).

Within the 100-year floodplain, flooding can occur at less than the 100-year flood level, and also more than the 100-year flood level. The 100-year flood represents a flood of high magnitude – it is a deep and widespread event. The 500-year flood is of a greater magnitude, and would be deeper and more widespread than a 100-year event. However, it is not as likely to occur. Smaller floods, with magnitudes of 10-years or 50-years for example, are also possible within the 100-year floodplain. These are not as deep or as widespread as a 100-year flood would be, however, they are much more likely to occur.

The term “100-year flood” can often be confusing to someone not intimately familiar with flooding or statistics. FEMA’s *NFIP Floodplain Management Requirements: a Study Guide and Desk Reference for Local Officials* (FEMA-480), suggests that another way to look at flood risk is to think of the odds that a 100-year flood will happen some time during the life of a 30-year mortgage of a home in the floodplain. Figure 3a.16 illustrates these odds, over various time periods for different size floods. In any given year, a property in the 100-year floodplain has a 10 percent chance of being flooded by a 10-year flood, and a 1 percent chance of being flooded by a 100-year flood. This may not sound particularly risky at first glance. However, over a 30-year period, that same location has a 96 percent chance of being flooded by a 10-year flood and a 26 percent chance of being flooded by a 100-year flood.

Figure 3a.16: Odds of Being Flooded



Ice Jams

Description – Ice Jam

Ice jams form when ice floating downstream in a river stalls and begins to build into a jam, forming a dam. The “reservoir” behind the dam quickly fills with water until out of bank flooding occurs. The observed effect can be very similar to flash flooding, and sudden flooding downstream may be caused by the sudden failure or release of the ice jam. Ice jams generally form at locations where the ice transport downstream is reduced by an obstruction or a significant hydrologic change. Natural obstructions in the river can include bends, intact sheet ice cover, or a decrease in channel slope. Man-made obstructions can include bridges, existing dams, waterline crossings, and other constructions in the channel.

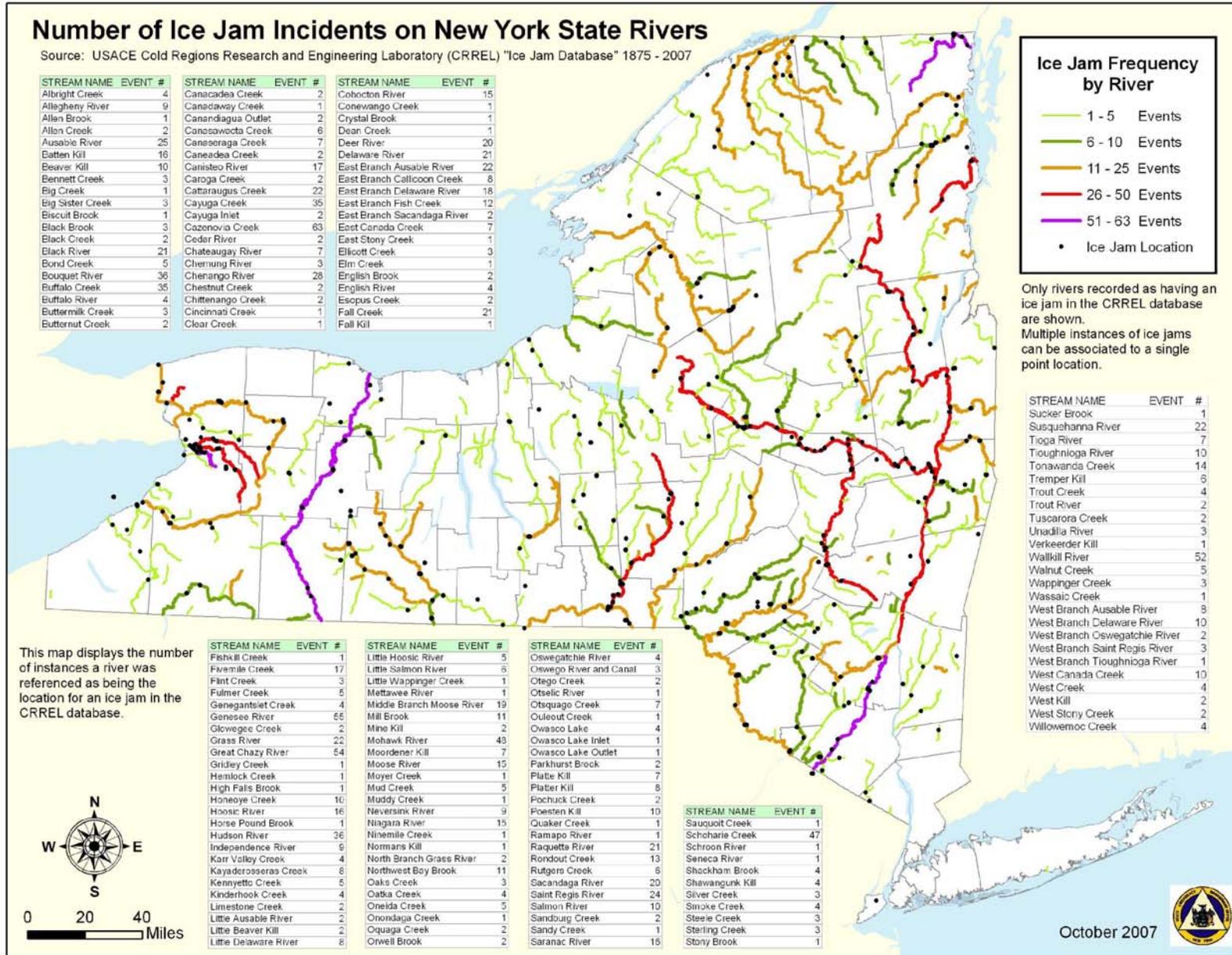
Ice jams and resulting floods can occur during fall freeze-up from the formation of frazil ice (a collection of loose, randomly oriented needle-shaped ice crystals) during midwinter periods when stream channels freeze solid forming anchor ice, and during spring breakup when rising water levels from snowmelt or rainfall break existing ice cover into large floating masses that lodge at bridges or other constructions. Damage from ice jam flooding may exceed that caused by open water flooding – flood elevations are usually higher than predicted for free-flow conditions and water levels may change rapidly. During cold weather, there is a reduction in evapotranspiration, infiltration (due to frozen ground) and surface storage, (due to the filling of ground depressions with snow and ice), which result in more water being delivered to the channel. Therefore for equal amounts of total available water during cold and warm seasons, the amount of excess water available for runoff will be greater during the cold season. Additional damage may be caused by the force of floating ice colliding with buildings, other structures, and automobiles.

Location – and Extent: Ice Jams

The identification of particular areas prone to ice jam flooding is difficult since the hazard can be extremely localized. However, available research and historic data suggests that ice jam flood hazard is most common in areas of flat terrain where the climate included extended periods of temperature below zero. Ice jams are very common in the north east United States, and according to data from the USACE Cold Region Research and Engineering Laboratory (USACE CRREL), 1,442 ice jam events have been recorded in New York State between 1867 and 2008, a number exceeded only by the State of Montana.

Figure 3a.17 shows the locations of ice jam incidents that have been recorded by the CRREL in New York State from 1875 to 2007. Multiple instances of ice jams may be associated with a single point location.

Figure 3a.17: Ice Jam Incidents in New York State



Previous Occurrences – Ice Jams

The USACE CRREL mapping indicates that ice jam incidents for which some details are available have been recorded at one location within the Northern and Eastern Dutchess County Planning Area since 1875. Details have been recorded by CRREL for one ice jam incident at this location:

At 11:00 PM on Monday, January 18, 1999 an ice jam was reported on the Wassaic Creek in the Town of Amenia. It caused the creek to back up onto Country Route 81 and resulted in the evacuation of homes. Country Route 81 is half way between State Route 22 and South Amenia Road in the town of Amenia. At 4:13 AM on Tuesday, January 19, the ice jam was still continuing to cause water to back up onto County Route 81 in Amenia. At 4:44 AM on that same day, the Dutchess County Sheriff's Office reported that the ice jam had dissipated but that the water was still flowing across the road.

In addition to data sourced from USACE CRREL, local sources have indicated that ice jam events occur on the Roe Jan Creek in the Jackson Corners area of the Town of Milan.

Probability of Occurrence – Ice Jams

Due to the nature of the terrain and the climate in Dutchess County, ice jam events are essentially certain to occur in the future, although whether or not such events will cause significant damage is less easy to predict, since records of actual damage caused by ice jams are scarce. The available data also does not easily allow for a meaningful average number of occurrences per year to be computed, since the actual number of recorded incidents is very low.

Earthquakes

Description – Earthquakes

FEMA defines the term “earthquake” as a sudden, rapid shaking of the Earth caused by the breaking and shifting of rock beneath the Earth’s surface. This movement forces the gradual buildup and accumulation of energy. Eventually, strain becomes so great that the energy is abruptly released, causing the shaking at the earth’s surface which we know as an earthquake.

According to the USGS Earthquake Hazards Program, most earthquakes (approximately 90%) occur at the boundaries where the plates meet, although it is possible for earthquakes to occur entirely within plates. Dutchess County is significantly distant from any plate boundaries. Regardless of where they are centered, earthquakes can impact locations at – and well beyond – their point of origin. They are often accompanied by “aftershocks” – secondary quakes in the earthquake sequence. Aftershocks are typically smaller than the main shock, and can continue over a period of weeks, months, or years from the main shock. In addition to the effects of ground shaking, earthquakes can also cause landslides and liquefaction under certain conditions. Liquefaction occurs when unconsolidated, saturated soils exhibit fluid-like properties due to intense shaking and vibrations experienced during an earthquake. Together, ground shaking, landslides, and liquefaction can damage or destroy buildings, disrupt utilities (i.e., gas, electric, phone, water), and sometimes trigger fires.

Location – Earthquakes

Earthquakes are possible within any of Dutchess County’s communities. Figure 3a.18 show an earthquake hazard map for the United States prepared by the USGS Earthquake Hazards Program. It shows that the earthquake hazard is low relative to other parts of the country (for example the west coast of the USA), but the possibility for noticeable earthquakes does exist in New York State.

Figure 3a.18: Earthquake Hazard Map of the United States

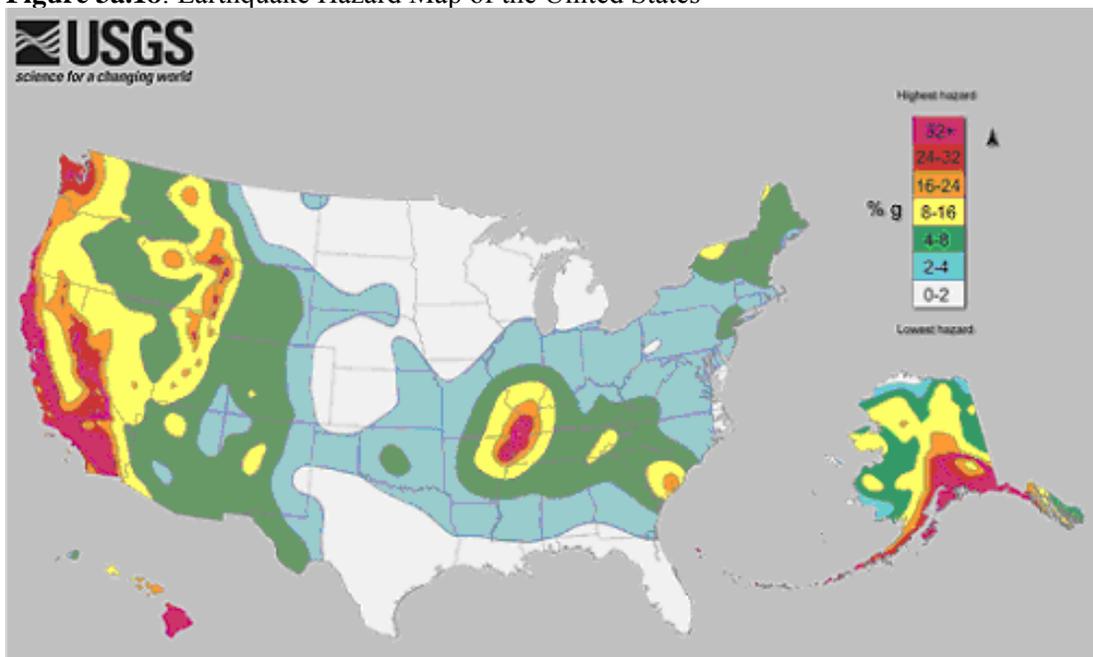
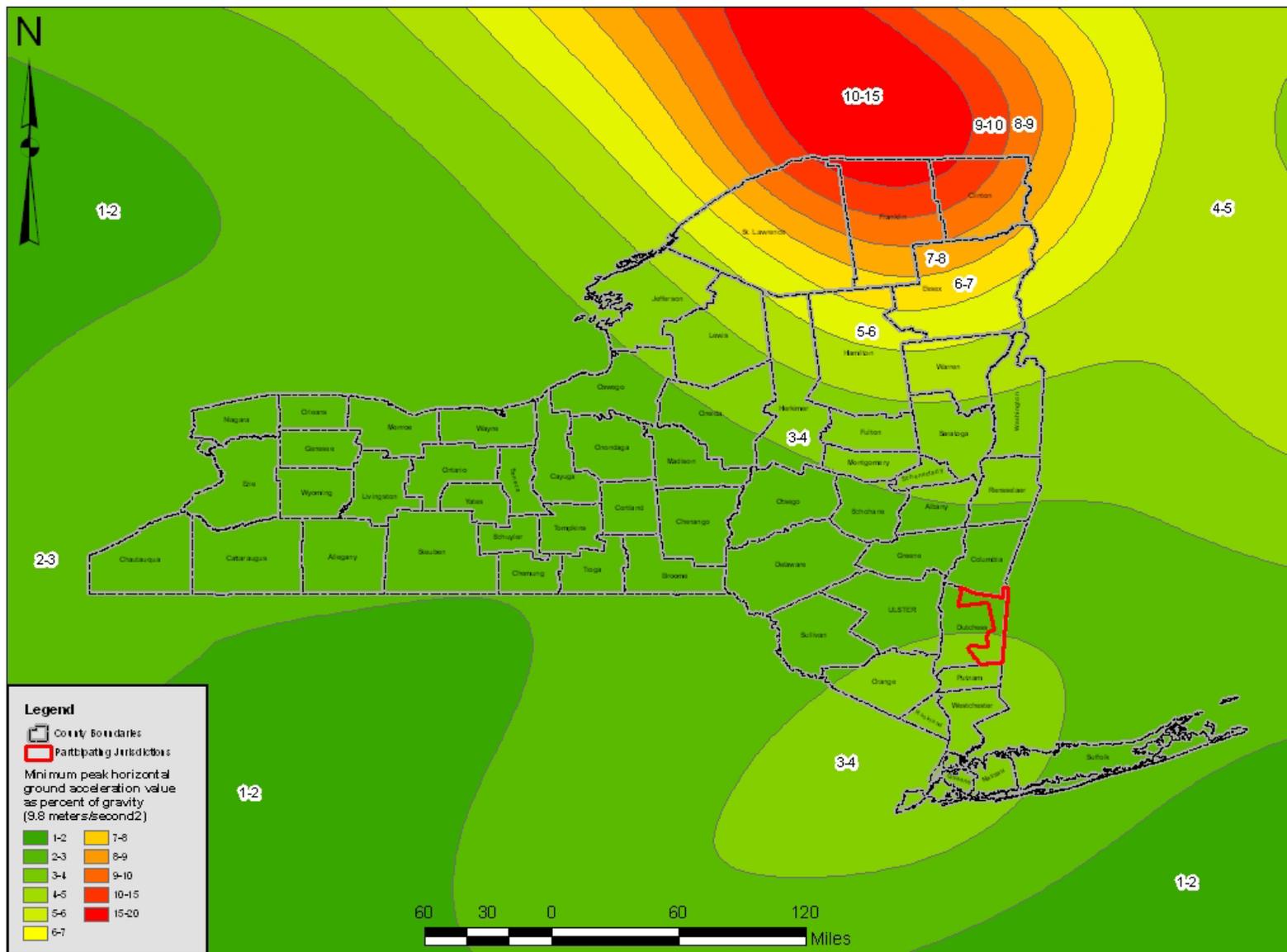


Figure 3a.19: Earthquake Hazard Map of New York State



Source: U.S.G.S. National Seismic Hazard Maps, 2008; Property Tax Services Agency, Municipal Boundaries - Towns, Cities, Villages, 2008; ESRI, US Counties, 2005

Extent – Earthquakes

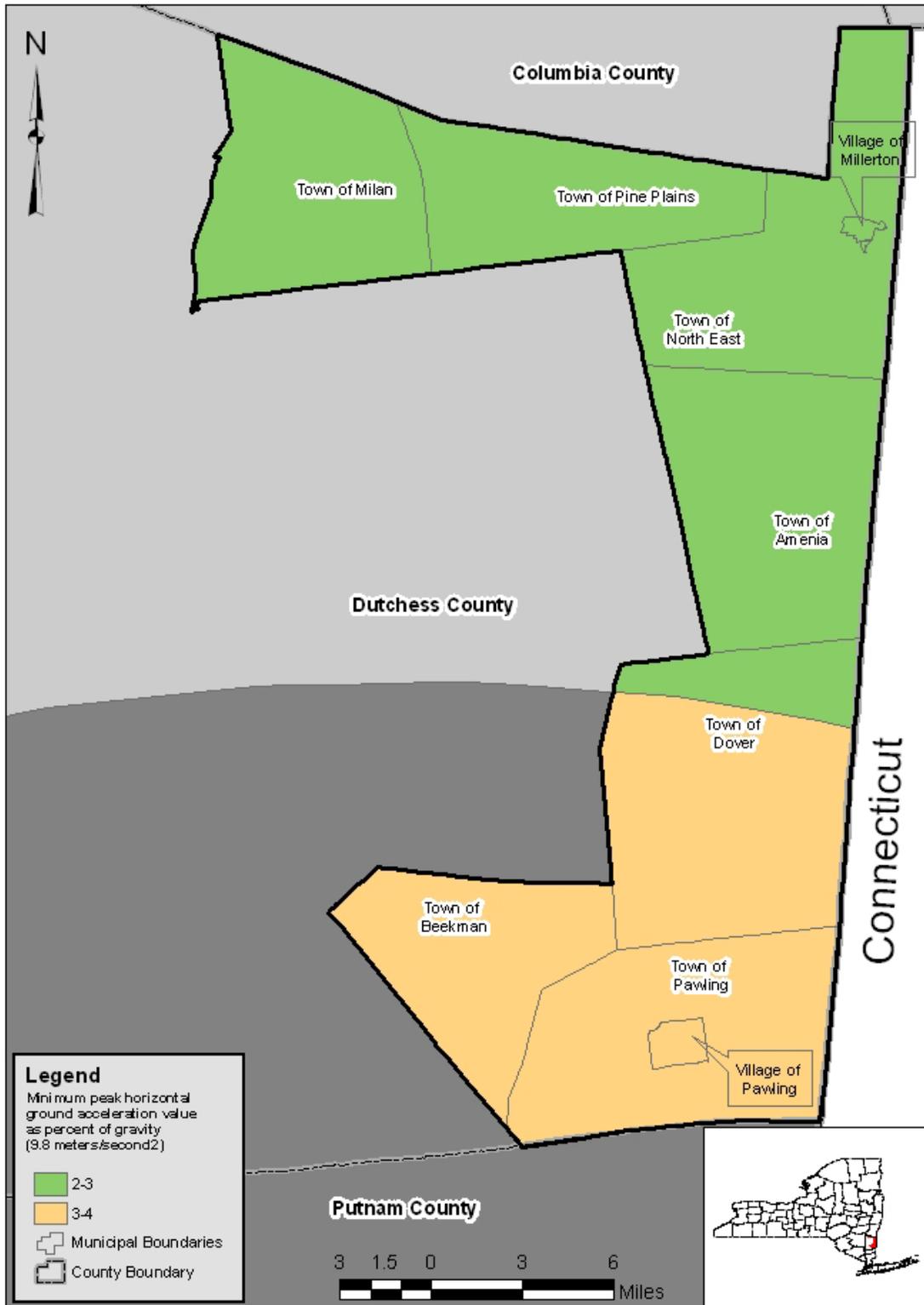
All of Dutchess County has some degree of exposure to earthquake hazard, as shown in Figure 3a.19. The severity of an earthquake at a given location depends on the amount of energy released at the epicenter, and the location's distance from the epicenter. The terms "magnitude" and "intensity" are two terms used to describe the severity of an earthquake. An earthquake's "magnitude" is a measurement of the total amount of energy released while its "intensity" is a measure of the effects of an earthquake at a particular place. Another way to express an earthquake's severity is to compare its acceleration to the normal acceleration due to gravity. Peak Ground Acceleration (PGA) measures the rate of change in motion of the earth's surface and expresses it as a percent of the established rate of acceleration due to gravity (9.8 m/sec²). Figure 3a.20 shows that, for northern and eastern Dutchess County, PGA values of between 2 and 4%g have a 10 percent chance of being exceeded over 50 years. While there are two mapped ranges of exposure, it is important to note that the effects at these low levels would be very similar.

An approximate relationship between PGA, magnitude, and intensity is shown in Table 3a.22. Using Table 3a.22, one can approximate that, for an earthquake of expected severity for northern and eastern Dutchess County and its participating jurisdictions (PGA values of 2 to 4%g), perceived shaking would be light to moderate (depending upon the distance from the epicenter) and potential damage could range from none to very light (also depending upon the distance from the epicenter).

PGA	Magnitude	Intensity	Perceived Shaking	Potential Damage
< 0.17	1.0 - 3.0	I	Not Felt	None
0.17 - 1.4	3.0 - 3.9	II - III	Weak	None
1.4 - 9.2	4.0 - 4.9	IV - V	IV. Light V. Moderate	IV. None V. Very Light
9.2 - 34	5.0 - 5.9	VI - VII	VI. Strong VII. Very Strong	VI. Light VII. Moderate
34 - 124	6.0 - 6.9	VIII - IX	VIII. Severe IX. Violent	VIII. Moderate/Heavy IX. Heavy
> 124	7.0 and higher	X and higher	Extreme	Very Heavy

An earthquake with a 10 percent chance of exceedance over 50 years in Dutchess County would have a PGA of 2 to 4%g and an intensity ranging from only IV to V, which would result in light to moderate perceived shaking, and damages ranging from none to very light. For comparison purposes, an earthquake of intensity IV on the Modified Mercalli Scale would most likely cause vibrations similar to heavy trucks driving over roads, or the sensation of a jolt. Hanging objects would swing; standing cars would rock; windows, dishes and doors would rattle; and, in the upper ranges of intensity IV, wooden walls and frames would creak. An earthquake of intensity V on the Modified Mercalli Scale would be felt outdoors, awaken sleepers, disturb or spill liquids, displace small unstable objects, swing doors, and cause shutters and pictures to move.

Figure 3a.20: Northern and Eastern Dutchess County Earthquake Hazard Zones



Source: U.S.G.S. National Seismic Hazard Maps, 2008; Property Tax Service Agency, Municipal Boundaries - Towns, Cities, Villages, 2008; ESRI, US Counties, 2005

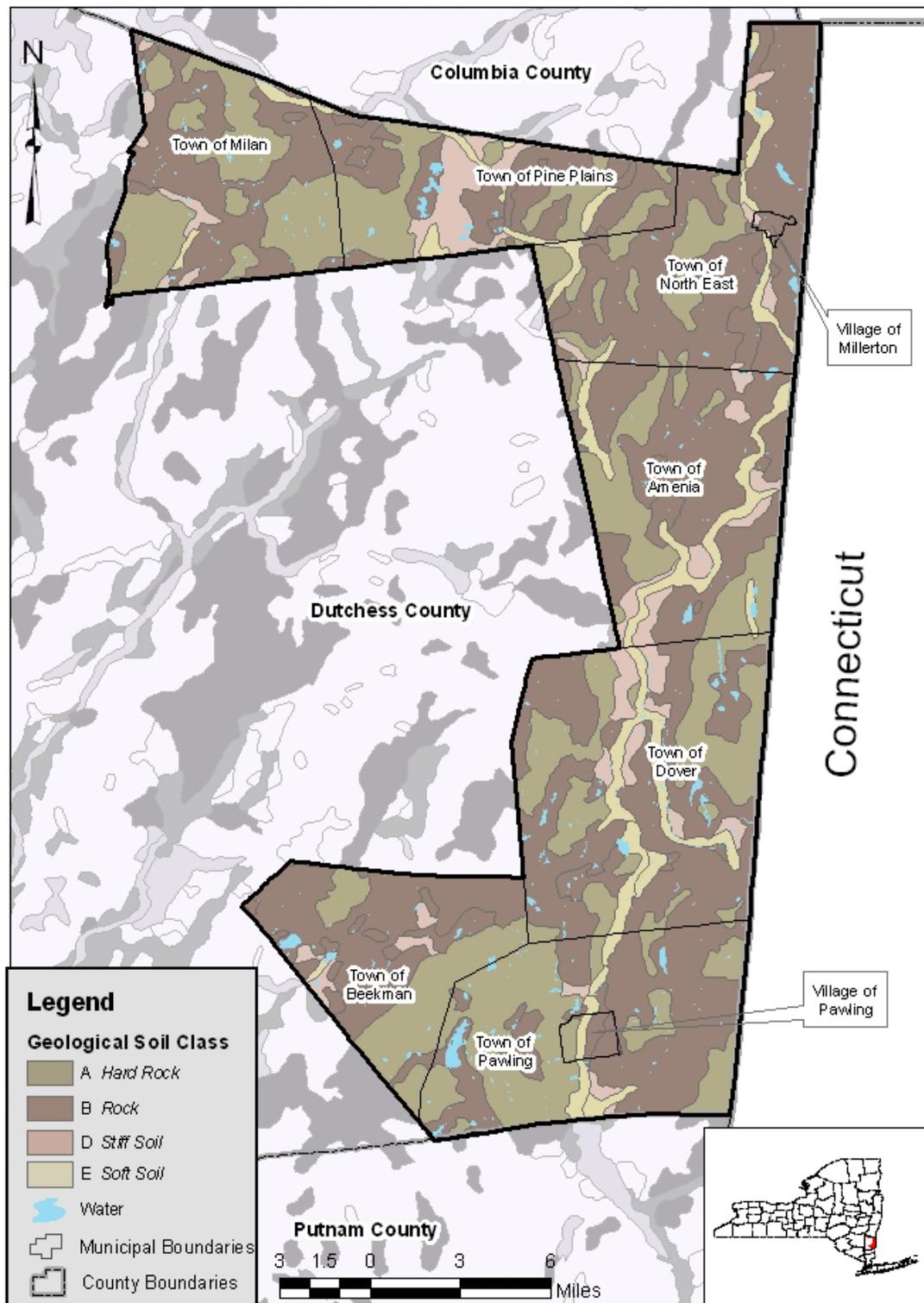
As noted in the New York State Hazard Mitigation Plan, soil type can have an impact on the severity of an earthquake at a given location. For example, soft soils (i.e., fill, sand) are more likely to amplify ground motion during an earthquake. Liquefaction is also more likely to occur in areas of soft soils. In contrast, harder soils (i.e., granite) tend to reduce ground motion during an earthquake. Figure 3a.21 shows soil types in five basic categories with varying degrees in likelihood of amplifying the affects of an earthquake, with Category A being far less likely to amplify the seismic motion than Category E. The soil types and surficial materials have been combined with the seismic hazards by NYSEMO/NYSGS to provide an adjusted, more refined picture of the earthquake hazard in terms of earthquake spectral acceleration*, which is a better indicator of damage to buildings, which in some areas of the state results in a significantly higher earthquake hazard than is evident from the simple USGS mapping of Figure 3a.22.

Table 3a.23 presents the areas of earthquake hazard risk in each municipality in the planning area by the adjusted spectral acceleration (SA) with a 2% probability of occurrence in 50 years, using the GIS data mapped in Figure 3a.22. Table 3a.24 presents the values of improved property within those hazard areas for each municipality. For clarity and conciseness these Tables 3a.23 and 3a.24 have omitted the acreages and improved values in areas of the lowest risk hazard band included in Figure 3a.22. No land or improved property in the planning area was found to fall within the highest risk band.

These tables indicate that the municipalities with the highest prevalence of soil types most likely to amplify the effects of seismic activity (the two highest risk bands) are the towns of Amenia and Dover and the Village of Amenia. The same three municipalities have the highest proportions of improved property values within the two highest risk areas. All other municipalities have less than 10% of their improved property in these areas. The Town of Milan appears to be at the least risk from earthquake damage, since it has the highest proportions of both land and improved property in the lowest risk band.

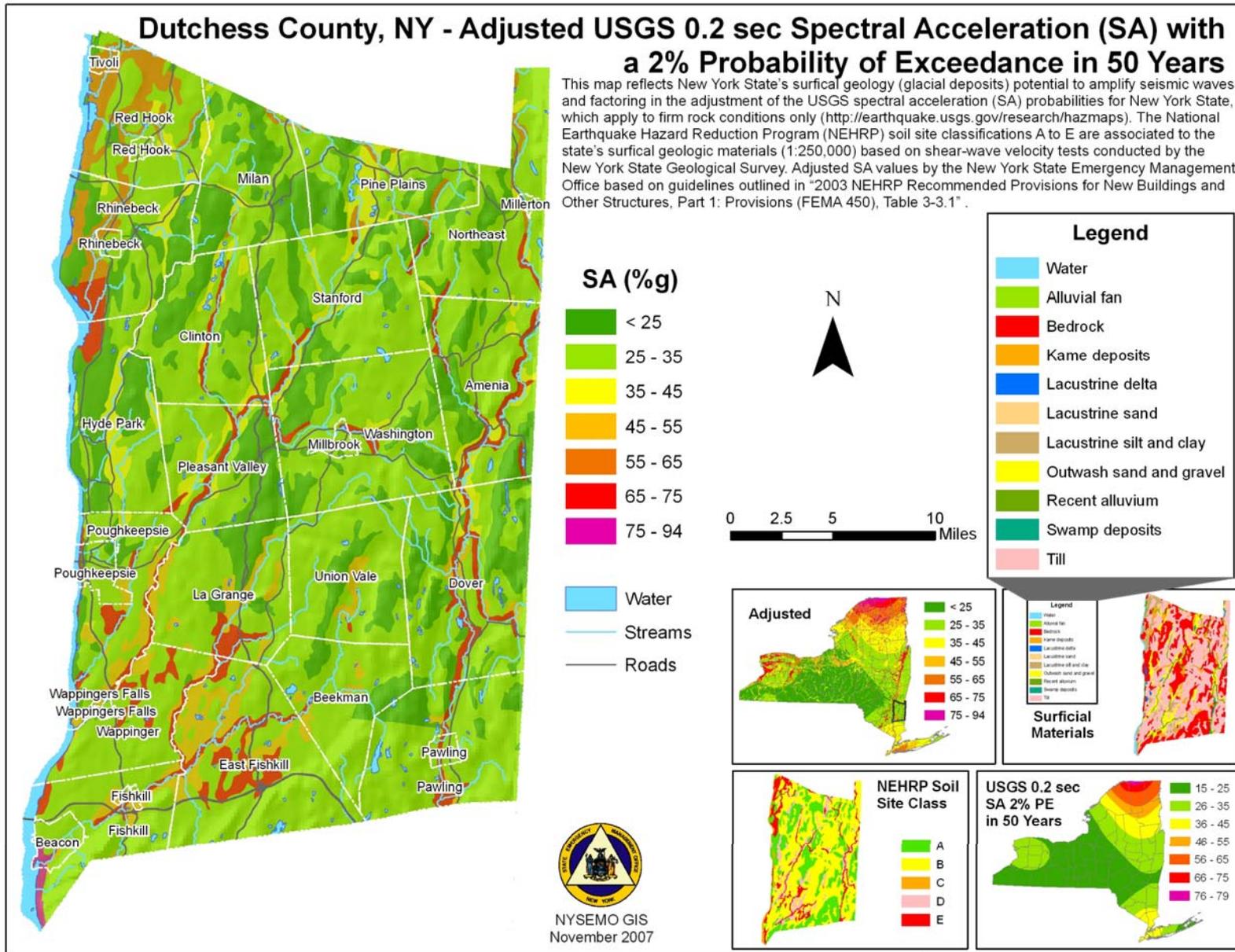
*While PGA (peak ground acceleration) is what is experienced by a particle on the ground, **spectral acceleration** is approximately what is experienced by a building, as modeled by a particle on a massless vertical rod having the same natural period of vibration as the building (USGS).

Figure 3a.21: Northern and Eastern Dutchess County Geological Soil Classification



Source: NYS Geological Survey, NEHRP Soil Class Data; ESRI, US Counties, 2005, Property Tax Service Agency, Municipal Boundaries - Towns, Cities, Villages, 2008; Dutchess County area hydrography, 2007

Figure 3a.22: Dutchess County Earthquake Hazard: Combined Seismic Risk/Soils Type



SECTION 3a - RISK ASSESSMENT: HAZARD PROFILES

Table 3a.23
Northern and Eastern Dutchess County Earthquake Hazard: Adjusted UGS 0.2 Sec Spectral Acceleration: Acreages
 Source: NYSEMO/NYS Geological Survey

Municipality	Total Acres	SA (%g) 25-35		SA (%g) 35-45		SA (%g) 45-55		SA (%g) 55-65		SA (%g) 65-75	
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Amenia	27,951	15,266	54.6%	2,338	8.4%	0	0.0%	0	0.0%	3,309	11.8%
Beekman	19,653	15,542	79.1%	0	0.0%	898	4.6%	0	0.0%	138	0.7%
Dover	36,025	19,132	53.1%	1,387	3.9%	1,077	3.0%	0	0.0%	3,520	9.8%
Milan	23,395	11,170	47.7%	898	3.8%	0	0.0%	517	2.2%	0	0.0%
Millerton	385	330	85.8%	41	10.6%	0	0.0%	14	3.7%	0	0.0%
North East	27,544	20,305	73.7%	643	2.3%	0	0.0%	1,187	4.3%	824	3.0%
Pawling (T)	27,696	22,024	79.5%	0	0.0%	457	1.6%	0	0.0%	1,236	4.5%
Pawling (V)	1,259	1,030	81.9%	0	0.0%	0	0.0%	0	0.0%	228	18.1%
Pine Plains	19,921	9,671	48.5%	2,880	14.5%	0	0.0%	1,268	6.4%	0	0.0%
<i>Planning Area Total</i>	<i>183,829</i>	<i>114,471</i>	<i>62.3%</i>	<i>8,186</i>	<i>4.5%</i>	<i>2,432</i>	<i>1.3%</i>	<i>2,986</i>	<i>1.6%</i>	<i>9,256</i>	<i>5.0%</i>

Table 3a.24
Northern and Eastern Dutchess County Earthquake Hazard: Adjusted UGS 0.2 Sec Spectral Acceleration With a 2% Probability of Exceedance over 50 Years: Improved Values
 Source: NYSEMO/NYS Geological Survey

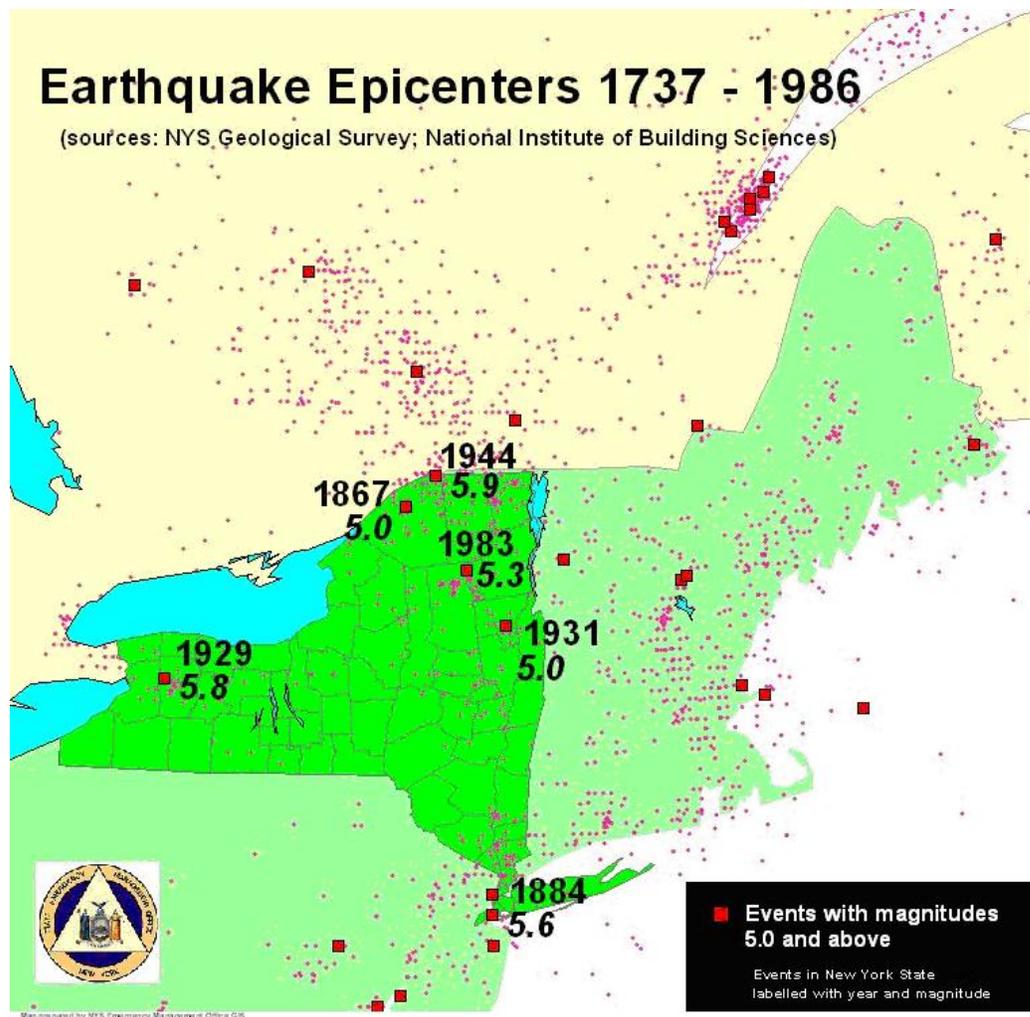
Municipality	Total Improved Property Value	SA (%g) 25-35		SA (%g) 35-45		SA (%g) 45-55		SA (%g) 55-65		SA (%g) 65-75	
		Improved Value	%	Improved Value	%	Improved Value	%	Improved Value	%	Improved Value	%
Amenia	\$404,121,634	\$263,770,421	65.3%	\$42,086,583	10.4%	0	0.0%	0	0.0%	\$56,680,019	14.0%
Beekman	\$1,196,340,238	\$1,074,690,520	89.8%	0	0.0%	\$49,706,605	4.2%	0	0.0%	\$207,199	0.0%
Dover	\$718,519,830	\$369,155,875	51.4%	\$96,912,794	13.5%	\$62,451,421	8.7%	0	0.0%	\$136,709,900	19.0%
Milan	\$260,081,800	\$124,263,053	47.8%	\$16,935,477	6.5%	0	0.0%	\$3,487,676	1.3%	0	0.0%
Millerton	\$61,541,706	\$55,360,474	90.0%	\$3,413,627	5.5%	0	0.0%	\$2,767,605	4.5%	0	0.0%
North East	\$307,271,704	\$239,525,055	78.0%	\$7,181,891	2.3%	0	0.0%	\$18,108,021	5.9%	\$5,845,161	1.9%
Pawling (T)	\$1,218,720,414	\$1,061,419,695	87.1%	0	0.0%	\$50,155,959	4.1%	0	0.0%	\$37,586,937	3.1%
Pawling (V)	\$323,281,916	\$237,337,803	73.4%	0	0.0%	0	0.0%	0	0.0%	\$85,944,113	26.6%
Pine Plains	\$312,013,435	\$117,855,719	37.8%	\$147,183,198	47.2%	0	0.0%	\$13,957,162	4.5%	0	0.0%
<i>Planning Area Total</i>	<i>\$4,801,892,677</i>	<i>\$3,543,378,616</i>	<i>73.8%</i>	<i>\$313,713,569</i>	<i>6.5%</i>	<i>\$162,313,985</i>	<i>3.4%</i>	<i>\$38,320,464</i>	<i>0.8%</i>	<i>\$322,973,329</i>	<i>6.7%</i>

Previous Occurrences - Earthquakes

As noted in the New York State Mitigation Plan, although the probability of damaging earthquakes in New York State is low, earthquakes do occur on a regular basis in New York. Figure 3a.23 illustrates the location of significant (magnitude 5.0 or greater) earthquake epicenters in New York, as obtained from the New York State Hazard Mitigation Plan, for earthquakes that occurred between 1737 and May 1986. Although Figure 3a.23 appears to show at least one earthquake epicenter in the planning area (in the Town of Pawling area), detailed information regarding any events in the planning area is not available.

Table 3a.25 presents details for earthquakes of magnitude greater than 3.0 recorded in New York State since 1737 that were recorded in the NYS statistical yearbook. The only recorded event in the NYS Statistical that has been definitively epicentered in Dutchess County occurred on June 7, 1974, some miles to the west of the planning area. The New York City Area Center for Earthquake Loss Mitigation reports that there have been thousands of earthquakes in the region with magnitudes less than 3.0.

Figure 3a.23: Significant Earthquake Epicenters, North Eastern United States



SECTION 3a - RISK ASSESSMENT: HAZARD PROFILES

Table 3a.25
Earthquake History Throughout New York State (1737 – 2005)
Source: NYSEMO / NYS Statistical Yearbook 2006

Date	Location	Size	Damage Description
December 18, 1737	New York City	5.2	Bells rang, several chimneys fell
January 16, 1840	Herkimer	3.7	No reference and/or No damage reported
September 2, 1847	Offshore NYC	3.5	No reference and/or No damage reported
September 9, 1848	Rockland Lake	V	Felt by many
March 12, 1853	Lowville	VI	Machinery knocked over
February 7, 1855	Saugerties	VI	Cryoseism
October 23, 1857	Buffalo (Lockport)	4.0	Bells rang, crocks fell from shelves
December 18, 1867	Canton	4.7	Sleepers awakened
December 11, 1874	Tarrytown	3.4	No reference and/or No damage reported
November 4, 1877	Lyon Mountain ¹	VII	Chimneys down, walls cracked, window damaged, crocks overturned
August 10, 1884	New York Bight (NYC)	5.2	Chimneys and bricks fell, walls cracked
May 28, 1897	Dannemora	4.5	No reference and/or No damage reported
February 3, 1916	Schenectady	3.8	Broke windows, people thrown out of bed
March 18, 1928	Saranac Lake	4.0	No reference and/or No damage reported
August 12, 1929	Attica	5.2	250 chimneys fell, brick buildings damaged, Attica prison walls, wells went dry
April 20, 1931	Warrensburg	4.8	Chimneys fell, church spire twisted
April 15, 1934	Dannemora	3.9	House shifted
July 9, 1937	Brooklyn	3.5	No reference and/or No damage reported
September 5, 1944	Corwall, Ontario/Massena, NY	5.8	Nearly all chimneys fell, buildings damaged, \$2 million damage
September 5, 1944	Corwall, Ontario/Massena, NY	4.5	Chimneys destroyed, houses damaged
September 3, 1951	Rockland County	3.6	No reference and/or No damage reported
January 1, 1966	Attica	4.7	Chimneys and walls damaged
June 13, 1967	Attica	3.9	Chimneys and walls damaged
May 23, 1971	Blue Mountain Lake	4.1	No reference and/or No damage reported
May 23, 1971	Blue Mountain Lake	3.5	No reference and/or No damage reported
June 7, 1974	Wappingers Falls	3.0	Windows broken
June 9, 1975	Plattsburgh (Altona)	3.5	Chimneys and fireplaces cracked
November 3, 1975	Raquette Lake	4.0	No reference and/or No damage reported
February 2, 1983	Scarsdale-Lagrangeville	3.0	Chimneys cracked

Table 3a.25
Earthquake History Throughout New York State (1737 – 2005)
Source: NYSEMO / NYS Statistical Yearbook 2006

Date	Location	Size	Damage Description
October 7, 1983	Goodnow, Adirondack Mountains	5.1	Tombstones rotated, some cracked chimneys, windows broken, walls damaged
October 19, 1985	Ardley	4.0	Windows broken, walls damaged
June 17, 1991	Richmondville	4.0	No reference and/or No damage reported
March 10, 1992	East Hampton, Suffolk County	4.1	No reference and/or No damage reported ²
April 20, 2000	Newcomb	3.8	Aftershock of the 1983 event. No damage reported
April 20, 2002	Au Sable Forks	5.1	Cracked walls, chimneys fell, road collapsed, power outages
May 24, 2002	Au Sable Forks	3.1	Aftershock of the April 20, 2002 event, no damage reported

Probability of Occurrence – Earthquakes

Earthquakes cannot be predicted. They strike without warning, at any time of the year, and at any time of the day or night. Earthquake hazard maps – sometimes referred to as “PGA maps” – are used as a tool to project the likelihood of a various intensity quake being exceeded at a certain location over a given period of time. They depict the Peak Ground Acceleration (PGA), expressed as a percentage of the force of gravity that can be expected to be exceeded at a given location for a particular probability of exceedance over a specific time frame. Figure 3a.18 is an example of an earthquake hazard map as prepared by the USGS Earthquake Hazards Program. It shows PGA values that have a 10 percent chance of being exceeded over 50 years.

As Figures 3a.18 and 3a.19 show, the earthquake hazard is relatively low but shows some degree of variation across the planning area, with higher hazard areas being in the southern section of the planning area and lower hazard areas being in the northern section. Figure 3a.16 shows that, for the planning area, PGA values of between 3%g and 4%g have a 10 percent chance of being exceeded over 50 years.

As stated above, according to the currently available earthquake hazard mapping of New York State, there is a 10 percent chance over 50 years that an earthquake with a PGA of greater than 2%g to 4%g will be centered within the nine municipalities comprising the Eastern and Northern Dutchess County Communities Planning Area. This earthquake, if it did occur, would likely have associated with it light to moderate perceived shaking and little to no damage.

Wildfires

Description – Wildfires

A wildfire is an uncontrolled fire burning in an area of vegetative fuels such as grasslands, brush, or woodlands. Wildfires can occur in areas essentially void of development, or in areas where development intermingles with these natural areas (known as the “urban-wildland interface”). Many wildfires occur in locations that abound in dense forests, grasslands and shrubs. Heavier fuels with high continuity, steep slopes, high temperatures, low humidity, low rainfall, and high winds all work to increase risk.

Wildfires can occur at any time of the year, but will usually occur during warmer and dryer months. Wildfires are most commonly caused by people (i.e., arson, debris burns, and carelessness). Lightning is the next most common cause of wildfires. As reported by the Wildland Fire Assessment System (WFAS) wildfires resulting from a lightning strike largely depend on the duration of the current and the kind of fuel the lightning hits. Spread of the wildfire after ignition usually depends primarily on fuel moisture.

Location and Extent – Wildfires

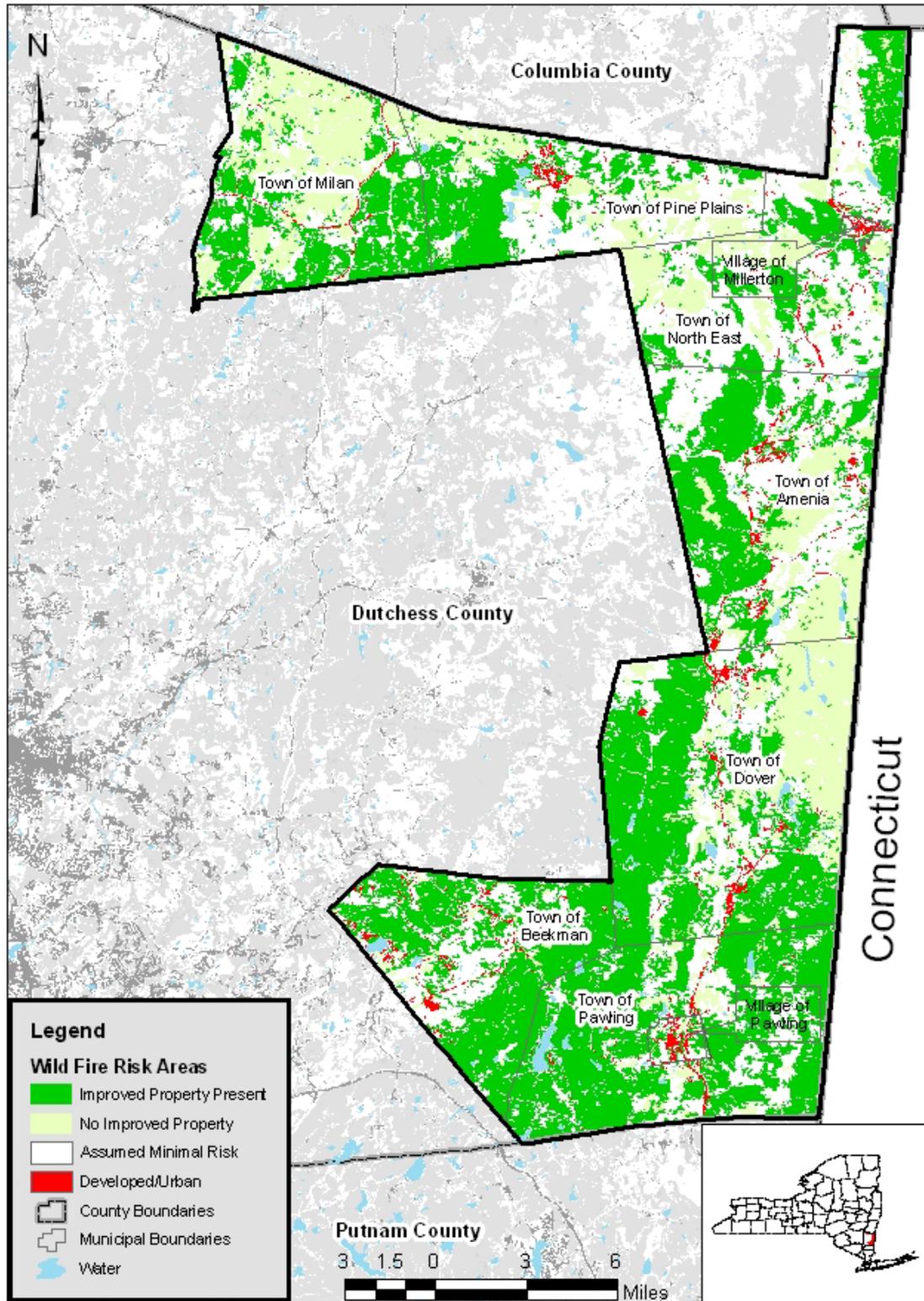
Areas that are typically considered to be safe from wildfires include highly urbanized, developed areas that are not contiguous with vast areas of wild lands. Areas typically considered to be prone to wildfires include large tracts of wild lands containing heavier fuels with high continuity, at steeper slopes.

Wildfires are a significant potential hazard throughout northern and eastern Dutchess County: Figure 3a.24 shows the areas that are considered to be at risk from wildfire colored green and urban/developed areas colored red. At-risk areas include deciduous, evergreen, and mixed woodland, shrub land, and grassland. It should be noted that the vast majority of the wildfire risk areas consist of woodland (approximately 60% of the County land area) while shrub and grassland areas are not present in significant quantities (together they make up less than 1% of the wildfire risk area). Cultivated agricultural land and pastureland are not considered to be at significant risk from wildfire for the purposes of this plan and its component risk assessment. Of the seven towns which make up 99.8% of the planning area by acreage, only one (the Town of North East) has less than 50% of its area lying within a wildfire hazard zone.

The wildfire risk areas in Figure 3a.24 have been color-coded as follows:

- Dark green: those areas in which the component parcels include some improved value; i.e. structures present.
- Light green: those areas for which no improved value and hence no structures are associated with the component parcels.

Figure 3a.24: Wildfire Hazard Areas in Northern and Eastern Dutchess County



Source: USGS Area 13 Land Cover Layer, 2003; US Census Borough, Putnam, Dutchess, and Columbia counties area hydrography, 2007; Real Property Tax Service Agency, Municipal Boundaries - Towns, Cities, Villages, 2008; ESRI, US Counties, 2005



This allows a general determination to be made regarding those areas at risk from wildfire in which there is a higher likelihood that such fires could also pose a threat to lives and structures, in addition to developed areas (colored red) which have a direct interface with the wildfire risk areas.

The wildfire risk for the individual municipalities within the planning area has been quantified by measuring the length of the urban-wildland interface and the total value of improved property located in hazard areas within the county, and these estimations are presented in Table 3a.26. The urban-wildland interface measurements were estimated incorporating a 200 ft buffer extending from the urban/developed areas into the wildfire risk areas, to account for the likelihood that structures in the urban area are at risk of combustion before a wildfire reaches the exact interface.

It should be noted that more than 60% of the planning area lies within in a wildfire hazard zone. Although the Towns of Dover, Milan, and Pawling have the highest proportions of their land area inside wildfire hazard zones (more than 70% in each case), the Town of Beekman has the longest urban-wildland interface by some distance. The Town of Milan has the highest proportion of improvement value within wildfire hazard zones, while the Town of Pawling has the highest actual dollar value of improvements in such zones.

Previous Occurrences – Wildfires

The *New York Times* reported in August 1894 that a forest fire burned more than 500 acres of land in the Town of Pine Plains. The fire was thought to have been started in the Stissing Mountain area by a spark from a railroad locomotive and the article reports that prolonged drought conditions in the area had contributed to the spread of the fire.

Local sources report that a substantial wildfire occurred in 2003 on East Mountain in the Wingdale area of the Town of Dover, which took several days to bring under control. Assistance from fire crews from elsewhere in Dutchess County and neighboring Connecticut was required to fight the fire.

Probability of Occurrence - Wildfires

Wildfire events will remain a frequent occurrence in northern and eastern Dutchess County, and the probability of future occurrences in the planning area is certain. The likelihood of increased future development (particularly residential) can only result in an increase in the length of the urban-wildland interface, an increase in the improved value of property within wildfire hazard zones, and a greater risk of property damage and danger to the public in future years. However, most wildfire events in the County are typically contained and extinguished rather quickly and those events causing major property damage or life/safety threats are much less likely to occur.



Table 3a.26
Wildfire Risk in Northern and Eastern Dutchess County

Municipality	Urban-Wildland Interface (miles)	Wildfire Risk Area – With Improved Property (Acres)	Wildfire Risk Area – No Improved Property (Acres)	Total Municipal Area (Acres)	Total Area Within Wildfire Risk Zones %	Total Value of Improvements in Municipal Areas	Improved Value Within Wildfire Risk Zones	Improved Value Within Wildfire Risk Zones %
Amenia	22.6	8,047	7,706	8,047	56%	\$404,121,634	\$139,365,573	34%
Beekman	40.3	5,655	6,580	5,655	62%	\$1,196,340,238	\$464,084,079	39%
Dover	30.7	13,333	12,516	13,333	72%	\$718,519,830	\$295,725,244	41%
Milan	28.6	10,281	6,707	10,281	73%	\$260,081,800	\$180,547,905	69%
Millerton	1.1	43	47	43	23%	\$61,541,706	\$5,471,965	9%
North East	11.9	6,644	6,272	6,644	47%	\$307,271,704	\$104,215,743	34%
Pawling (Town)	24.9	12,539	7,015	12,539	71%	\$1,218,720,414	\$661,983,277	54%
Pawling (Village)	5.1	287	160	287	35%	\$323,281,916	\$75,084,703	23%
Pine Plains	11.7	7,000	3,717	7,000	54%	\$312,013,435	\$113,077,098	36%
Planning Area Totals	176.9	63,830	50,826	183,829	62%	\$4,801,892,677	\$2,039,555,588	42%

A Distinction Between “Hazards” and “Events”

This section of the plan speaks to hurricanes and tropical storms, tornadoes, and winter storms/ice storms. These are severe weather events (not hazards themselves). Severe weather events have specific hazards associated with them. The unique hazards associated with the severe weather events discussed in this section are addressed specifically elsewhere in the plan; they are summarized briefly here. While HAZARDS are fully identified and profiled, with vulnerability assessments completed, EVENTS are merely summarized here for information only. EVENTS are not fully profiled and a vulnerability assessment has not been completed. The reader is, however, directed to the HAZARDS associated with these EVENTS (for profile/vulnerability assessment/etc.).



SECTION 3b - RISK ASSESSMENT: IDENTIFICATION AND CHARACTERIZATION OF ASSETS

Overview

An inventory of geo-referenced assets in the Northern and Eastern Dutchess County hazard mitigation planning area has been created in order to identify and characterize property and persons potentially at risk from the identified hazards. Understanding the type and number of hazards that exist in relation to known hazard areas is an important step in the process of formulating the risk assessment and quantifying the vulnerability of the municipalities that make up the planning area. For this plan, six key categories of assets have been mapped and analyzed using GIS data provided by the Dutchess County Office of Computer Information Systems (GIS Department), with some additional data drawn from other public sources:

1. Improved property: This category includes all developed properties according to parcel data provided by Dutchess County. Impacts to improved properties are presented as a percentage of each community's total assessed value of improvements that may be exposed to the identified hazards.
2. Emergency facilities: This category covers all facilities dedicated to the management and response of emergency or disaster situations, and includes emergency operations centers (EOCs), fire stations, police stations, ambulance stations, and hospitals. Impacts to these assets are presented by tabulating the number of each type of facility present in areas that may be exposed to the identified hazards.
3. Critical infrastructure and utilities: This category covers facilities and structures vital to the maintenance of basic living conditions in the county, and includes power generating stations, potable water treatment plants, wastewater treatment plants, significant public works buildings, airports, and ferry ports. Impacts to these assets are presented by tabulating the number of each type of facility present in areas that may be exposed to the identified hazards.
4. Other key facilities: This category covers facilities which may be capable of providing refuge and limited medical care and hence may be utilized as emergency shelters, and those which routinely house more vulnerable sectors of the county population, making them potentially especially vulnerable to identified hazards. Included in this category are schools and senior care facilities and impacts to these assets are presented by tabulating the number of each type of facility present in areas that may be exposed to the identified hazards.
5. Historic and cultural resources: This category includes those historic structures, landmarks and sites that are included in the New York State or National Register of Historic Places. Impacts to these assets are presented by tabulating the number of each type of facility present in areas exposed to each identified hazard. Any other structure, landmark or asset identified during the course of general research for this section that has been judged to be potentially of local historical or cultural significance has also been included in this category.
6. Population: This category covers the number of people residing in the nine municipalities in the planning area as measured by the 2000 U.S. Census. Impacts to population are presented as a percentage of each municipality's total population exposed to the identified hazards, with the exposed population collated by census block.



SECTION 3b - RISK ASSESSMENT: ASSET IDENTIFICATION & CHARACTERIZATION

Improved Property

Improved property covers all development in the form of structures for residential, commercial, industrial, municipal, recreational, and utility uses. The total value of property improvements in the nine participating jurisdictions has been estimated at just over \$4.8 billion, based on total assessed values converted to 2008 market values using State equalization rates supplied for each jurisdiction by the New York State Office of Real Property Services. Table 3b.1 summarizes the improved properties in each jurisdiction, in terms of total parcels, percentage of improved parcels, and the total value of improvements in each, based on GIS data provided by the Dutchess County Real Property Tax Service Agency via the County Office of Computer Information Systems.

Jurisdiction	Total Number of Parcels	Number of Improved Parcels	Percentage of Improved Parcels	Total Value of Improvements*
Amenia, Town of	1,875	1,397	75%	\$404,121,634
Beekman, Town of	4,918	4,126	84%	\$1,196,340,238
Dover, Town of	3,281	2,531	77%	\$718,519,830
Milan, Town of	1,731	1,123	65%	\$260,081,800
Millerton, Village of	444	393	89%	\$61,541,706
North East, Town of	1,359	917	67%	\$307,271,704
Pawling, Town of	3,289	2,476	75%	\$1,218,720,414
Pawling, Village of	755	675	89%	\$323,281,916
Pine Plains, Town of	1,677	1,096	65%	\$312,013,435
<i>Total</i>	<i>19,329</i>	<i>14,734</i>	<i>76%</i>	<i>\$4,801,892,677</i>

*Not including some public buildings and other tax-exempt structures.

Table 3b.2 presents a summary of the estimated improved property values within each delineated hazard area by jurisdiction, expressed as a percentage of the total improved property value in each jurisdiction.

Municipality	Total Value of Improvements	Flood (High Risk)	Flood (Moderate Risk)	Dam Failure	Wildfire	Earthquake (Soil Type E)	Earthquake (Soil Type D)
Amenia	\$404,121,634	7.0%	0.0%	1.9%	34.5%	14.0%	10.4%
Beekman	\$1,196,340,238	1.6%	0.3%	1.2%	38.8%	0.0%	4.2%
Dover	\$718,519,830	6.5%	1.4%	0%	41.2%	19.0%	22.2%
Milan	\$260,081,800	0.9%	0%	0%	69.4%	1.3%	6.5%
Millerton	\$61,541,706	3.9%	1.5%	0%	8.9%	4.5%	5.5%
North East	\$307,271,704	3.0%	0.3%	0%	33.9%	7.8%	2.3%
Pawling (T)	\$1,218,720,414	2.5%	0.2%	0%	54.3%	3.1%	4.1%
Pawling (V)	\$323,281,916	11.9%	0.6%	0.3%	23.2%	26.6%	0.0%
Pine Plains	\$312,013,435	1.7%	0%	0%	36.2%	4.5%	47.2%
<i>Total</i>	<i>\$4,801,892,677</i>	<i>3.8%</i>	<i>0.4%</i>	<i>0.5%</i>	<i>42.5%</i>	<i>7.5%</i>	<i>9.9%</i>



SECTION 3b - RISK ASSESSMENT: ASSET IDENTIFICATION & CHARACTERIZATION

“Delineated” hazards are those which only affect specific identifiable areas as opposed to those assumed to have a uniform risk across the entire planning area; i.e. hurricanes, nor’easters and all other extreme wind events, winter storms, extreme temperatures, and lightning. While droughts are considered to affect only specific delineable areas, they are assumed not to impact improved property (i.e. structures) and drought are therefore not included in Table 3b.2. The figures for dam failure reflect only the three dams for which dam failure inundation mapping is currently available. Detailed tables presenting the improved property values broken down by land use and development type within delineated hazard areas are included in Appendix A.

Emergency Facilities

Emergency facilities were included in the asset identification and characterization to determine jurisdictions with particularly high numbers of key facilities located in hazard areas, which may guide the focus of individual mitigation activities in the mitigation goals and strategy stage of the plan. Emergency facilities by jurisdiction are presented in Table 3b.3. According to County GIS records, databases embedded in HAZUS-MH, and local sources, there are a total of 29 geo-referenced emergency facilities in the nine municipalities that comprise the Northern and Eastern Dutchess County Hazard Mitigation Planning Area. According to the available records, there is at least one type of emergency facility located in each of the nine municipalities.

Table 3b.3 Emergency Facilities by Jurisdiction				
Jurisdiction	Fire Stations	Police Stations	Ambulance Stations	Hospitals
Amenia, Town of	2	1	0	0
Beekman, Town of	1	1	1	0
Dover, Town of	2	1	1 + 2*	0
Milan, Town of	3	0	0	0
Millerton, Village of	1	1	1*	0
North East, Town of	0	0	1	0
Pawling, Town of	3	0	1*	0
Pawling, Village of	0	1	0	0
Pine Plains, Town of	1	3	1*	0
<i>Total</i>	<i>13</i>	<i>8</i>	<i>8</i>	<i>0</i>

*Incorporated into Firehouse or Police Station Facility

Critical Infrastructure and Utilities

Critical infrastructure and utilities were included in the asset identification and characterization to determine jurisdictions with particularly high numbers of key facilities located in hazard areas, which may guide the focus of individual mitigation activities in the mitigation goals and strategy stage of the plan. Critical infrastructure and utilities by jurisdiction are presented in Table 3b.4. According to County GIS records, information from New York State Department of Environmental Conservation, databases embedded in HAZUS-MH and local sources, there are a total of 44 identified critical infrastructure and utility facilities in the planning area. According to the best readily available data, no power generating stations are located in the planning area.



SECTION 3b - RISK ASSESSMENT: ASSET IDENTIFICATION & CHARACTERIZATION

**Table 3b.4
Critical Infrastructure and Utilities by Jurisdiction**

Jurisdiction	Water Treatment Facilities	Wastewater Treatment Facilities	Public Works Facilities	Passenger Railroad Stations	Utility Facilities	Communication Facilities
Amenia, Town of	1	0	3	2	0	0
Beekman, Town of	5	3	1	0	0	0
Dover, Town of	4 + 1*	2*	1	2	1	0
Milan, Town of	0	0	1	0	0	1
Millerton, Village of	0	0	1	0	0	0
North East, Town of	0	0	1	0	0	2
Pawling, Town of	1	0	0	0	0	1
Pawling, Village of	5	1	1	1	0	0
Pine Plains, Town of	1	0	1	0	0	0
<i>Total</i>	<i>18</i>	<i>6</i>	<i>10</i>	<i>5</i>	<i>1</i>	<i>4</i>

*Pending

Water treatment facilities include any community potable water supply facility serving 15 or more properties and identified by the County as a treatment plant or as some other supply facility which incorporates at least one treatment process.

Public works facilities include buildings for the storage and maintenance of vehicles and other equipment used to respond to emergency situations, apart from police, fire and ambulance stations, such as municipal highway departments.

Passenger railroad stations are those with regularly scheduled train services and significant facilities for passenger embarkation/disembarkation, such as permanent raised platforms and shelters. All passenger stations in the planning area are located on the Metro-North Railroad Harlem Line, which operates service into New York City. The northern terminus of the line for passengers is currently at Wassaic, in the town of Amenia.

The only significant utility asset which has been identified in the planning area is the Iroquois Natural Gas Pipeline Transmission Compressor Station, located in the Town of Dover.

Communications facilities are transmitting stations for radio and/or television stations licensed by the Federal Communications Commission.

There are no airports in the planning area. For the purposes of this plan, airports are defined as substantial airfields with paved runways operating scheduled services or suitable for the operation of fixed-wing aircraft for the transporting of emergency response personnel and equipment.

Other Key Facilities

Other key facilities were included in the asset identification and characterization to determine jurisdictions with particularly high numbers of such facilities located in hazard areas, which may guide the focus of individual mitigation activities in the mitigation goals and strategy stage of the plan. Schools and senior care facilities by jurisdiction are presented in Table 3b.5.



SECTION 3b - RISK ASSESSMENT: ASSET IDENTIFICATION & CHARACTERIZATION

Table 3b.5
Other Key Facilities by Jurisdiction

Jurisdiction	Schools	Senior Care Facilities
Amenia, Town of	2	0
Beekman, Town of	1	0
Dover, Town of	3+1*	0
Milan, Town of	0	0
Millerton, Village of	1	0
North East, Town of	3	0
Pawling, Town of	2	1
Pawling, Village of	3	1
Pine Plains, Town of	2	0
Total	18	2

*Includes middle school and high school in the same facility

According to County GIS records and databases embedded in HAZUS-MH, there are a total of 20 such geo-referenced key facilities in the planning area. The exposure of identified emergency services, critical facilities, and infrastructure assets to hazards with discrete delineable impact areas is presented in Appendix B.

Historical and Cultural Resources

Historical and cultural resources were included in the asset identification and characterization to determine jurisdictions with particularly high numbers of culturally or historically valuable assets located in hazard areas, which may influence the focus of individual mitigation activities in the mitigation goals and strategy stage of the plan. At the State and Federal levels, official listings of historic resources are established and maintained to foster the preservation of particular cultural resources. The State and National Registers of Historic Places are the official listings of buildings, structures, districts, objects, and sites significant in the history, architecture, archaeology, engineering, and culture of the State and the nation. Cultural and historic resources are defined as follows:

Cultural Resources: As defined by the National Park Service in its "Cultural Resources Management Guidelines," cultural resources are: "Those tangible and intangible aspects of cultural systems, both living and dead, that are valued by or representative of a given culture or that contain information about a culture . . . and [they] include but are not limited to sites, structures, districts, objects and artifacts, and historic documents associated with or representative of peoples, cultures, and human activities and events, either in the present or in the past. Cultural resources also can include the primary written and verbal data for interpreting and understanding those tangible resources."

Historic Resources: Historic resources are any cultural resource dating from the period between the onset of written records (which in southern New York State is typically placed around the time of first European contact in the sixteenth century) and 50 years ago.

In the State of New York, the State Historic Preservation Office (SHPO) – within the New York State Office of Parks, Recreation and Historic Preservation – helps communities identify, evaluate, preserve, and revitalize their historic and cultural resources. New York SHPO maintains GIS databases of all historic and cultural assets listed on the State and National Registers. To identify the



SECTION 3b - RISK ASSESSMENT: ASSET IDENTIFICATION & CHARACTERIZATION

resources of this nature located in the Eastern and Northern Dutchess County Hazard Mitigation Planning Area, GIS files were downloaded from the New York SHPO website (<http://www.nysparks.state.ny.us/shpo/resources/index.htm>). This data includes only those cultural and historic properties and sites that are included in the New York State or National Registers of Historic Places, or that have been determined Eligible for inclusion through federal or state processes as administered by the New York SHPO. Inclusion in this data set does not preclude the existence of other historic properties or sites not within this category or as yet unidentified.

Historical and cultural assets located in the planning area are presented in Table 3b.6. According to New York SHPO and National Register of Historic Places data there are around 20 such assets registered in the planning area. According to the available records, State and Federally listed historical assets are located in seven of the nine municipalities covered by this hazard mitigation plan. In addition to assets identified via the State and Federal registers of historic places, Table 3b.5 also includes other significant cultural and historical assets such as museums of local history, which have been identified via general internet research and local feedback. The exposure of identified historical and cultural resources to hazards with discrete delineable impact areas is presented in Appendix C.

Table 3b.6 Historic and Cultural Resources by Jurisdiction		
Jurisdiction	Asset Name/Description	Location
Amenia, Town of	Lewis Mumford House	Leedsville Road
Amenia, Town of	Hendrik Winegar House	SE of Amenia on SR 2 off NY 343
Amenia, Town of	Indian Rock Schoolhouse	Mygatt Road
Amenia, Town of	Beth David Synagogue	East Main Street
Amenia, Town of	St. Thomas' Episcopal Church	Leedsville Road, north side, west of Rte. 41
Amenia, Town of	Maxon Mills	Main Street and Furnace Bank Road
Dover, Town of	Tabor-Wing House	Route 22 and North Nellie Hill Road.
Dover, Town of	Dover Veterans Memorial Library	1797, Route 22, Wingdale
Milan, Town of	Fulton Homestead	Fulton Homestead Road, off Turkey Hill Road
Milan, Town of	LaFayette House	North Road/Route 199
Milan, Town of	The Wilcox House	Wilcox Park
North East, Town of	Hiddenhurst House	Sheffield Hill Rd. NW of jct. with Sharon Station Rd.
North East, Town of	Coleman Station Historic District	Coleman Station, Indian Lake, Regan and Sheffield Hill Rds.
North East, Town of	Ezra Clark House	Mill Rd.
North East, Town of	Dakin-Coleman Farm	Coleman Station Road
North East, Town of	Oliver Barrett House	Reagan Road
North East, Town of	Thomas N. Wheeler Farm	Indian Lake Road
Pawling, Town of	Oblong Friends Meetinghouse	Meetinghouse Rd. on Quaker Hill
Pawling, Town of	Akin Free Library	97 Quaker Hill Rd.
Pawling, Village of	John Kane House	126 E. Main St.
Pine Plains, Town of	The Pines House	Maple St.
Pine Plains, Town of	Graham-Brush Log House	NY 199 (Church Street)

Note: Includes resources provided by local sources which are not currently on the state or national register of historic places



SECTION 3b - RISK ASSESSMENT: ASSET IDENTIFICATION & CHARACTERIZATION

Population

According to the U.S. Census Bureau 2000 Census, the total population of the nine component municipalities of the planning area was 41,716, in 14,249 households. Current projections by the U.S. Census estimate that the 2007 population of the nine component municipalities is 44,495, an increase of almost 7% over the 2000 Census. More information regarding likely future population trends can be found in the discussion of Land Use and Development Trends in a later section of the Plan report. Table 3b.7 presents the breakdown of the county population and household totals in 2000 by participating jurisdiction, while Table 3b.8 presents a summary of vulnerable sectors of the population by participating jurisdiction.

For the purposes of this plan, “vulnerable” has been taken to mean residents of the county aged under five or over 65 years. Compared to the majority of the county population, people of these ages are assumed to require extra medical care and additional resources, particularly in the event of emergency evacuation. When viewed in combination with the data in Table 3b.5 and subsequent assessments of assets in individual hazard areas, this data may be used to highlight areas which may benefit from increased focus in the development of mitigation goals and strategies.

**Table 3b.7
Population and Households by Jurisdiction (2000 Census*)**

Jurisdiction	Population		Households	
	Total	% of Planning Area	Total	% of Planning Area
Amenia, Town of	4,048	10%	1,625	11%
Beekman, Town of	13,655	33%	3,751	26%
Dover, Town of	8,565	21%	3,034	21%
Milan, Town of	2,356	6%	882	6%
Millerton, Village of	925	2%	375	3%
North East, Town of	2,077	5%	771	5%
Pawling, Town of	5,288	13%	1,904	13%
Pawling, Village of	2,233	5%	919	6%
Pine Plains, Town of	2,569	6%	988	7%
Total	41,716	100.00%	14,249	100.00%

Note: similar breakdown data for years later than 2000 is not yet available.

*Census 2000 as corrected by Dutchess County Planning to correct an error in the Census regarding incorrect coding of Greenhaven Prison in Milan rather than Beekman.

Table 3b.8 indicates that about 17% of the population of the planning area can be termed “vulnerable”, and that the municipality with the highest proportion of vulnerable residents is the Village of Pawling, while the Town of Milan has the lowest. Within the vulnerable sector of the population, seniors generally outnumber small children by a ratio of 2 or 3 to 1.



Table 3b.8
Vulnerable Sectors of the Population by Jurisdiction (2000 Census)

Jurisdiction	Total Population	Under 5 Years	% of Municipal Total	65 Years and over	% of Municipal Total	Total Vulnerable Population	% of Municipal Total
Amenia, Town of	4,048	222	5%	694	17%	916	23%
Beekman, Town of	13,655	905	7%	859	6%	1,764	13%
Dover, Town of	8,565	562	7%	779	9%	1,341	16%
Milan, Town of	2,356	153	6%	301	13%	454	19%
Millerton, Village of	925	39	4%	143	15%	182	20%
North East, Town of	2,077	82	4%	278	13%	360	17%
Pawling, Town of	5,288	355	7%	645	12%	1,000	19%
Pawling, Village of	2,233	93	4%	495	22%	588	26%
Pine Plains, Town of	2,569	124	5%	384	15%	508	20%
<i>Total</i>	<i>41,716</i>	<i>2,535</i>	<i>6%</i>	<i>4,578</i>	<i>11%</i>	<i>7,113</i>	<i>17%</i>

Note: similar breakdown data for years later than 2000 is not yet available.



SECTION 3c - RISK ASSESSMENT: ESTIMATED DAMAGES IN HAZARD AREAS

44 CFR Part 201.6 (c)(2)(ii)(B) states, “[The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare this estimate...” This section of the Plan is intended to satisfy this requirement.

Methodology

The team attempted to assess vulnerability to various hazards within the limitations of the available data, where generally accepted measures of vulnerability are established. Parcel data included assessed values for land and total assessed values; assessed values for improvements were calculated by subtracting the land value from the total value. Expanding upon the parcel data in the county’s GIS to include such information as building square footage, year built, type, foundation type, and condition, would allow for a more accurate assessment of vulnerability. Therefore, the Planning Committee has considered actions in this regard. Please see further sections of this plan for additional information on actions considered and ultimately selected.

To ensure that meaningful conclusions could be drawn across the range of susceptible hazards, the plan presents an estimation of annual damages for each hazard (as opposed to event damages or damages associated with a certain recurrence interval), in all cases where generally accepted methodologies exist for estimating potential dollar losses to vulnerable structures, and where sufficient data was readily available to employ these methodologies.

Estimated Damages – Extreme Temperatures

Generally accepted methodologies do not exist for estimating potential dollar losses to vulnerable structures during extreme heat/cold events.

While all of the Northern and Eastern Dutchess County planning area is exposed to extreme temperatures, existing buildings, infrastructure and critical facilities are not considered vulnerable to significant damage caused by extreme heat or cold events. Therefore any estimated property losses associated with these hazards are anticipated to be minimal across the area. Extreme temperatures do however present a significant life and safety threat to the planning area’s population.

Heat casualties are usually caused by lack of adequate air conditioning or heat exhaustion. The most vulnerable population to heat casualties are the elderly or infirmed, who frequently live on low fixed incomes and cannot afford to run air-conditioning on a regular basis. This population is sometimes isolated, with no immediate family or friends to look out for their well being.

Casualties resulting from extreme cold may result from a lack of adequate heat, carbon monoxide poisoning from unsafe heat sources and frostbite. The most vulnerable populations to cold casualties are the elderly or infirm as well as low income households, as they may not be able to afford to operate a heat source on a regular basis and may not have immediate family or friends to look out for their well being.

Given the lack of historical data and limited likelihood for structural losses resulting from extreme heat or cold occurrences in the planning area, annualizing potential structural losses over a long period of time would most likely yield a negligible annual loss estimate for the entire planning area.



Estimated Damages – Extreme Winds

Generally-accepted methodologies do exist for estimating potential dollar losses to vulnerable structures during extreme wind event; however, sufficient data was not available at the time of the study to estimate detailed damages due to extreme winds. At this time, vulnerability is being expressed as the value of improvements exposed to the hazard (as defined in the “Hazard Profiles” section). Because it cannot be predicted where extreme winds may occur, all existing and future buildings, facilities and populations are considered to be exposed to this hazard and could potentially be impacted.

First, while FEMA methodologies do exist to estimate damages due to extreme wind, specific information is required for buildings in order to employ these methodologies, such as type of construction and details on any existing protective features. This data was not included in GIS datasets supplied by Dutchess County and was not readily available from other sources.

Second, having even the year built data for each structure, one would be able to highlight structures built before codes and standards were adopted to make buildings more resistant to wind damage, thus being better candidates for mitigation. Without the year-built data, this can not be done.

Sufficient historical data regarding events and associated losses was not available to make even the roughest of estimates of potential future losses. NCDC records for the period 1958 through 2008 included 85 extreme wind events in Dutchess County, the records were not specific in terms of dollar damages associated with any events which impacted the Northern and Eastern Dutchess County communities.

Given the lack of historical data and documented structural losses resulting from extreme wind occurrences in the planning area, annualizing potential structural losses over a long period of time would most likely yield a negligible annual loss estimate for the entire planning area.

If more detailed information should become available in the future, it should be utilized for loss estimates incorporated into future updates of the plan. While one could make some blanket assumptions at this time to enable the use of various tools for loss estimation, this would be unlikely to yield meaningful results.

Estimated Damages – Earthquakes

As stated previously in the plan in the Hazard Profile section, according to the Earthquake Hazard Map of Northern and Eastern Dutchess County, there is a 10 percent chance over 50 years that an earthquake with a PGA of greater than 3 to 4%g will be centered within the planning area. This earthquake, if it were to occur, would likely have associated with it light to moderate perceived shaking and little to no damage. PGA's of between 8 and 10%g would most often be required to cause appreciable damage, say, to unreinforced masonry buildings. While it is true that earthquakes are possible in this part of New York, they are not particularly likely, or likely to be particularly intense. Therefore, a full earthquake loss estimation was not conducted at this time for individual jurisdictions. However, countywide data included in the State Plan has been evaluated and is presented later in this section.

Examples of the types of damages that could be observed during an earthquake with a PGA of 3 to 4%g include:

- ⇒ Felt indoors by many, outdoors by few during the day
- ⇒ At night, some awakened.
- ⇒ Dishes, windows, doors disturbed and possibly broken



- ⇒ Walls make cracking sounds
- ⇒ Unstable objects could be overturned
- ⇒ Sensation like heavy truck striking building
- ⇒ Standing automobiles rocked noticeably

For earthquakes, the hazard area encompasses the entire study area and therefore all assets could be impacted.

FEMA's How-To #2 suggests that for earthquake loss estimation, data regarding building type, type of foundation, building code design level, and date of construction, is required for a quality analysis. This is because certain structures are more susceptible to earthquake damage than others. In the State of New York, regulations accounting for earthquake risk exist for new construction. Older buildings, built before these standard building codes went into effect, are more susceptible to earthquake damage. Similarly, unreinforced masonry buildings are more likely to sustain earthquake damage. While extensive damage to even these structures is unlikely, based on the mapped hazard areas, identifying this subset of buildings is important, particularly with regard to critical facilities that may meet these criteria. This information was not readily available at the time of the study for the planning area.

The New York State Hazard Mitigation Plan includes HAZUS-MH runs for earthquake losses in counties across New York State. The data prepared by the State estimates the following potential earthquake losses for the whole of Dutchess County as shown in Table 3c.1. This includes; Total Exposure – representing dollar value of all general building stock and calculated potential total losses (Capital Stock + Income Losses) for the four return periods of 2500, 1000, 500, & 250-years. To approximate roughly the damages realized for the nine municipalities in the planning area for the same magnitude events, the relative values of structures in the County and the planning area have been compared. The New York State Plan gives the dollar value of all general building stock in the County as just over \$18.6 billion. Approximately 26% of the value all structures in Dutchess County is located within the planning area, leading to the second set of figures in Table 3c.1.

Area	2500-year	1000-year	500-year	250-year
Dutchess County	\$758,948,000	\$223,125,000	\$68,087,000	\$16,916,000
Planning Area	\$195,687,000	\$57,531,000	\$17,556,000	\$4,362,000

The State Plan goes on to show an estimated unadjusted annualized total earthquake losses in the whole of Dutchess County of \$880,000 which ranks 15th when compared to all of New York State's 62 counties. For comparison purposes, the highest annualized losses were calculated in Kings County at \$10,093,000 and the lowest were calculated in Schuylar County at \$19,000. However, when factoring in National Earthquake Hazard Reduction Program soil classes, the estimated annualized earthquake loss for Dutchess County drops to \$296,089, 22nd out of all New York State Counties. Scaling the adjusted annual damage using the relative structure values of the planning area and the whole of Dutchess County gives an annualized loss in the planning area of \$76,344.

For the purpose of estimating annual earthquake damages at this time, we have compared the State's estimated annual earthquake losses for the planning area (\$76,344) to the total value of all improvements (\$4,801,892,677) and have determined that based on this, roughly 0.0016% of the planning area's improved property could be damaged in any given year by an earthquake. Applying this same percentage



to each of the County's municipalities (since the earthquake hazard does not vary wildly across the planning area) yields the following estimated annual damages to improved property for earthquakes. Note that these estimates do not incorporate any magnification of damages due to soil type.

Jurisdiction	Total Value of Improvements	Annual Loss Estimate, Earthquakes
Amenia, Town of	\$404,121,634	\$6,425
Beekman, Town of	\$1,196,340,238	\$19,020
Dover, Town of	\$718,519,830	\$11,423
Milan, Town of	\$260,081,800	\$4,135
Millerton, Village of	\$61,541,706	\$978
North East, Town of	\$307,271,704	\$4,885
Pawling, Town of	\$1,218,720,414	\$19,376
Pawling, Village of	\$323,281,916	\$5,140
Pine Plains, Town of	\$312,013,435	\$4,961
<i>Planning Area Total:</i>	<i>\$4,801,892,677</i>	<i>\$76,344</i>

Estimated Damages – Flood

Generally-accepted methodologies do exist for estimating potential dollar losses to vulnerable structures during flood events; however sufficient data was not available at the time of the study to undertake detailed formal estimates of damages due to flooding. At this time, vulnerability is being expressed as the value of improvements in the current mapped flood hazard areas as presented in the “Hazard Profiles” section of this plan. First, while FEMA methodologies do exist to estimate damages due to flooding, specific information is required for buildings in order to employ these methodologies, such as first floor elevation, type of construction, foundation type, and details on any existing protective features. This data was not available as a part of the County GIS during this study.

Second, having even the year built data for each structure, one would be able to highlight structures built before codes and standards were adopted to make buildings more resistant to flood damage, thus being better candidates for mitigation. Without the year-built data, this can not be done. If this information should become available in the future, it could be incorporated into future updates of the plan. While one could make some blanket assumptions at this time to use various tools for loss estimation, this would likely yield erroneous data. Acting upon such rough estimates could result in an unwise use of limited resources.

For the purpose of estimating annual flood damages at this time, we have evaluated the NOAA NCDC database for flood events in Dutchess County in the last twelve years (1996-2008) and have determined that these events have caused approximately \$14,350,000 in property damages (or \$1,196,000 per year county-wide). Because the flood hazard is not uniform across the county, we have scaled this total annual damage to the subset of improved property in the high risk flood hazard area (Zones A, AE) in each



municipality in the planning area to estimate annual flood losses presented in the table below. The New York State plan estimates the total value of improved property in the high risk flood zone over the whole county to be \$1,563,000,000. Thus, based on recent historical data, the flood damage experienced over the whole county per year represents 0.08% of the value of property in the county 100-year-floodplains. This percentage has been applied to the values of improved property in the nine municipalities in the planning area and combined with locally sourced flood damage records not captured by NCDC to derive the annual damage estimates presented in Table 3c.3. These estimates are considered to be extremely conservative, due to the limited amount of relevant historical data, as described above. (Note: NFIP losses were considered for use, but were not selected due to their limitations in not including: unpaid claims, damages to uninsured properties, crop losses, or damages to roads/bridges/etc.)

Jurisdiction	Total Value of Improvements	Total Value of Improvements in the Flood Hazard Area*	Annual Loss Estimates, Flood
Amenia, Town of	\$404,121,634	\$28,291,482	\$21,645
Beekman, Town of	\$1,196,340,238	\$19,071,891	\$14,592
Dover**, Town of	\$718,519,830	\$46,532,915	\$74,602
Milan**, Town of	\$260,081,800	\$2,259,370	\$4,462
Millerton, Village of	\$61,541,706	\$2,387,749	\$1,827
North East, Town of	\$307,271,704	\$9,272,429	\$7,094
Pawling, Town of	\$1,218,720,414	\$29,879,521	\$22,860
Pawling, Village of	\$323,281,916	\$38,388,885	\$29,371
Pine Plains, Town of	\$312,013,435	\$5,285,665	\$4,044
<i>Planning Area Total:</i>	<i>\$4,801,892,677</i>	<i>\$181,369,907</i>	<i>\$180,497</i>

*Zones A, AE, only

** Includes locally reported damages not recorded by NCDC

Estimated Damages – Ice Jams

Flooding caused by ice jams is similar to flash flooding. Ice jam formation causes a rapid rise of water at the jam and extending upstream. Failure or release of the jam causes sudden flooding downstream. Generally accepted methodologies do not exist for estimating potential dollar losses to vulnerable structures due to ice jam events, and historical data regarding past events and losses was not sufficient to generate meaningful estimates.

It is difficult to identify particular areas that are generally prone to ice jam flooding because the hazard can be very localized. The formation of ice jams depends on the weather and physical conditions in river channels. Unlike the typical violent flash flooding occurrences where steep terrain is present, ice jams are most likely to occur where the channel slope naturally decreases, where culverts freeze solid at headwaters of reservoirs, at natural channel restrictions such as bends and bridges, and along shallows where channels may freeze solid. While local sources indicate that ice jams are not uncommon in some parts of the planning area, research of readily available data uncovered only one documented ice jam event in northern and eastern Dutchess County since 1875.

Damage from ice jam flooding usually exceeds that caused by open water flooding. Flood elevations are usually higher than predicted for free-flow conditions and water levels may change rapidly. Additional physical damage is caused by the force of ice impacting buildings and other structures. Because of the



sometimes unpredictable nature of ice jam floods, FEMA's Flood Insurance Rate Maps often do not reflect ice jam flood threats. Since standard loss estimation methodologies are not currently available for estimating ice jam damages, and sufficient historical data regarding events and associated losses was not available, it has been assumed that annual losses would be realized as an unquantifiable component within the flood damage estimate.

Estimated Damages – Dam Failure

Generally accepted methodologies do not exist for estimating potential annual losses to vulnerable structures due to dam failure events, and historical data regarding past events and losses was not sufficient to generate meaningful estimates.

Sufficient data was not available at the time of the study to estimate damages due to dam failure. At this time, vulnerability is being expressed as the value of improvements exposed to the hazard, as presented in Table 3a.14 in the "Hazard Profiles" section of this plan.

Given the lack of historical data for significant dam failure occurrences, and that it would be inappropriate to make assumptions regarding the effectiveness of future dam inspection and maintenance activities, it is assumed that major dam failures are a considerably rare event. Therefore, while one major event may result in significant losses, annualizing structural losses over a long period of time would most likely yield a negligible annual loss estimate for jurisdictions exposed to this hazard.

Estimated Damages – Lightning

Sufficient data was not available at the time of the study to estimate damages due to lightning in comprehensive detail. At this time, vulnerability is being expressed as the value of improvements exposed to the hazard, as presented in the "Hazard Profiles" section of this plan.

First, current loss estimation methodologies are not available for estimating lightning damages.

Second, having even the year built data for each structure, one would be able to highlight structures built before codes and standards were adopted to make buildings more resistant to lightning damage, thus being better candidates for mitigation. Without the year-built data, this can not be done.

If this information should become available in the future, it could be incorporated into future updates of the plan. While one could make some blanket assumptions at this time to use various tools for loss estimation, this would likely yield erroneous data given the high degree of variation in type and density of development in the study area. Acting upon such rough estimates could result in an unwise use of limited resources.

In general terms, estimated damages due to a single lightning event could be severe in any one location, however no one location or municipality in the county is any more vulnerable than another, and annual damages from lightning in the study area are estimated to be generally low.

For the purpose of estimating annual lightning damages at this time, we have evaluated the NOAA NCDC database for lightning events in the last ten years (1998-2008) and have determined that these events have caused approximately \$231,000 in property damages in the whole of Dutchess County (or \$23,100 per year). The total value of all improvements in the county is estimated to be \$18.6 billion. Thus, based on recent historical data, annual lightning damage represents roughly 0.00012% of Dutchess County's



improved property value. Applying this same percentage to each of the study area municipalities (since the lightning hazard is uniform across the county) yields the following estimated annual damages to improved property for lightning events.

Jurisdiction	Total Value of Improvements	Annual Loss Estimate, Lightning
Amenia, Town of	\$404,121,634	\$502
Beekman, Town of	\$1,196,340,238	\$1,486
Dover, Town of	\$718,519,830	\$892
Milan, Town of	\$260,081,800	\$323
Millerton, Village of	\$61,541,706	\$76
North East, Town of	\$307,271,704	\$382
Pawling, Town of	\$1,218,720,414	\$1,514
Pawling, Village of	\$323,281,916	\$401
Pine Plains, Town of	\$312,013,435	\$388
<i>Planning Area Total:</i>	<i>\$4,801,892,677</i>	<i>\$5,964</i>

Estimated Damages – Drought

According to FEMA's How-To #2, current loss estimation methodologies are not available for estimating drought damages. If this information should become available in the future, it could be incorporated into future updates of the plan. While one could make some blanket assumptions at this time to use various tools for loss estimation, this would likely yield erroneous data given the high degree of variation in type and density of development. Acting upon such rough estimates could result in an unwise use of limited resources. At this time, vulnerability is being expressed in qualitative terms in terms of types of damages.

In general estimated damages due to future droughts in northern and eastern Dutchess County are potentially significant. Types of damages are discussed qualitatively below.

Because drought impacts large areas and crosses jurisdictional boundaries, all existing and future buildings, facilities and populations are considered to be exposed to this hazard and could potentially be impacted. However, drought impacts are mostly experienced in water shortages and crop losses on agricultural lands and have no impact on buildings.

Crop failure is one common affect of drought. According to the 2007 USDA Agriculture Census, Dutchess County has 656 farms totaling 102,360 acres. Farms in Dutchess County are 45.9 percent cropland (46,942 acres), 28.9% woodland, 14% pasture land, and 11.3% other uses. The market value of production on Dutchess County farms in 2007 was \$44.9 million, with \$23.4 million generated from crop sales and \$21.5 million generated from livestock sales. Dutchess County ranks 23rd out of 62 counties in the State of New York by the value of agricultural crop sales. By far the largest commodity group within Dutchess County crop sales in 2007 consisted of nursery, greenhouse and floriculture produce, with 29%



of the crop sales. A more detailed breakdown of the County crop sales for 2007 is presented in Table 3c.5. While these figures are considered to be the best readily available data, future plan updates should endeavor to make use of more specialized local sources of data, such as the Dutchess County Soil and Water Conservation District.

Crop/Produce Category	Total Sales by Crop/Produce Category (in \$1,000s)	Crop/Produce Category Sales as Percent of Total
Nursery, greenhouse, floriculture, and sod	\$6,860	29%
Vegetables, melons, potatoes, and sweet potatoes	\$5,840	25%
Fruits, tree nuts, and berries	\$3,688	16%
Corn	\$2,598	11%
Wheat	\$38	0.2%
Other grains, oilseeds, dry beans, and dry peas	\$412	2%
Christmas trees and woody crops	\$361	2%
Other crops and hay	\$3,611	15%
<i>Total</i>	<i>\$23,408</i>	<i>100%</i>

Agricultural losses, specifically losses to crops and produce, in Dutchess County could be significant during a drought. When drought begins, the agricultural sector is usually the first to be impacted because of its heavy reliance on stored soil water, which can rapidly be depleted during extended dry periods. When precipitation returns to normal, impacts on the agricultural sector are quick to diminish again due to the reliance on stored soil moisture.

Water supply shortages are a second affect of drought. Dutchess County's total withdrawal of fresh water for public supply is 24.53 million gallons per day, with 48% percent from groundwater sources and 52 percent from surface water sources. Groundwater is fairly resistant to drought conditions, while surface water is more immediately susceptible to the effects of drought. The extent to which crops in the participating communities are vulnerable to drought conditions will depend to a great extent on from where they draw their water supply. The greatest source of agricultural losses under drought conditions is likely to be from those nursery, greenhouse, or floriculture businesses which rely predominantly on surface water supplies.

A third common affect of drought is fish and wildlife mortality. Dutchess County is largely rural, has diverse populations of fish and wildlife, and abundant creeks, aquifers and reservoirs providing essential water resources. Five different threatened and endangered species reside in Dutchess County, including water-based species such as the bog turtle (*Glyptemys muhlenbergii*) and the dwarf wedgemussel (*Alasmidonta Heterodon*). Because much of the land area in Dutchess County is undeveloped, aquatic and other wildlife habitat is fairly significant and therefore losses to fish and wildlife could likely be high.

A fourth common affect of drought is wildfires. Due to Dutchess County's largely rural nature (only 7 percent of the planning area is classified as "developed"), fuel is plentiful for wildfires (63 percent of the



planning area is woodland or other areas at risk from wildfire). In the planning area, fuel tends to be most plentiful in areas where development densities are lowest; this works to reduce possible property damages and loss of life; however, the wildland-urban interface would be particularly vulnerable as well as transportation routes. Wildfires are a unique hazard addressed separately in this plan.

For the purpose of estimating annual drought damages at this time, we have evaluated the NOAA NCDC database for drought events in the last fifteen years (1993-2008). While the database includes numerous drought events which affected Dutchess County in this period, crop damages are recorded for only one event (in the summer of 1993). The database records that \$50 million in crop losses was realized across the Mid-Hudson Valley and southeast New York State. Estimates of grain feed losses for affected counties were between 40 and 100 percent, and hay, corn, fruit and vegetable crops were also hard hit. In the adjacent Columbia County, which has a very similar agricultural land and crop sales profile to Dutchess County, crop losses due to the 1993 drought were estimated at \$8 million, or 56 percent of total crop sales in Columbia County, based on the 1992 USDA Agriculture Census.

It is reasonable to assume that since Dutchess and Columbia Counties are adjacent and share similar crop profiles, they would also experience similar losses in a region-wide event such as that of 1993. Applying the same percentage of loss experienced by Columbia County to Dutchess County, and dividing the resulting loss among the planning area municipalities according to their share of the total county crop land produces the annualized crop loss estimates presented in Table 3c.6.

This methodology does not take into account the degree of variation in value of various crop types between the municipalities, or the degree of drought resistance, and should be used for mitigation planning purposes only. This is considered to be a significantly conservative estimate, since it relies on only one damage estimate since 1993, a period in which there have been multiple additional drought events for which crop damages are likely to have occurred but were not recorded by NCDC or any other readily available data source.

Jurisdiction	Total Acres Cultivated Crop Land (Acres)	Percent of Total Cultivated Crop Land in Dutchess County	Annual Loss Estimate, Drought
Amenia, Town of	1,535	3.3%	\$28,576
Beekman, Town of	162	0.3%	\$3,016
Dover, Town of	669	1.4%	\$12,454
Milan, Town of	134	0.3%	\$2,495
Millerton, Village of	1	0.0%	\$19
North East, Town of	1,726	3.7%	\$32,132
Pawling, Town of	114	0.2%	\$2,122
Pawling, Village of	11	0.0%	\$205
Pine Plains, Town of	986	2.1%	\$18,356
<i>Planning Area Total</i>	5,338	9.3%	\$99,375

Estimated Damages – Tornadoes

Available data for historic damages due to tornadoes in the planning area was not sufficient to enable a detailed analysis of annualized tornado losses for participating jurisdictions. The NCDC database records only three tornadoes in the planning area with recorded damages since 1978, affecting only two



municipalities (the Towns of Amenia and Pawling) and causing a recorded total of \$305,000 in property damage. This represents an annualized loss of only \$10,167 over the whole planning area, or an average of \$1,130 per municipality per year. Since the risk of tornados is assumed to be uniform over the planning area, the total annual loss can be pro rated among the nine municipalities as to give individual annual loss estimates as presented in Table 3c.7.

Jurisdiction	Total Value of Improvements	Annual Loss Estimate, Tornado
Amenia, Town of	\$404,121,634	\$856
Beekman, Town of	\$1,196,340,238	\$2,533
Dover, Town of	\$718,519,830	\$1,521
Milan, Town of	\$260,081,800	\$551
Millerton, Village of	\$61,541,706	\$130
North East, Town of	\$307,271,704	\$651
Pawling, Town of	\$1,218,720,414	\$2,580
Pawling, Village of	\$323,281,916	\$684
Pine Plains, Town of	\$312,013,435	\$661
<i>Planning Area Total:</i>	<i>\$4,801,892,677</i>	<i>\$10,167</i>

Estimated Damages – Wildfires

Sufficient data such as the numbers and locations of wildfires and damages attributed to them was not available at the time of the study to estimate damages due to wildfires. At this time, vulnerability is being expressed as the value of improvements exposed to the hazard, as presented in the “Hazard Profiles” section of this plan.

First, according to FEMA’s How-To #2, current loss estimation methodologies are not available for estimating wildfire damages. In addition, specific information would be required for buildings in order to develop alternate methodologies, such as type of construction, and details on any existing protective features. This data was not available as a part of the County GIS during this study.

Second, having even the year built data for each structure, one would be able to highlight structures built before codes and standards were adopted to make buildings more resistant to wildfire damage, thus being better candidates for mitigation. Without the year-built data, this can not be done.

If this information should become available in the future, it could be incorporated into future updates of the plan. While one could make some blanket assumptions at this time to use various tools for loss estimation, this would likely yield erroneous data given the high degree of variation in type and density of development. Acting upon such rough estimates could result in an unwise use of limited resources.

Loss estimation methodologies are not currently available for estimating wildfire damages. Sufficient historical data regarding events and associated losses was not available to quantify here. For the purpose of this analysis, we have determined that annual losses are unquantifiable at this time.



Estimated Damages – Winter Storms

Detailed data regarding the damages attributed to the numerous winter storms recorded in the planning area was not available at the time of the study to adequately estimate damages due to winter storms. While the NCDC database records that more than \$20 million in property damages have been caused by winter storms in the Dutchess County area since 1993, these damages apply to a wide region covering multiple counties and further breakdowns giving damages by individual counties are not readily available.

While it is assumed that all nine municipalities are essentially equally vulnerable to winter storms, since neither standard loss estimating methodologies for winter storms or the required data are readily available, we have determined that annual losses due to winter/ice storms are currently unquantifiable.

Estimated Damages – Severe Weather Events: Hurricanes/Tropical Storms and Nor’easters

Sufficient data to enable estimates of the potential annual losses experienced by the municipalities in the planning area due to severe storms such as hurricanes and nor’easters was not readily available. The NCDC database contains no recorded damages for events of this nature which have affected Dutchess County, and the only alternative data that has been discovered during the planning process takes the form of broad brush damage estimates covering the entire region, rather than breakdowns of damage by individual counties.

While it is assumed that all nine municipalities are essentially equally vulnerable to storms of this nature, since detailed data necessary for an analysis is not readily available, we have determined that annual losses due to severe weather events are currently unquantifiable.

Estimated Damages - Summary

The following table (Table 3c.8) is a useful tool to summarize vulnerability in terms of annual damages estimated for various hazards in communities across the nine municipalities that form the Northern and Eastern Dutchess County planning area. For mitigation planning purposes only, municipalities could use this information in their evaluation and prioritization of mitigation options, and development of a mitigation strategy, as municipalities may wish to stress mitigation of those hazards for which annual loss estimates are the highest. These estimated damages are not intended for use in any more formal benefit-cost analyses.



Table 3c.8
Annual Loss Estimates – Summary, All Natural Hazards

Jurisdiction	Total Value of Improvements	Extreme Temperatures	Extreme Wind	Winter Storms	Earthquake	Flood	Ice Jams	Dam Failure	Lightning	Drought	Tornado	Wildfires	Severe Weather Events
Amenia, Town of	\$404,121,634	N	N	U*	\$6,425	\$21,645	U	N	\$502	\$28,576	\$856	U	U*
Beekman, Town of	\$1,196,340,238	N	N	U*	\$19,020	\$14,592	U	N	\$1,486	\$3,016	\$2,533	U	U*
Dover, Town of	\$718,519,830	N	N	U*	\$11,423	\$35,602	U	N	\$892	\$12,454	\$1,521	U	U*
Milan, Town of	\$260,081,800	N	N	U*	\$4,135	\$1,729	U	N	\$323	\$2,495	\$551	U	U*
Millerton, Village of	\$61,541,706	N	N	U*	\$978	\$1,827	U	N	\$76	\$19	\$130	U	U*
North East, Town of	\$307,271,704	N	N	U*	\$4,885	\$7,094	U	N	\$382	\$32,132	\$651	U	U*
Pawling, Town of	\$1,218,720,414	N	N	U*	\$19,376	\$22,860	U	N	\$1,514	\$2,122	\$2,580	U	U*
Pawling, Village of	\$323,281,916	N	N	U*	\$5,140	\$29,371	U	N	\$401	\$205	\$684	U	U*
Pine Plains, Town of	\$312,013,435	N	N	U*	\$4,961	\$40,44	U	N	\$388	\$18,356	\$661	U	U*
<i>Planning Area Total</i>	<i>\$4,801,892,677</i>	<i>N</i>	<i>N</i>	<i>U*</i>	<i>\$76,344</i>	<i>\$138,764</i>	<i>U</i>	<i>N</i>	<i>\$5,964</i>	<i>\$99,375</i>	<i>\$10,167</i>	<i>U</i>	<i>U*</i>

U Currently Unquantifiable

U* Currently Unquantifiable but potentially significant

N Assumed Negligible



SECTION 3d - RISK ASSESSMENT: EXISTING LAND USES AND FUTURE DEVELOPMENT TRENDS IN HAZARD AREAS

The Dutchess County master plan (“*Directions: the Plan for Dutchess County*” (1987)) and its component plan “*Greenway Connections*” (2000) work in concert as a guide for the overall future growth and development of the Dutchess County in support of local land use planning and decision-making. Guided by these plans, the ultimate objective of the Planning Department is to maintain and enhance the County's quality of life and economic climate through planned activity, examination of alternatives, and selection of the most beneficial courses of action.

The Planning Department indicated that “*Greenway Connections*” would be the most current source of information regarding land uses and development trends; this was the source of much of the information provided within this section. In addition, information is supplemented by feedback from Core Planning Group members through their completion of a Land Uses and Development Trends Questionnaire. Text below regarding historic land use and development was obtained largely from the Dutchess County web site.

Historic

Historic development in our planning area of the Northern and Eastern Dutchess County Communities of Amenia, Beekman, Dover, Milan, North East, Pawling (Town and Village), Pine Plains, and Millerton generally mirrors characteristics and trends of the County overall.

Dutchess County has a rich and varied history. For centuries, it had been home to the Wappinger Indians and other members of the Algonquin Federation. In 1609, Henry Hudson sailed up the Hudson River and laid claim to the valley for the Dutch Crown. Dense forests and rolling hills were hospitable to trappers and farmers who immigrated to the valley. Major waterways and networks of trails through the wilderness served as early regional transportation routes. Over time, trading posts became early settlements. From the early 1800s on, open farmland dominated the landscape. City neighborhoods, villages, and hamlets were closely centered around convenient walking distances.

After World War II, there was a dramatic proliferation of highways and suburbs throughout the county. Still, prior to the 1960s, Dutchess County was primarily agricultural. But between 1950 and 1995, the county saw a 37 percent decline in agricultural lands, lost often to large-lot zoning and urban sprawl. Since the 1960s, the southern part of Dutchess County (mainly from Poughkeepsie south) has developed into a largely residential area suburban in character with many of its residents commuting to jobs in New York City. The northern region of the county at the same time developed many residences used during the summer and or on weekends by people living in the New York City urban area.

In recent years, many buildings and landscapes have been preserved through adaptive re-use, nomination to the National Register of Historic Places, and the development of entire historic districts. In consideration of the County's predominantly rural character, more than 200,000 acres of farmland have been dedicated to agricultural districts.

This is not only a story of development in the planning area, but also a story of how that development can be impacted by the hazards which affect the area.



Existing Land Use

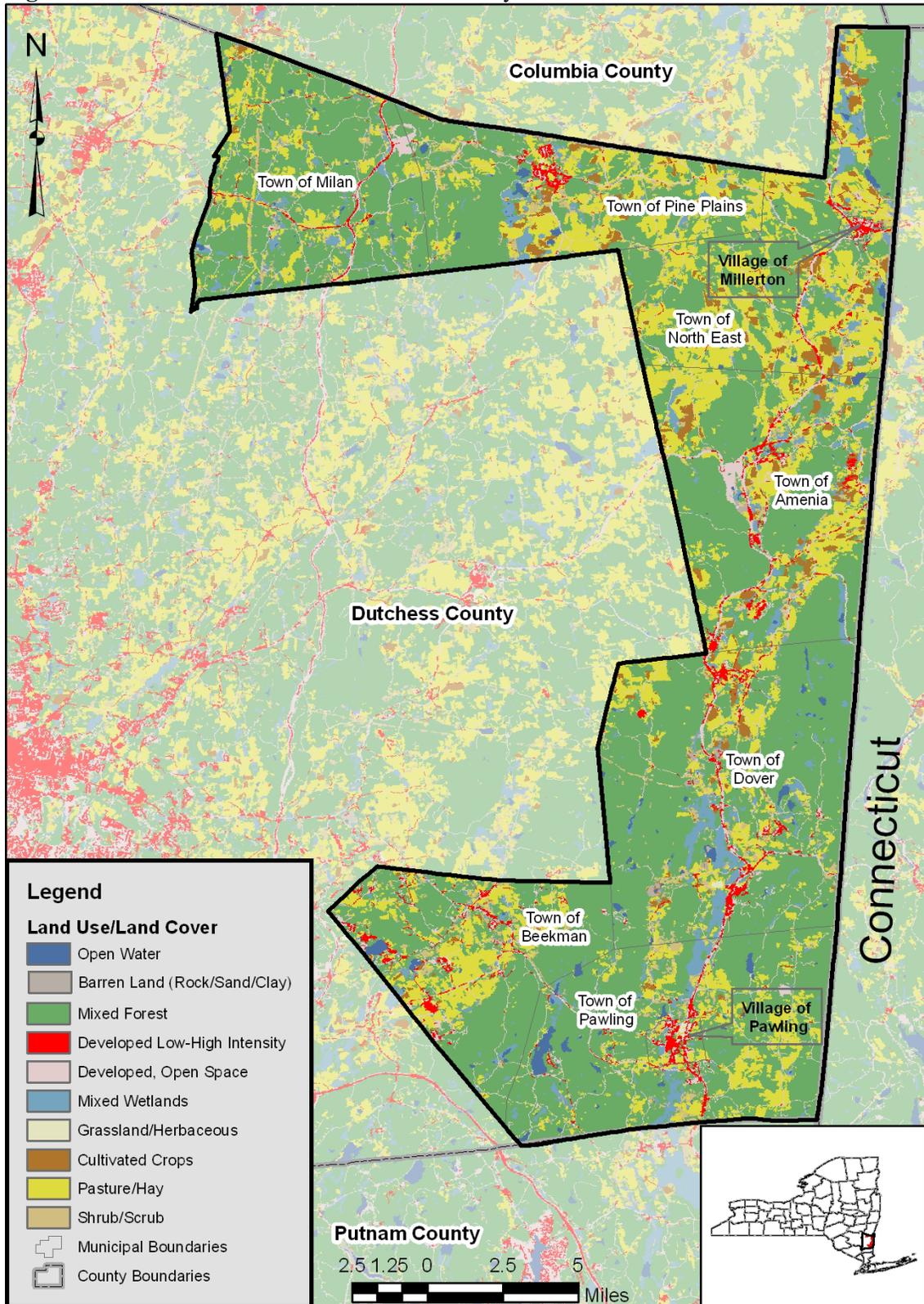
The Northern and Eastern Dutchess County Communities are located in southeastern New York State approximately 85 miles north of New York City and 85 miles south of Albany. They are generally bounded to the west by the Taconic Ridge (which provides geographical separation from the remainder of Dutchess County's municipalities), and to the east by the State of Connecticut. Columbia County lies to the north and Putnam County is located immediately south. The nine participating jurisdictions comprise 287 square miles in area. The population of the planning area as determined by the 2000 Census was 41,716 and population projections of the Poughkeepsie-Dutchess County Transportation Council, as reported in the County's "Connections" report, estimate a 2025 population of 50,451 – an increase of just over 20 percent. Figure 3.d.1 presents a graphical depiction of the land use/land cover in the planning area, and the component data used to compile this figure is presented in Tables 3d.1 and 3d.2.

Most of the study area is forested (60 percent). Pastures and cultivated crops account for an additional 24.2 percent (with pasture/hay at 21.3 percent and cultivated crops at 2.9 percent). Only 6.9 percent of the study area is developed. Of the land which is developed, most is low-intensity residential. The remaining 8.9 percent of the study area is comprised of wetlands, grassland/scrub/shrub, open water, and barren land.

* Note: In the following pages, acreages and percents appearing in Land Cover summary tables have been calculated in GIS based upon USGS land cover shape files, while acreages and percents appearing in Land Use summary tables have been calculated in GIS based upon Dutchess County parcel data shape files.



Figure 3d.1: Northern and Eastern Dutchess County Communities Land Use / Land Cover



Source: USGS NLCD Zone 65 Land Cover Layer, 2003; Real Property Tax Service Agency, Municipal Boundaries - Towns, Cities, Villages, 2008; ESRI, US Counties, 2005



Table 3d.1
Land Cover Estimates – Planning Area Overall

Description of Land Cover	Acres	Percent of Planning Area
Forest	110,273	60.0%
Pasture/Hay	39,238	21.3%
Developed, Open Space	8,395	4.6%
Wetlands	8,042	4.4%
Grassland/Shrub/Scrub	5,843	3.2%
Cultivated Crops	5,338	2.9%
Developed, Low Intensity	3,006	1.6%
Open Water	2,120	1.2%
Developed, Medium Intensity	1,005	0.5%
Barren Land (Rock/Sand/Clay)	368	0.2%
Developed, High Intensity	201	0.1%
Planning Area Total	183,829	100.0%

Table 3d.2
Land Use Estimates – Planning Area Overall

Description of Land Use	Acres	Percent of Planning Area
Agriculture	40,769	22.18%
Commercial	2,560	1.39%
Community Services	2,987	1.62%
Entertainment & Recreation	3,497	1.90%
Industrial	2,630	1.43%
Public Service	1,137	0.62%
Residential	62,403	33.95%
Vacant Land	43,697	23.77%
Wild, Forested, Conservation Lands & Public	16,471	8.96%
Unclassified	2,242	1.22%
Roadways	5,437	2.96%
Planning Area Total	183,829	100.00%

Land Use Planning

Land use planning in the State of New York is primarily a function of local communities, with Dutchess County serving a coordination function for those elements that are best served on a regional level.

The County Department of Planning and Development is responsible for comprehensive countywide planning, economic development coordination and planning, review of local zoning referrals, planning assistance to local governments, community development block grant implementation, urbanized area transportation planning, public information, citizen participation, and transportation. The Department also



oversees LOOP bus operations. County planning includes the collection, analysis, evaluation and dissemination of data, preparation of plans, both business and land use, and development of implementation programs pertaining to water resource management, development of the county capital improvements program, transportation improvements, affordable housing, long range economic development, environmental reviews, historic preservation, and land use management.

At the local level, eight of the nine participating communities have zoning statutes, while all nine communities have building codes, subdivision statutes and, comprehensive plans.

Municipality	Zoning Statutes	Building Code	Subdivision Statutes	Comprehensive Plan
Amenia	Y	Y	Y	Y
Beekman	Y	Y	Y	Y
Dover	Y	Y	Y	Y
Milan	Y	Y	Y	Y
Millerton	Y	Y	Y	Y
North East	Y	Y	Y	Y
Pawling (Town)	Y	Y	Y	Y
Pawling (Village)	Y	Y	Y	Y
Pine Plains	N*	Y	Y	Y

*In the process of adoption at the time of writing

Existing Land Use and Future Development Trends– Town of Amenia

Land Use. The Town of Amenia encompasses a land area of 27,951 acres, making it the second largest municipality in the planning area (second only to Dover with 36,025 acres). On the basis of land cover, almost 92 percent of the Town's land is characterized by some form of natural cover with 54 percent forest cover, 25 percent pasture/hay, 4 percent wetlands, 3 percent grasslands, 5 percent cultivated crops, 0.4 percent open water, and 0.2 percent barren land. Development is predominantly low-intensity and residential, but also includes commercial, community services, entertainment and recreation, industrial and public service uses. On a land use basis, agricultural uses account for 39 percent of the Town's area.

Development Trends. The Town of Amenia currently has two ongoing large development projects, occurring on lands which formerly were farmland/pasture. These projects were proposed prior to the Town's adoption of a new master plan and zoning. The first project involves the expansion of an existing country club to include spa, banquet hall and small street of shops on a village green, in addition to a 300-unit condominium hotel and 338 residential units (including single family homes, golf villas, vineyard cottages, flats (two-bedrooms) and townhomes). The second project involves expansion of an existing horse farm to include a community center and 137 single-family residences managed under a condo association and developed as cluster housing. The other 2008 projects before the Planning Board have been minor two-lot subdivisions or lot-line adjustments. In the future, the Town anticipates that their new Master Plan and zoning will direct residential and commercial growth to existing hamlet centers as mainly infill-type construction as opposed to the sprawl which has typified development in recent years. Development trends observed today can be expected to continue in the near future.



Table 3d.4
Land Cover Estimates – Town of Amenia

Description of Land Cover	Acres	Percent of Town
Forest	15,066	53.90%
Pasture/Hay	6,869	24.57%
Developed, Open Space	1,524	5.45%
Wetlands	1,240	4.44%
Grassland/Shrub/Scrub	782	2.80%
Cultivated Crops	1,532	5.48%
Developed, Low Intensity	518	1.85%
Open Water	107	0.38%
Developed, Medium Intensity	191	0.68%
Barren Land (Rock/Sand/Clay)	56	0.20%
Developed, High Intensity	66	0.24%
Total	27,951	100.00%

Table 3d.5
Land Use Estimates – Town of Amenia

Description of Land Use	Acres	Percent of Town
Agricultural	10,769	38.53%
Commercial	300	1.07%
Community Services	270	0.97%
Entertainment & Recreation	367	1.31%
Industrial	804	2.87%
Public Services	115	0.41%
Residential	6,544	23.41%
Vacant Land	6,526	23.35%
Wild, Forested, Conservation Lands & Public	1,635	5.85%
Unclassified	67	0.24%
Roadways	554	1.98%
Total	27,397	100.00%

Existing Land Use and Future Development Trends – Town of Beekman

Land Use. The Town of Beekman encompasses a land area of 19,653 acres, making it the seventh largest municipality in the planning area. On the basis of land cover, approximately 90 percent of the Town's land is characterized by some form of natural cover with 60 percent forest cover, 22 percent pasture/hay, 2 percent wetlands, 3 percent grasslands, 1 percent cultivated crops, 1 percent open water, and 0.2 percent barren land. Development is predominantly low-intensity and residential, but also includes commercial, community services, entertainment and recreation, industrial and public service uses. On a land use basis, agricultural uses account for just under nine percent of the Town's area.



Development Trends. The Town of Beekman did not provide feedback regarding development trends in their municipality for inclusion in this plan. In the year 2000, the Town did adopt a zoning ordinance to provide incentives to land development applicants for the provision of open space and public amenities. In 2007 the Town adopted a Comprehensive Plan which stresses the desire to preserve and enhance the existing rural character of Beekman while accommodating a balanced mix of agricultural, recreational, residential, commercial and industrial uses, and focus higher density commercial and residential development in the Town Center to preserve the outlying open space areas of the Town. Development trends observed today can be expected to continue in the near future.

Table 3d.6
Land Cover Estimates – Town of Beekman

Description of Land Cover	Acres	Percent of Town
Forest	11,783	59.96%
Pasture/Hay	4,396	22.37%
Developed, Open Space	1,125	5.72%
Wetlands	468	2.38%
Grassland/Shrub/Scrub	647	3.29%
Cultivated Crops	166	0.84%
Developed, Low Intensity	565	2.87%
Open Water	275	1.40%
Developed, Medium Intensity	157	0.80%
Barren Land (Rock/Sand/Clay)	46	0.23%
Developed, High Intensity	26	0.13%
Total	19,653	100.00%

Table 3d.7
Land Use Estimates – Town of Beekman

Description of Land Use	Acres	Percent of Town
Agricultural	1,689	8.59%
Commercial	259	1.32%
Community Services	1,206	6.13%
Entertainment & Recreation	347	1.77%
Industrial	11	0.05%
Public Services	180	0.92%
Residential	7,831	39.85%
Vacant Land	4,415	22.46%
Wild, Forested, Conservation Lands & Public	2,878	14.65%
Unclassified	46	0.24%
Roadways	790	4.02%
Total	19,653	100.00%



Existing Land Use and Future Development Trends– Town of Dover

Land Use. The Town of Dover encompasses a land area of 36,025 acres, making it the largest municipality in the planning area. On the basis of land cover, approximately 94 percent of the Town’s land is characterized by some form of natural cover with 69 percent forest cover, 12 percent pasture/hay, 6 percent wetlands, 3 percent grasslands, 2 percent cultivated crops, 1 percent open water, and 1 percent barren land. Development is predominantly low-intensity and residential, but also includes commercial, community services, entertainment and recreation, industrial and public service uses. On a land use basis, agricultural uses account for just under 12 percent of the Town’s area.

Development Trends. Development in the Town of Dover has been characterized predominantly by the building of single family homes on vacant lots in older subdivisions. There are, however, three large projects proposed at this time. The first is the Dover Knolls project, which involves commercial and residential development of the former Harlem Valley Psychiatric Center in Wingdale adjacent to the Swamp River. The project would include 1,376 residential units, a combination of attached, single-family and apartment units, along with some retail mixed-use. The second is the Wind Rose project, proposed development of 1,145 acres of farmland in the Towns of Dover (654 acres) and Pawling (491 acres). This would include construction of a 230 to 260 unit residential membership club with recreational amenities including a golf course and clubhouse, equestrian center, riding and hiking trails, tennis courts, pool areas, spa, fitness area, helicopter landing pad, and children’s camp. The third key project in the planning phases at this time is proposed condominium development behind the Town firehouse. Other smaller projects have been proposed for review by the Planning Board, including smaller subdivisions such as the 20-lot River Valley subdivision adjacent to the Swamp River floodplain; the 6-lot Meadowbrook subdivision adjacent to the Ten Mile River floodplain; and a proposed apartment building in the floodplain of two tributaries to the Ten Mile River (next to McDonald’s) involving additional fill above where a LOMR/LOMA was previously issued. Development trends observed today can be expected to continue in the near future.

Table 3d.8
Land Cover Estimates – Town of Dover

Description of Land Cover	Acres	Percent of Town
Forest	24,909	69.14%
Pasture/Hay	4,306	11.95%
Developed, Open Space	1,341	3.72%
Wetlands	2,113	5.86%
Grassland/Shrub/Scrub	1,185	3.29%
Cultivated Crops	674	1.87%
Developed, Low Intensity	539	1.50%
Open Water	441	1.22%
Developed, Medium Intensity	268	0.74%
Barren Land (Rock/Sand/Clay)	215	0.60%
Developed, High Intensity	35	0.10%
Total	36,025	100.00%



Table 3d.9
Land Use Estimates – Town of Dover

Description of Land Use	Acres	Percent of Town
Agricultural	4,269	11.85%
Commercial	1,222	3.39%
Community Services	435	1.21%
Entertainment & Recreation	1,013	2.81%
Industrial	1,483	4.12%
Public Services	399	1.11%
Residential	10,066	27.94%
Vacant Land	11,294	31.35%
Wild, Forested, Conservation Lands & Public	4,987	13.84%
Unclassified	0	0.00%
Roadways	857	2.38%
Total	36,025	100.00%

Existing Land Use and Future Development Trends – Town of Milan

Land Use. The Town of Milan encompasses a land area of 23,395 acres, making it the fifth largest municipality in the planning area. On the basis of land cover, approximately 93 percent of the Town's land is characterized by some form of natural cover with 69 percent forest cover, 14 percent pasture/hay, 4 percent wetlands, 5 percent grasslands, 1 percent cultivated crops and 1 percent open water. Development is predominantly low-intensity and residential, but also includes commercial, community services, entertainment and recreation, industrial and public service uses. On a land use basis, agricultural uses account for just over 12 percent of the Town's area.

Development Trends. Development in the Town of Milan has been, and is expected to be, characterized mainly by small amounts of single family residential subdivision activity. Development trends observed today can be expected to continue in the near future.

Table 3d.10
Land Cover Estimates – Town of Milan

Description of Land Cover	Acres	Percent of Town
Forest	16,205	69.27%
Pasture/Hay	3,344	14.29%
Developed, Open Space	1,271	5.43%
Wetlands	884	3.78%
Grassland/Shrub/Scrub	1,066	4.56%
Cultivated Crops	137	0.58%
Developed, Low Intensity	294	1.26%
Open Water	160	0.68%
Developed, Medium Intensity	33	0.14%
Barren Land (Rock/Sand/Clay)	0	0.00%
Developed, High Intensity	0	0.00%
Total	23,395	100.00%



Table 3d.11
Land Use Estimates – Town of Milan

Description of Land Use	Acres	Percent of Town
Agricultural	2,846	12.16%
Commercial	79	0.34%
Community Services	428	1.83%
Entertainment & Recreation	341	1.43%
Industrial	122	0.52%
Public Services	16	0.07%
Residential	8,507	36.36%
Vacant Land	6,612	28.26%
Wild, Forested, Conservation Lands & Public	1,606	6.86%
Unclassified	1,794	7.67%
Roadways	1,044	4.46%
Total	23,395	100.00%

Existing Land Use and Future Development Trends– Town of North East

Land Use. The Town of North East encompasses a land area of 27,544 acres, making it the fourth largest municipality in the planning area. On the basis of land cover, approximately 94 percent of the Town's land is characterized by some form of natural cover with 45 percent forest cover, 36 percent pasture/hay, 4 percent wetlands, 2 percent grasslands, 6 percent cultivated crops, 1 percent open water, and 0.1 percent barren land. Development is predominantly low-intensity and residential, but also includes a small amount of commercial, community services, entertainment and recreation, industrial and public service uses. On a land use basis, agricultural uses account for approximately 42 percent of the Town's area.

Development Trends. Development in the Town of North East has been moderately slow over the years, being relatively dispersed and low-density. Most has been residential subdivision activity. Residential developments in the more remote areas of Town have tended to be second homes. Some commercial development/redevelopment (in the form of a mix of retail and other uses) is occurring along US Rte. 44 and NY Rte. 22 in areas with some flood risk. No large scale developments are currently proposed in the Town. Development trends observed today can be expected to continue in the near future.



Table 3d.12
Land Cover Estimates – Town of North East

Description of Land Cover	Acres	Percent of Town
Forest	12,427	45.12%
Pasture/Hay	10,010	36.34%
Developed, Open Space	1,003	3.64%
Wetlands	1,096	3.98%
Grassland/Shrub/Scrub	566	2.05%
Cultivated Crops	1,735	6.30%
Developed, Low Intensity	338	1.23%
Open Water	269	0.98%
Developed, Medium Intensity	56	0.20%
Barren Land (Rock/Sand/Clay)	36	0.13%
Developed, High Intensity	8	0.03%
Total	27,544	100.00%

Table 3d.13
Land Use Estimates – Town of North East

Description of Land Use	Acres	Percent of Town
Agricultural	11,585	42.06%
Commercial	185	0.37%
Community Services	157	0.57%
Entertainment & Recreation	37	0.14%
Industrial	64	0.23%
Public Services	60	0.22%
Residential	8,526	30.95%
Vacant Land	4,610	16.74%
Wild, Forested, Conservation Lands & Public	1,515	5.50%
Unclassified	268	0.97%
Roadways	537	1.95%
Total	27,544	100.00%

Existing Land Use and Future Development Trends – Town of Pawling

Land Use. The Town of Pawling encompasses a land area of 27,696 acres, making it the third largest municipality in the planning area. On the basis of land cover, approximately 94 percent of the Town's land is characterized by some form of natural cover with 69 percent forest cover, 15 percent pasture/hay, 5 percent wetlands, 3 percent grasslands, 0.4 percent cultivated crops, 2 percent open water, and 0.1 percent barren land. Development is predominantly low-intensity and residential, but also includes a small amount of commercial, community services, entertainment and recreation, industrial and public service uses. On a land use basis, agricultural uses account for approximately 11 percent of the Town's area.



Development Trends. The Town of Pawling did not provide feedback regarding development trends in their municipality for inclusion in this plan. One known project under consideration at this time is the Wind Rose project, the proposed development of 1,145 acres of farmland in the Towns of Dover (654 acres) and Pawling (491 acres). This project would include construction of a 230 to 260 unit residential membership club with recreational amenities including a golf course and clubhouse, equestrian center, riding and hiking trails, tennis courts, pool areas, spa, fitness area, helicopter landing pad, and children's camp. A master plan is currently under development. Development trends observed today can be expected to continue in the near future.

Table 3d.14
Land Cover Estimates – Town of Pawling

Description of Land Cover	Acres	Percent of Town
Forest	19,129	69.07%
Pasture/Hay	4,153	15.00%
Developed, Open Space	1,287	4.65%
Wetlands	1,268	4.58%
Grassland/Shrub/Scrub	747	2.70%
Cultivated Crops	115	0.42%
Developed, Low Intensity	240	0.87%
Open Water	634	2.29%
Developed, Medium Intensity	91	0.33%
Barren Land (Rock/Sand/Clay)	15	0.05%
Developed, High Intensity	17	0.06%
Total	27,696	100.00%

Table 3d.15
Land Use Estimates – Town of Pawling

Description of Land Use	Acres	Percent of Town
Agricultural	3,152	11.38%
Commercial	285	1.03%
Community Services	135	0.49%
Entertainment & Recreation	1,110	4.01%
Industrial	106	0.38%
Public Services	234	0.85%
Residential	11,198	40.43%
Vacant Land	7,259	26.21%
Wild, Forested, Conservation Lands & Public	3,102	11.20%
Unclassified	33	0.12%
Roadways	1,083	3.91%
Total	27,696	100.00%



Existing Land Use and Future Development Trends– Town of Pine Plains

Land Use. The Town of Pine Plains encompasses a land area of 19,921 acres, making it the sixth largest municipality in the planning area. On the basis of land cover, approximately 94 percent of the Town’s land is characterized by some form of natural cover with 50 percent forest cover, 29 percent pasture/hay, 5 percent wetlands, 4 percent grasslands, 5 percent cultivated crops, 1 percent open water, and 0.01 percent barren land. Development is predominantly low-intensity and residential, but also includes a small amount of commercial, community services, entertainment and recreation, industrial and public service uses. On a land use basis, agricultural uses account for approximately 32 percent of the Town’s area.

Development Trends. Development in the Town of Pine Plains is predominantly single-family, low-density residential construction in woodland areas and on former farm fields widely dispersed throughout the town. There is the potential, however, that three larger scale projects proposed for construction over the next ten years could add 600 to 1,000 new housing units (some on steep sloped woodlands and ridge lines), as well as a great deal of commercial space and high density residential/mixed use development. These three proposals are expected to be the dominant development patterns and influences over the next decade. Development trends observed today can be expected to continue in the near future.

Description of Land Cover	Acres	Percent of Town
Forest	9,911	49.75%
Pasture/Hay	5,688	28.55%
Developed, Open Space	890	4.47%
Wetlands	962	4.83%
Grassland/Shrub/Scrub	888	4.46%
Cultivated Crops	984	4.94%
Developed, Low Intensity	293	1.47%
Open Water	231	1.16%
Developed, Medium Intensity	59	0.29%
Barren Land (Rock/Sand/Clay)	2	0.01%
Developed, High Intensity	14	0.07%
Total	19,921	100.00%

Description of Land Use	Acres	Percent of Town
Agricultural	6,321	31.73%
Commercial	127	0.64%
Community Services	138	0.69%
Entertainment & Recreation	230	1.15%
Industrial	5	0.02%
Public Services	25	0.13%



Table 3d.17
Land Use Estimates – Town of Pine Plains

Description of Land Use	Acres	Percent of Town
Residential	9,118	45.77%
Vacant Land	2,792	14.02%
Wild, Forested, Conservation Lands & Public	719	3.61%
Unclassified	20	0.10%
Roadways	426	2.14%
Total	19,921	100.00%

Existing Land Use and Future Development Trends – Village of Pawling

Land Use. The Village of Pawling encompasses a land area of 1,259 acres, making it the second smallest municipality in the planning area. On the basis of land cover, approximately 61 percent of the Village's land is characterized by some form of natural cover with 27 percent forest cover, 20 percent pasture/hay, 4 percent wetlands, 9 percent grasslands, 1 percent cultivated crops and 0.1 percent open water. Development is predominantly low-intensity and residential, but also includes a mix of commercial, community services, entertainment and recreation, industrial and public service uses. On a land use basis, agricultural uses account for nine percent of the Village's area.

Development Trends. The Village of Pawling is experiencing development primarily in the form of farmland being converted to single-family subdivisions outside of the Village core, and redevelopment of commercial/retail space in what is primarily the Village core. There are three remaining large, undeveloped parcels on former farmland on the periphery of the Village that have been the focus of most development discussion over the last few years. Under the current zoning, it is expected that these parcels will likely be developed into single family homes in a subdivision format. A recent proposal for a clustered, single family/condominium development on a parcel in the northern side of the Village (Umscheid property) is no longer being pursued because it would have required a change in zoning to allow an increased density with a clustered development and remaining open space. The Village is now considering a change to its zoning law to allow for this type of development in the future in order to encourage the clustering of units and maintaining open space in return for the requested density.

Table 3d.18
Land Cover Estimates – Village of Pawling

Description of Land Cover	Acres	Percent of Village
Forest	341	27.11%
Pasture/Hay	248	19.72%
Developed, Open Space	169	13.41%
Wetlands	54	4.33%
Grassland/Shrub/Scrub	114	9.06%
Cultivated Crops	11	0.90%
Developed, Low Intensity	186	14.76%
Open Water	2	0.14%



Table 3d.18
Land Cover Estimates – Village of Pawling

Description of Land Cover	Acres	Percent of Village
Developed, Medium Intensity	103	8.17%
Barren Land (Rock/Sand/Clay)	0	0.00%
Developed, High Intensity	30	2.38%
Total	1,259	100.00%

Table 3d.19
Land Use Estimates – Village of Pawling

Description of Land Use	Acres	Percent of Village
Agricultural	112	8.87%
Commercial	57	4.52%
Community Services	189	15.05%
Entertainment & Recreation	52	4.14%
Industrial	24	1.94%
Public Services	87	6.93%
Residential	475	37.76%
Vacant Land	136	10.83%
Wild, Forested, Conservation Lands & Public	22	1.77%
Unclassified	0	0.01%
Roadways	103	8.19%
Total	1,259	100.00%

Existing Land Use and Future Development Trends– Village of Millerton

Land Use. The Village of Millerton encompasses a land area of 385 acres, making it the smallest municipality in the planning area. On the basis of land cover, approximately 44 percent of the Village’s land is characterized by some form of natural cover with 20 percent forest cover, 14 percent pasture/hay, 5 percent wetlands, 4 percent grasslands, 0.3 percent cultivated crops and 0.5 percent open water. Development is predominantly low- and medium- intensity residential, but also includes a mix of commercial, community services, entertainment and recreation, industrial and public service uses. On a land use basis, agricultural uses account for seven percent of the Village’s area.

Development Trends. The Village of Millerton has always had a strong commercial center serving the rural communities around it. New development currently in the forefront in the Village involves the proposed development of a 20-unit multi-family apartment complex on a 3.7 acre parcel at the intersection of NY Rte. 44 and Main Street (“Overlook” project). This development has been the subject of some local opposition, with concerns about the basic need for the development, traffic and water issues, and its affordability for local people at the forefront.



Table 3d.20
Land Cover Estimates – Village of Millerton

Description of Land Cover	Acres	Percent of Village
Forest	78	20.19%
Pasture/Hay	53	13.88%
Developed, Open Space	79	20.54%
Wetlands	18	4.68%
Grassland/Shrub/Scrub	16	4.04%
Cultivated Crops	1	0.29%
Developed, Low Intensity	76	19.79%
Open Water	2	0.46%
Developed, Medium Intensity	54	13.98%
Barren Land (Rock/Sand/Clay)	0	0.00%
Developed, High Intensity	8	2.16%
Total	385	100.00%

Table 3d.21
Land Use Estimates – Village of Millerton

Description of Land Use	Acres	Percent of Village
Agricultural	28	7.21%
Commercial	45	11.76%
Community Services	29	7.47%
Entertainment & Recreation	0.16	0.04%
Industrial	12	3.07%
Public Services	20	5.14%
Residential	137	35.60%
Vacant Land	52	13.46%
Wild, Forested, Conservation Lands & Public	8	1.98%
Unclassified	14	3.59%
Roadways	41	10.68%
Total	385	100.00%

Potential for Future Development in Delineated Hazard Areas

While future development patterns are subject to many regulatory and market-driven factors, it is possible to prepare general estimates of the relative potential for future development to occur in hazard areas by analyzing vacant parcels and their relation to the various hazard areas. As discussed in detail in the Risk Assessment, the planning area is susceptible to certain hazards uniformly. However, the nature of other hazards is such that only delineable portions of the study area are at risk. Using GIS, parcel data provided by Dutchess County’s GIS Department for “vacant” parcels was combined with geographically delineated hazard area boundaries to tally the acreage of vacant, potentially developable parcels within each municipality and further, the relative percentage of this acreage lying within each of the geographically delineated hazard areas. Because vacant land was accounted for separately from protected open space in



the County data set, it was assumed that all vacant lands are potentially developable in the future, at least to some extent. **Table 3d.22** lists the estimated number of potentially developable vacant parcels throughout the study area in relation to the geographically delineated hazard zones.

According to the analysis, it is estimated that there are 43,697 acres of vacant, potentially developable land in the nine participating jurisdictions. On a municipal level, this ranges from a minimum of 52 acres in the Village of Millerton to a maximum of 11,294 acres in the Town of Dover. In the Northern and Eastern Dutchess County Communities, there are 2,350 acres of vacant land in flood hazard areas (that is, high or moderate flood risk areas as defined by FEMA Q3 mapped 100- or 500- year flood zones); 2,687 acres of vacant land in earthquake hazard areas for which the soil type is most likely to amplify the effects of shaking (type E soils); 34,556 acres of vacant land in wildfire hazard areas; and 60 acres of vacant land in areas potentially impacted if a dam break were to occur at one of the four high hazard dams for which dam inundation mapping is available).

Municipality	Total Acres Vacant Land	Vacant Land as Percent of Total Acreage	Percent of Vacant Land in Flood Hazard Areas (100 and 500 year floodplains)	Percent of Vacant Land in Earthquake Hazard Areas of Class E Soils	Percent of Vacant Land in Wildfire Hazard Areas	Percent of Vacant Land in Delineated Dam Inundation Areas*
Amenia	6,526.13	23.35%	4.56%	11.04%	76.31%	0.04%
Beekman	4,414.83	22.46%	4.24%	1.20%	73.85%	0.64%
Dover	11,294.43	31.35%	6.86%	8.43%	84.04%	0.00%
Milan	6,612.16	28.26%	1.78%	3.15%	82.15%	0.00%
Northeast	4,609.72	16.74%	3.67%	5.31%	74.89%	0.00%
Pawling	7,259.30	26.21%	8.32%	5.08%	77.65%	0.41%
Pine Plains	2,792.34	14.02%	5.62%	4.22%	78.17%	0.00%
Millerton Village	51.86	13.46%	9.25%	1.15%	34.27%	0.00%
Pawling Village	136.34	10.83%	27.64%	16.69%	74.89%	0.00%
Total	43,697.13	23.77%	5.38%	6.15%	79.08%	0.14%

*For designated High Hazard dams for which inundation mapping was available.

The following discussion will analyze the likelihood for future development in each of the identified hazard areas to incorporate hazard-resistant design.

Future Development Trends in Hazard Areas – Study Area Overview

The Northern and Eastern Dutchess County Communities have a lot to offer. The area's scenic beauty and open space, proximity to New York City, historic sites, cultural attractions and farmsteads are some of the attributes that make this region unique and attractive to people and businesses. Infrastructure investment, quality school systems, Main Street revitalization programs, area tourism promotions, Economic Development Zone incentives to attract businesses, and joint marketing of agricultural products



have all been successful strategies for increasing the strength of our regional economy. At the same time, quality economic development and quality design in our communities are complementary objectives that will increase the strength of our regional economy. Our municipalities aim to support development in a manner that will maintain the scenic landscape which sustains our rural heritage.

In addition, we are cognizant of the risks that we face due to the impacts of natural hazards. Many of us have programs in place today which address certain natural hazards – whether it is our comprehensive or master plan, a floodplain management ordinance, or a steep slope ordinance.

Together, our nine municipalities have a total of 43,697 acres of vacant (potentially developable) land. This represents almost one quarter of our total area. Thirteen natural hazards were identified earlier in this plan as having a significant impact on the planning area and have been analyzed in detail in this plan. The paragraphs below analyze the likelihood for future development in each of the identified hazard areas to incorporate hazard-resistant design. Overall, while new development is expected to result in an increasing number of structures present in our municipalities, codes and standards in place today will require that they be designed to provide a certain degree of protection from the hazards to which we are susceptible.

Future Development Trends – Extreme Wind

One hundred percent of the land and built environment in the participating jurisdictions is susceptible to extreme wind events. This is also true for currently vacant (developable) parcels. The wind hazard area encompasses the entire planning region and is essentially uniform from one jurisdiction to the next. Therefore, future development trends for the extreme wind hazard area would be the same as those development trends identified on a municipal basis earlier in this chapter. New construction is subject to the requirements of the New York State Building Code, which contains provisions for wind resistant design. It is anticipated that while an increasing number of structures will be present, they will be built to a code that will offer a certain degree of protection from the most frequent high wind events.

Future Development Trends – Severe Weather Events: Hurricanes and Tropical Storms, Nor'easters, Tornadoes and Winter Storms/Ice Storms

One hundred percent of the land and built environment in the participating jurisdictions is susceptible to severe weather events. This is also true for currently vacant (developable) parcels. Severe weather events such as hurricanes/tropical storms, nor'easters, tornadoes, and winter storms/ice storms can occur anywhere in the participating jurisdictions. These events have certain hazards associated with them.

- For hurricanes/tropical storms, see future development trends for flooding and extreme winds.
- For tornadoes, see future development trends for extreme winds.
- For winter storms/ice storms, see future development trends overview and for flooding and extreme winds. The New York State Building code also contains provisions regarding snow/ice loads. It is anticipated that while an increasing number of structures will be present, they will be built to codes which include basic measures to protect against the potentially crushing effects of high accumulations of snow and ice on roofs.
- For nor'easters, see future development trends for flooding and extreme winds.



Future Development Trends – Lightning

One hundred percent of the land and built environment in the participating jurisdictions is susceptible to lightning. This is also true for currently vacant (developable) parcels. The lightning hazard area encompasses the entire planning region and is uniform from one jurisdiction to the next. Therefore, future development trends for the extreme wind hazard area would be the same as those development trends identified on a municipal basis earlier in this chapter. New construction is subject to the requirements of the New York State Building Code, which contains provisions for lightning resistant design. It is anticipated that while an increasing number of structures will be present, they will be built to codes which include basic measures to protect against lightning strikes

Future Development Trends – Dam Failure

Less than one percent of the region's vacant (developable) land is located in mapped dam inundation areas, and is located in the Towns of Amenia, Beekman and Pawling. The New York State Department of Environmental Conservation Dam Safety Program maintains an inventory of dams in the State and conducts safety inspections of dams, completes technical reviews of proposed dam construction or modification, monitoring of remedial work for dam safety compliance, and is involved in emergency preparedness activities. At the time of writing, research of readily available data sources did not reveal any dams proposed or under construction, in addition to those listed by the US Army Corps of Engineers National Inventory of Dams, or the Stanford University National Performance of Dams Program. While planning is not underway for construction of new dams in the participating jurisdictions, new development is possible on just over 60 acres of vacant parcels in mapped inundation areas for existing dams.

Future Development Trends – Drought

The drought hazard area encompasses the entire planning region and is uniform from one jurisdiction to the next, although the local impact depends on the prevalence of agricultural land in individual municipalities. While the individual jurisdictions would like to focus on the preservation of farmland and other open space, possible pressures on agricultural land to be zoned for residential and other development, may reduce the economic effects of drought on agriculture, while the impact on potable water supplies may increase.

Future Development Trends – Flood

Individuals and larger developers often look toward land along rivers, streams, canals, bays, and near the ocean for development because of the passive and active recreational opportunities that they offer. In turn, flood hazard areas are often areas where development pressures are high due to the recreational value of these lands, particularly in communities where the amount of undeveloped land is small and the density of development is high.

Just over five percent of all currently vacant (developable) parcels in the planning region are located in flood hazard areas. They account for roughly 2,350 acres of potentially developable flood prone lands. Development within mapped flood hazard areas is currently regulated for communities participating in FEMA's National Flood Insurance Program (NFIP). All nine jurisdictions participating in this hazard mitigation plan are also participating in the NFIP and thereby must have in place a floodplain management ordinance to regulate activities in the floodplain, as well as a designated floodplain



manager/NFIP Coordinator to enforce the relevant ordinances. This will work to protect new development and substantial improvements in the region's floodplains. In addition, several municipalities have included a discussion of floodplains in their comprehensive plans.

While an increased number of assets could be susceptible, it is assumed that they will be built to codes that will offer a certain degree of protection from the most frequent events.

Future Development Trends – Ice Jams

The ice jam hazard is similar to the flood hazard in that ice jams may cause rivers and streams to overflow their banks. However, using flooding as a guide, if a structure is near the banks of the rivers or streams, it may also be subject to structural damage from the impact of ice striking the structure. The jurisdictions' flood hazard ordinances are assumed to currently deal with the flooding aspect of the ice jam hazard, and future damages due to this hazard will depend on development within the floodplain and adherence to the relevant building codes.

Future Development Trends – Earthquake

Within the Northern and Eastern Dutchess County Communities, PGA values of between 2 and 4%g have a 10 percent chance of being exceeded over 50 years. The earthquake hazard area encompasses the entire region and is nearly uniform from one jurisdiction to the next, although the effects of an earthquake may vary from one jurisdiction and across jurisdictions as the soil type varies. Just over six percent of all currently vacant parcels in the study area are currently located in areas where the soil type (Class E soils) is likely to amplify the effects of an earthquake – a total of 2,688 acres. While new development on these parcels could lead to an increased number of assets susceptible to this hazard in the future, new construction is subject to the requirements of the New York State Building Code, which contains provisions for earthquake resistant design. It is anticipated that while an increasing number of structures will be present, they will be built to a code that will offer a certain degree of protection from the most frequent events.

Future Development Trends – Wildfires

Seventy-nine percent of currently vacant parcels are located in delineated wildfire hazard areas - a total of 34,556 acres of potentially developable land. The severity of the hazard is greatest in areas of high fuel loading and steep slopes. Areas that are typically considered to be safe from wildfires include highly urbanized, developed areas that are not contiguous with vast areas of wild lands. Areas typically considered to be prone to wildfires include large tracts of wild lands containing heavier fuels with high continuity such as those forested areas in many parts of the study region. Pressure to develop some forested areas, especially for residential use, will generally result in increases to the wildland-urban interface and the value of improved property within these areas in most jurisdictions, and hence an increased risk of future property damage and public danger due to wildfires.

Conclusion

The Northern and Eastern Dutchess County Communities are balancing the objectives of preserving natural, cultural and historic resources; facing the reality of an economy which is undergoing a big change as the nation moves into the post-industrial era; and, seeing development that is driven by agricultural and natural resources as well as the occurrences of the nations largest urban area only 95 miles away. The



area is involved in economic development, housing, open space, stormwater and transportation planning, and many of the participating jurisdiction in this planning effort have prepared comprehensive plans in recent years. This is an indication that they are concerned with their communities and want to ensure that they are safe, thriving and appealing places to live work and play. The following recent development trends are expected to continue in the future:

- While most recent development has been single family homes and small subdivisions, larger communal developments, especially those associated with recreational activities and second homes, are increasingly becoming a feature of the area.
- Agriculture will continue to play an important socio-economic role in the planning area, and communities will encourage the preservation of farmland, open space, and the rural character of the area in general.
- Many communities will focus development on infill and re-use of already developed areas, rather than permit outward sprawl, as part of their efforts to preserve open space and farmland.
- Northern and Eastern Dutchess County will continue to be an attractive area for those seeking to escape the New York City urban area, whether to live permanently or as the location for a second residence.
- Communities will continue to meet the requirements of the National Flood Insurance Program and County stormwater requirements.
- Communities will continue to enforce minimum building codes meeting the requirements of the New York State Building Code.

A full summary of all the completed Land Use and Development Questionnaires returned by individual jurisdictions is presented in Table 3.d.3. For some jurisdictions, responses from several local officials have been amalgamated and condensed into a single entry in the table.



Summary of Responses – Land Use and Development Trends Questionnaire

Table 3d.23 Summary of Responses Land Uses and Development Trends Questionnaire (Source: Core Planning Group Members)		
Community	Land Uses and Development Trends in Hazard Areas	Regulations/Codes/Ordinances To Protect New Development From Natural Hazards
Amenia	<p>Three large developments are occurring on farmland/pasture (all above the floodplain – the Town is in a narrow valley with a creek and wetlands at the base). These are characterized as “second home” developments, with a clustered plan and open space buffer. The largest includes townhomes and a hotel, in addition to detached houses:</p> <p>Two major projects being considered before the planning board:</p> <p>1. Silo Ridge Resort Community: approximately 670 acre project site west of NYS Route 22 in the Town. Approximately 170 acres presently consists of the Silo Ridge Country Club (18-hole golf course and clubhouse). The new project is organized in the manner of a traditional town with 300 condominium hotel units and other resort facilities (spa, village green with shops), and a total of 338 residential units including single-family homes, golf villas, cottages, flats and townhomes. The project’s master development plan markets the development as a second home, resort-style community in which the majority of residential unit owners are expected to be part-time residents.</p> <p>2. Depot Hill Farm/Keane’s Stud: Approximately 480 acres on Depot Hill Road in the Town. The project includes 137 single-family residences managed under a condo association and developed as cluster housing. The project includes a community center, and the equestrian facilities will allow for public use of the riding trails for public recreation. Keane Stud will continue as a thoroughbred stud farm. Existing woodlands and wetlands totaling approximately 190 acres will remain undeveloped.</p> <p>Whether or not these developments proceed will depend on the financial markets. The new Town Master Plan and zoning directs residential and commercial growth to the existing hamlet centers, but the projects above were proposed in advance of this plan’s adoption. It is hoped there will be infill construction in the hamlets, but several are in low-lying areas. In light of the Town’s easy access to New York City via the Metro North railroad, there is a feeling in that mitigation methods which do not result in lower densities in the Town will be more readily supported</p>	<p>The Code Enforcement Officer (CEO) is currently attending workshop/s to compare the floodplain maps of 1986 to the proposed maps of 2008. [Local Law #1 of 1988 reflects the 1986 mapping.] This upgrade will enhance the Town's ability to assess the changes in our flood hazard zones and create the mapping changes that reflect 20+ years of erosion, changing buffer zones, floodways and wetlands. A number of the Town's employees are NFIP trained, and the CEO attends workshops on FEMA's NFIP to upgrade his training and enforce NYS requirements regarding development or changes in floodplain management. The Town of Amenia is currently working toward developing an amendment to Local Law #1 of 1988 to reflect the 2008 mapping changes, administration, and flood prevention.</p> <p>The Town has been very careful in reviewing recent applications for compliance with wetland, watershed, and steep slope avoidance, all of which are critical with the specific local topography. The Town applies New York State codes in review for earthquake, high winds, and wildfire resistance, but the Town has no specific requirements since these have not been a historical problem in Amenia.</p>



Table 3d.23
Summary of Responses
Land Uses and Development Trends Questionnaire
(Source: Core Planning Group Members)

Community	Land Uses and Development Trends in Hazard Areas	Regulations/Codes/Ordinances To Protect New Development From Natural Hazards
Beekman	<p>The predominant type of development on the Town of Beekman is single family residential units on parcels ranging in size. The largest part of Town is zoned for 1 acre development with other areas zoned for 2 or 3 acre development. There is minimal commercial or industrial development in the Town. In December of 2007 the Town adopted an updated Comprehensive Plan and updated zoning laws are in the final stages of approval.</p> <p>The Town of Beekman is also aggressively working to protect open space. The Town’s people have authorized the Town through referendum to borrow up to \$3,000,000 for the preservation of open space. We are very near the completion of our first Preservation project with the purchase of development rights on 304 acres or prime buildable and farmable land.</p>	<p>In December of 2007 the Town adopted an updated Comprehensive Plan and updated zoning laws are in the final stages of approval.</p> <p>The Town does have several environmentally sensitive areas, primarily ridge lines, steep slopes and wet lands. Protection of these areas is being addressed in the proposed updated zoning. The current zoning primarily deals with floodplain issues and prevention. The regulations are strengthened and new regulation for dealing with steep slopes are proposed under the updated</p> <p>The Town of Beekman’s current Zoning Code and proposed updated Zoning Code can be found on the Town’s website at www.townofbeekman.com</p>
Dover	<p>There are currently more than 50 proposed development projects on file before the Town of Dover planning board in various stages of review, of which the most significant are summarized as follows:</p> <ul style="list-style-type: none"> • <i>Dover Knolls</i>: 1,367 residential units, a combination of attached single-family residences and apartments, along with some retail/mixed use, proposed for the Wingdale area of the Town, adjacent to the Swamp River (promotional material for this development suggests that no structures within the mapped A-Zone/100-year floodplain are proposed). • <i>Wind Rose</i>: 230 – 260 residential unit membership club, proposed on the hills in the south western part of the Town west of the Swamp River. This development also includes a golf course and clubhouse, plus additional recreational facilities such as an equestrian center, pool areas, tennis courts, helicopter landing pad, and a children’s camp. • <i>River Valley</i>: A 20-lot subdivision directly adjacent to the Swamp River floodplain, which is now under construction. • <i>Meadowbrook</i>: A 6-lot subdivision directly adjacent to the Ten Mile River floodplain north of Dover hamlet, currently under review. • A proposed apartment building in the floodplain of two tributaries to the Ten Mile River in Dover next to McDonald’s, which involves additional fill above where a LOMR/LOMA was issued several years 	<p>The Town of Dover enforces all New York State building codes, NYSDEC stormwater regulations, and a flood damage prevention NFIP ordinance. The Town also has an erosion and sediment control ordinance, steep slope regulations, and the area is considered a special wind district by the NY State building codes. There is also a stream corridor overlay district – primary buildings must be 100 feet from the river or stream, accessory buildings must be 50 feet from the river or stream. This is part of the zoning law.</p> <p>In the light of problems encountered enforcing these regulations, the penalties for non-compliance should be increased.</p> <p>There are local concerns that flood mitigation regulations in the various communities along the Ten Mile River are uncoordinated and inconsistently enforced. Regulations should be uniform and aggressively enforced, possibly via the employment by the several communities of one officer specifically for the enforcement of local flood control regulations.</p>

SECTION 3d - RISK ASSESSMENT: LAND USES AND DEVELOPMENT TRENDS



Table 3d.23
Summary of Responses
Land Uses and Development Trends Questionnaire
(Source: Core Planning Group Members)

Community	Land Uses and Development Trends in Hazard Areas	Regulations/Codes/Ordinances To Protect New Development From Natural Hazards
	<p>ago.</p> <p>The area around the Dover section of the valley has seen the disappearance of small farms and they are now housing subdivisions. In addition, the vacant lots of older subdivisions are being sold and developed. As the wooded sections are cleared and changed to housing lots with impervious surfaces, and lawns the Town is getting more and more complaints concerning runoff. The steep slopes of the valley walls contribute to runoff in severe weather as there is little or no soil over the rock in many areas. An additional concern is that the paving of formerly dirt roads also contributes to the speed of water runoff. The ability of local aquifers to recharge themselves should also be considered in allowing new development.</p>	
Milan	<p>The Town of Milan is a rural community that has experienced small amounts of single-family residential subdivision activity.</p>	<p>All applicable laws and regulations are complied with during the subdivision and site plan process, such as NYSDEC standards and stormwater regulations.</p>
Millerton	<p>One significant development is at Millerton Overlook : 3.7 acres at the intersection of Route 44 and Millerton Village Main Street, a 20-unit affordable rental apartment housing project. The site borders a cemetery, wetlands, and Union Free School.</p>	<p>Enforcement of all regulations/codes/ordinances are handled through the Village Planning Board.</p>
North East	<p>The Town has experienced a moderately slow pace of development. Historically, residential growth occurred generally through subdivision of individual land parcels and single unit house construction. In the late 1960s and early 1970s three subdivisions of multiple parcels each took place in areas of the Town well away from the community center, within what was then mostly a one-acre zoning district. The Town reacted by establishing a more conservative land use plan and zoning code which put approximately 80% of the Town's area into a 5-acre zoning district.</p> <p>A second spurt of residential subdivision activity took place in the mid 1980s, which created approximately 30 parcels of 1+ acre lots aimed at primary home buyers near the village. Inventory from all subdivisions, from the 1960s onward, sat mostly undeveloped until recent years and now appears to be mostly built-out. There have been only a few individual houses built for speculation purposes and no tract development made by any developer.</p>	<p>The Town of North East has a floodplain management law which places the management of the NFIP regulations with the Building Department. The Town land use plan and zoning code does not, by district designation, identify or map floodplain boundaries.</p> <p>The protection of wetlands is based with the NY State Department of Environmental Conservation and is not administered at the local level. The town use plan and zoning code does closely mirror the state-designated wetland areas. It incorporates them into the Town Land Conservation Zone, which is highly restrictive to any building development.</p> <p>The Town of North East does not have any special ordinances addressing steep slopes, earthquakes, high wind design, or to establish buffer zones for wildfire hazards. The Building Department enforces the NY State building codes which, as the Town understands, do have</p>



Table 3d.23
Summary of Responses
Land Uses and Development Trends Questionnaire
(Source: Core Planning Group Members)

Community	Land Uses and Development Trends in Hazard Areas	Regulations/Codes/Ordinances To Protect New Development From Natural Hazards
	<p>Starting in the 1980s, rural areas of the Town, particularly the more remote portions, became more attractive to second home development. Most of this has happened on what had been active farmland and generally created a limited number of much larger sized lots than possible under the 5-acre zoning. With the exceptions noted above, the general land use pattern (in Town areas away from the village) has been dispersed and at a relatively low density. No large-scale development projects are currently being proposed in the Town.</p> <p>Commercial development in the Town has grown slowly. A mix of retail and other uses has developed since the 1970s in the area east of the village along US Route 44. it is an area that includes filled wetlands and has a stream corridor with a flood hazard area adjacent to developed sites. Newer development and some redevelopment is occurring in this area, but most current sites are older and have limited site features for control of surface water runoff. Generally water is deposited into storm drains, or flows by sheet action across pavement, which in turn deposits directly into the Kelsey Brook stream corridor.</p> <p>A limited amount of newer commercial development is occurring in an area along NY Route 22 just north of the village of Millerton, which includes a flood plain associated with the Webatuck Creek. The area nearest to the creek has experienced some flooding, becoming more frequent in recent years, with the high water occurring during any significant storm event. The potential for conflict between new site development and a loss of floodplain, which is permitted under flood hazard regulations, appears to be increasing in that general area. Residential households downstream from that area and along the Town road (North Center Street) have been experiencing greater flooding of back yards than had been noted in prior years.</p>	<p>high wind criteria within the regulations.</p>
Pawling (Town)	<i>No LUDT Questionnaire response was submitted by the Town of Pawling.</i>	<i>No LUDT Questionnaire response was submitted by the Town of Pawling.</i>
Pawling (Village)	<p>In general, The Village of Pawling is a developed Village with some undeveloped former or current farming land on its periphery. We are seeing redevelopment of commercial/retail space in primarily the</p>	<p>The Village of Pawling enforces the following relevant regulations/ordinances/codes:</p> <ul style="list-style-type: none"> • Erosion and sediment control under recently enacted MS4



Table 3d.23
Summary of Responses
Land Uses and Development Trends Questionnaire
(Source: Core Planning Group Members)

Community	Land Uses and Development Trends in Hazard Areas	Regulations/Codes/Ordinances To Protect New Development From Natural Hazards
	<p>Village core, with some proposed projects increasing the commercial density of the core slightly. These include a proposed office/retail building in a parking lot at Kalyto Plaza, a proposed building on Charles Coleman Boulevard on a lot that has been vacant for roughly 30 years since a fire destroyed the existing building, and a recently completed office structure on Route 22 and Pine Drive. In addition, the Village Center is undergoing major renovations with the establishment of a village green on primarily existing paved surface.</p> <p>While the Great Swamp does border (and in fact go through) the Village, it has generally not been a factor in development projects because of its location. There are three remaining large parcels on the periphery of the Village that have been the focus of most development discussion over the last few years. These are located on undeveloped land around the edges of the Village, most of which are now or were at one time farmland. A fourth, similar parcel was developed into a subdivision of single family homes on the western edge of the Village over the last 10 years (Baxter Green). Recent proposals for the other parcels include a clustered, single family/condominium development on a parcel known as the Umscheid property on the northern edge of the Village. This proposal resulted in much discussion in the Village because it was to be designed for, and marketed to, active adults and the developer was seeking a change in zoning to allow an increased density with a clustered development and remaining open space. While that project has recently been shelved, the Village is considering a change to its zoning law to allow this type of development in order to encourage the clustering of units and maintaining open space in return for the requested density. However, at this point, the zoning change has not taken place and the Village master plan contemplates that each of these three remaining parcels will be developed as single family homes in a subdivision format. This would result in a more complete development of the parcels making it unlikely that the developments would maintain open, undeveloped space. It is not clear whether the recent economic downturn will push development of these parcels toward single family subdivisions and away from clustered development because of the time required to obtain approval for the appropriate zoning.</p>	<p>regulations.</p> <ul style="list-style-type: none"> • Construction under New York State Building Codes. • The Village enforces DEC Storm Water regulations. • SEQRA analysis conducted by Village boards for all applicable Village actions. • Zoning and subdivision regulations. • Planning Board Site Plan Approval.



Table 3d.23
Summary of Responses
Land Uses and Development Trends Questionnaire
(Source: Core Planning Group Members)

Community	Land Uses and Development Trends in Hazard Areas	Regulations/Codes/Ordinances To Protect New Development From Natural Hazards
Pine Plains	<p>Most development is single-family, low density in woodlands and former farm fields, widely dispersed throughout town. There is potential over the next 10 years for 600 – 1,000 new housing units. The current pace is low but there is the potential for several hundred new units to be built per year.</p> <p>Several projects are proposed at much higher density: one on former farm fields and woodlands, another in the hamlet of Pine Plains. There is a projected 650+ residential development in the western part of the town, other residential development may occur in the southern and north western parts.</p> <p>A commercial/mixed use proposal is also under consideration which would add a great deal of commercial space and high density residential development in the hamlet.</p>	<p>The Town is working on adopting a first zoning law. Current subdivision and site plan laws do exist, but do not adequately address protecting new development from natural hazards. If the new law is adopted, it will likely include more protections: steep slope, prohibitions of buildings in floodplains, buffers from streams and wetlands, etc.</p> <p>The Town currently enforces a flood damage prevention local law, in addition to the NY State Uniform Fire Prevention and Building Codes.</p>



SECTION 4 - CAPABILITIES AND RESOURCES

This capability assessment examines the ability of the Northern and Eastern Dutchess County Communities and other participating jurisdictions to implement and manage a comprehensive mitigation strategy, which includes a range of mitigation actions. The strengths, weaknesses, and resources of participating jurisdictions are identified in this assessment as a means to develop an effective hazard mitigation program. Furthermore, the capabilities identified in this assessment are evaluated collectively to develop recommendations, which support the implementation of effective mitigation actions throughout the region.

URS Corporation distributed questionnaires to the Core Planning Group members in order to initiate this capability assessment. The questionnaires requested information pertaining to existing plans, polices, and regulations that contribute to or hinder the ability to implement hazard mitigation actions. They also requested information pertaining to the legal and regulatory capability, technical and administrative capacity, and fiscal capability of each jurisdiction. All nine municipalities submitted completed questionnaires illustrating their capability to implement a mitigation strategy.

This section describes the local jurisdictional activities currently underway, which contribute to or can be utilized for hazard mitigation, in addition to the technical and financial resources available at the State and Federal levels which the communities in the region can access to effectively implement a hazard mitigation program.

Capabilities and Resources – Northern and Eastern Dutchess County Jurisdictions

Legal and Regulatory Capability

As indicated in Table 4-1, the Northern and Eastern Dutchess County jurisdictions have several policies, programs, and capabilities, which help to prevent and minimize future damages resulting from hazards. These tools are valuable instruments in pre and post disaster mitigation as they facilitate the implementation of mitigation activities through the current legal and regulatory framework. These policies, programs, and capabilities are described in greater detail for the participating jurisdictions, as well as the State and Federal levels.



**Table 4-1
Jurisdictional Legal and Regulatory Capabilities**

Jurisdiction	Building Code	Zoning Ordinance	Subdivision Ordinance	Special Purposes Ordinance	Growth Mgmt Ordinance	Site Plan Review Requirements	Comprehensive Plan	Capital Improvements Plan	Economic Development Plan	Emergency Response Plan	Post-Disaster Recovery Plan	Post-Disaster Recovery Ordinance	Real Estate Disclosure Ordinance
Town of Amenia	√	√	√	√	√	√	√	√	√	√	√		
Town of Beekman	√	√	√	√		√	√		√	√			√
Town of Dover	√	√	√	√		√	√			√			
Town of Milan	√	√	√	√	√	√	√		√	√	√	√	√
Town of North East	√	√	√	√		√	√						
Town of Pawling	√	√	√	√	√	√	√		√	√			√
Town of Pine Plains	√	√	√	√	√	√	√			√	√		√
Village of Millerton	√	√	√	√		√	√			√			
Village of Pawling	√	√	√	√		√	√		√	√			

Building Code

Building codes regulate construction standards and are developed for specific geographic areas of the country. They consider the type, frequency, and intensity of hazards present in the region. Structures built to applicable building codes are inherently resistant to many hazards such as strong winds, floods, and earthquakes. Due to the location specific nature of the building codes, these are very valuable tools for mitigation.

The Towns of Amenia, Beekman, Dover, Milan, North East, Pawling, and Pine Plains; and the Villages of Millerton and Pawling adhere to a building code through local authority. Several communities noted that the authority for enforcing the building code comes from the New York State Building Code.

Zoning Ordinance

Zoning is a useful tool to consider when developing a mitigation strategy. It can be used to restrict new development, require low-density development, and designate specific uses (e.g. recreational) in the hazard prone areas. Private property rights must be considered, but enacting a zoning ordinance can reduce or potentially eliminate damages from future hazard events.

All of the jurisdictions in the Northern and Eastern Dutchess County planning area have adopted a zoning ordinance with the exception of Town of Pine Plains, which is currently in the process of adopting a zoning ordinance.



Subdivision Ordinance

Subdivision ordinances offer an opportunity to account for natural hazards prior to the development of land as they formulate regulations when the land is subdivided. Subdivision design that incorporates mitigation principles can reduce the exposure of future development to hazard events

All of the jurisdictions in the planning area have adopted a subdivision ordinance.

Special Purpose Ordinance

A special purpose ordinance is a form of zoning in which specific standards dependent upon the special purpose or use must be met. For example, many special purpose ordinances include basic development requirements such as setbacks and elevations. The special purpose ordinance is a useful mitigation technique particularly when implemented to reduce damages associated with flooding and coastal erosion. Special purpose ordinances identified by jurisdictions include erosion and sediment control, floodplain, wetlands, County Road setbacks, and steep slopes.

All of the jurisdictions in the planning area have adopted a special purpose ordinance.

Growth Management Ordinance

Growth management ordinances are enacted as a means to control the location, amount, and type of development in accordance with the larger planning goals of the jurisdiction. These ordinances often designate the areas in which certain types of development is limited and encourage the protection of open space for reason such as environmental protection and limitation of sprawl.

The Towns of Amenia, Milan, Pawling, and Pine Plains have adopted growth management ordinances.

Site Plan Review Requirements

Site plan review requirements are used to evaluate proposed development prior to construction. An illustration of the proposed work, including its location, exact dimensions, existing and proposed buildings, and many other elements are often included in the site plan review requirements. The site plan reviews offer an opportunity to incorporate mitigation principles, such as ensuring that the proposed development is not in an identified hazard area and that appropriate setbacks are included.

All of the jurisdictions in the planning area have adopted site plan review requirements.

Comprehensive Plan

A comprehensive plan is a document which illustrates the overall vision and goals of a community. It serves as a guide for the community's future and often includes anticipated demographics, land use, transportation, and actions to achieve desired goals. Integrating mitigation concepts and policies into a comprehensive plan provides a means for implementing initiatives through legal frameworks and enhances the opportunity to reduce the risk posed by hazard events.

All of the jurisdictions in the planning area have a Comprehensive Plan or Master Plan.



Capital Improvement Plan

Capital Improvement Plans schedule the capital spending and investments necessary for public improvements such as schools, roads, libraries, and fire services. These plans can serve as an important mechanism to reduce growth in identified hazard areas through limited public spending and can be used as a to develop a match for mitigation projects.

Of the jurisdictions in the planning area, only the Town of Amenia has a Capital Improvement Plan.

Economic Development Plan

Economic development plans offer a comprehensive overview of the local or regional economic state, establish policies to guide economic growth, and include strategies, projects, and initiatives to improve the economy in the future.

Furthermore, economic development plans, similar to capital improvement plans, offer an opportunity to reduce development in hazard prone areas by encouraging economic growth in areas less susceptible to hazard events.

The Towns of Amenia, Beekman, Milan and Pawling have adopted economic development plans and the Village of Pawling's Chamber of Commerce is working on an Economic Development Strategy. The remainder of the towns and villages do not have an economic development plan.

Emergency Response Plan

Emergency response plans provide an opportunity for local governments to anticipate an emergency and plan the response accordingly. In the event of an emergency, a previously established emergency response plan can reduce negative effects as the responsibilities and means by which resources are deployed has been previously determined.

The Towns of Amenia, Beekman, Milan, Pawling, and Pine Plains; and the Villages of Millerton and Pawling indicated in the Capability Assessment Questionnaire that they have adopted an emergency response plan. Although the Town of Dover does not have a dedicated Emergency Response Plan, the Town does have a specific chapter in the Town Code entitled "Emergency Preparedness". The jurisdictions referenced above as well as the Town of Dover discussed a County Plan. Only the Town of North East did not discuss an emergency operation plan.

Post-Disaster Recovery Plan

A post-disaster recovery plan guides the physical, social, environmental, and economic recovery and reconstruction procedures after a disaster. Hazard mitigation principles are often incorporated into post-disaster recovery plans in order to reduce repetitive disaster losses.

The Towns of Amenia, Milan and Pine Plains have developed post-disaster recovery plans.

Post-Disaster Recovery Ordinance

Post-disaster recovery ordinances are often produced in conjunction with post-disaster recovery plans. The ordinances are enacted after a hazard event to guide redevelopment in order to reduce future damages and mitigate repetitive loss. The Town of Milan has a post-disaster recovery ordinance.



Real Estate Disclosure Ordinance

A real estate disclosure ordinance requires individuals selling real estate to inform potential buyers of the hazards to which the property and/or structure is vulnerable prior to the sale. Such a requirement ensures that the new property owner is aware of the hazards to which the property is at risk of damage.

The Town of Milan has adopted a real estate disclosure ordinance, the Town of Dover and the Village of Millerton reference vapor guideline of the State of New York, the Towns of Pawling and Pine Plains reference State Regulations and the Town of Dover references State regulations dealing with Agricultural Districts. The Village of Pawling references a State property condition disclosure form.

Administrative and Technical Capability

The ability of a local government to develop and implement mitigation projects, policies, and programs is contingent upon its staff and resources. Administrative capability is determined by evaluating whether there are an adequate number of personnel to complete mitigation activities. Similarly, technical capability can be evaluated by assessing the level of knowledge and technical expertise of local government employees, such as personnel skilled in surveying and Geographic Information Systems.

Table 4-2 provides a summary of the administrative and technical capabilities currently in place in each participating jurisdiction. The checkmark (√) indicates that the local government maintains a staff member for the given function.

Jurisdiction	Planner(s) or engineer(s) with knowledge of land development and management practices	Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	Planner(s) or engineer(s) with an understanding of natural and/or human caused hazards	Floodplain manager	Surveyors	Staff with education or expertise to assess the community's vulnerability to hazards	Personnel skilled in GIS and/or HAZUS	Scientists familiar with the hazards of the community	Emergency Manager	Grant writers
Town of Amenia	√	√		√	√	√	√		√	√
Town of Beekman	√	√		√			√		√	
Town of Dover	√	√	√	√			√	√	√	√
Town of Milan	√	√	√			√	√		√	
Town of North East	√	√		√						
Town of Pawling	√	√	√	√						
Town of Pine Plains	√	√	√	√						
Village of Millerton	√	√	√		√				√	√
Village of Pawling	√	√		√	√				√	√



Fiscal Capability

The ability of a local government to implement mitigation activities is also associated with the funding available for policies and projects. Funding for such initiatives is often locally based revenue and financing, as well as outside grants. Costs associated with mitigation activities range from staffing and administrative costs to the actual cost of the mitigation project.

Table 4-3 provides a summary of the fiscal capabilities currently in place in each participating jurisdiction. The checkmark (√) indicates that the financial resource is available in the local jurisdiction for mitigation purposes.

Table 4-3 Jurisdictional Fiscal Capabilities										
Jurisdiction	Community Development Block Grants (CDBG)	Capital Improvements Project Funding	Authority to Levy Taxes for Specific Purposes	Fees for Water, Sewer, Gas, or Electric Service	Impact Fees for Homebuyers or Developers for New Developments/Homes	Incur Debt through General Obligation Funds	Incur Debt through Special Tax and Revenue Bonds	Incur Debt through Private Activity Bonds	Withhold Spending in Hazard-Prone Areas	Other
Town of Amenia	√	√	√	√	√	√				
Town of Beekman	√	√	√		√	√	√			
Town of Dover	√	√	√	√	√	√				
Town of Milan	√	√	√		√	√				
Town of North East	√	√		√	√	√				
Town of Pawling	√	√	√	√	√	√	√			
Town of Pine Plains	√	√	√	√	√	√	√			
Village of Millerton	√	√	√	√		√				
Village of Pawling		√		√		√				

It should be noted that several of the communities answered that they did not know whether they had various financial capabilities available to them. It is recommended that during the plan maintenance cycle, these capabilities be researched further.

Conclusion

This capability assessment finds that all of the Northern and Eastern Dutchess County participating jurisdictions collectively have a significant level of legal, technical, and fiscal tools and resources necessary to implement hazard mitigation strategies



Capabilities and Resources – State of New York

The State of New York, through the New York State Consolidated Laws, Executive Law Article 2-B entitled “*State and Local: Natural and Man-Made Disaster Preparedness*” established the Disaster Preparedness Commission (DPC) to examine all aspects of natural and human induced disasters. While the law emphasized local authority and responsibility in the development and maintenance of plans and programs for natural and human induced disaster mitigation, DPC is tasked to examine all aspects of disaster prevention, response, and recovery, as well as prepare the state disaster preparedness plans.

The DPC consists of commissioners, directors, and chairs of State agencies and the American Red Cross. State agencies such as the New York State Emergency Management Office (SEMO), the Department of State (DOS), the Department of Environmental Conservation (DEC), and the Department of Transportation (DOT) are participants in the DPC. The DPC, with the support of the Mitigation Section of the SEMO, developed the New York State Multi-Hazard Mitigation Plan. The State Plan was not only designed to fulfill the requirements of the Disaster Mitigation Act of 2000, but was also created to serve as a resource for local governments in the development of local hazard mitigation plans.

The State’s Plan includes an evaluation of the State’s pre and post hazard mitigation policies, programs, and capabilities; the policies related to development in hazard prone areas; and the State’s funding capabilities. The Nassau County Multi-Jurisdictional Hazard Mitigation Plan incorporates many of the resources identified in the State Plan to demonstrate the capabilities present for local jurisdictions to consider in the development of local hazard mitigation. Many of these capabilities are described in further detail in this portion of the assessment.

New York State Emergency Management Office (SEMO)

In addition to facilitating the development of the New York State Multi-Hazard Mitigation Plan, SEMO offers a variety of assistance to local governments in the preparation and implementation of mitigation activities. For example, the SEMO Mitigation and Planning Sections recently coordinated to develop the “Empire Plan,” a comprehensive emergency management plan which addresses the aspects of emergency management: readiness, mitigation, response, and recovery. SEMO developed the “Empire Plan” as a model for local governments to use in the creation of local comprehensive emergency management plans. In addition to the “Empire Plan” SEMO also offers direct funding support and technical assistance for the preparation of all-hazards mitigation plans for those communities to which funding for such assistance is not available. Beyond these activities, SEMO also coordinates with agencies such as the New York Department of State and the Department of Environmental Conservation to provide resources for hazard mitigation.

New York State Department of State (DOS)

DOS offers local governments many forms of assistance for preparing, implementing, and sustaining mitigation activities. The DOS Division of Coastal Resources, for example, provides local governments with technical assistance in the completion of Local Waterfront Revitalization Plans (LWRP). These plans are comprehensive land and water use plans which contain many components and address issues such as coastal erosion management and waterfront development. Upon completion of the LWRP, the plan is reviewed by the SEMO Mitigation Section to ensure that the policies and strategies outlined do not place people or property at undue risk to a hazard event. Approximately sixty-six local jurisdictions in the State have approved LWRPs.



New York State Department of Environmental Conservation (DEC)

The DEC directs many programs and forms of assistance useful to local governments developing mitigation strategies.

DEC provides technical assistance to local governments through the Floodplain Management Program and the Flood Protection Bureau. The Floodplain Management Program provides assistance to local governments adopting and administering local floodplain management ordinances. Similarly, the Flood Protection Bureau provides technical assistance in eligibility requirements for the National Flood Insurance Program in order to qualify local governments for entrance into the program. Each of these forms of assistance aids local governments in the development and implementation of flood mitigation activities to eliminate or reduce future flood damages.

Further technical assistance in floodplain management is provided through “Community Assistance Visits” administered by the DEC in collaboration with the SEMO. These two agencies partner in this effort to provide technical assistance on floodplain management program development. The Visits are prioritized by an assessment of needs conducted by the DEC and the SEMO. In addition to the “Community Assistance Visits,” these agencies also coordinate to provide assistance for flood mitigation planning and sponsor technical assistance workshops for local governments interested in developing flood mitigation programs.

New York State Department of Transportation (DOT)

The Department of Transportation incorporates mitigation techniques into routine design, construction, and maintenance procedures throughout the State and also engages in mitigation projects, technical assistance activities, and training. For example, DOT provides guidance to local communities developing plans for the long-term re-routing of traffic due to a disaster. Furthermore, DOT engages in mitigation projects such as the elevation of roads in flood prone areas, cleaning of ditches and streams, management of stormwater erosion, tree pruning, and bi-annual inspection of bridges. DOT also develops and conducts training sessions on heavy snow removal and snow plowing for highway maintenance supervisors and equipment operators.

State Resources

This capability assessment finds that the State of New York’s various departments collectively have a significant level of legal, technical, and fiscal tools and resources necessary to implement hazard mitigation strategies.



Capabilities and Resources – Federal

The Federal government offers a wide range of funding and technical assistance programs to help make communities more disaster resistant and sustainable. Many of these are included in Table Z, the Federal Technical Assistance and Funding matrix. Programs associated with the construction or reconstruction of housing and businesses, public infrastructure (transportation, utilities, water, and sewer), and supporting overall hazard mitigation and community planning objectives are emphasized in the matrix. Some programs are disaster-specific, activated by a Presidential Disaster Declaration under the provisions of the Stafford Act. Also included are programs or grants that are not specifically disaster related.

Federal Resources

FEMA has developed a large number of documents that address implementing hazard mitigation at the local level. Five key resource documents are briefly described.

How-to Guides. Some communities in Dutchess County have chosen not to participate in the planning process at this time, but could participate during future updates of the plan, at the discretion of the nine municipalities that have developed the original plan. Any communities that become interested in participating in the future can find additional information about the hazard mitigation planning process on the FEMA web site. FEMA has developed a series of nine “how-to guides” to assist States, communities, and tribes in enhancing their hazard mitigation planning capabilities. The first four guides mirror the four major phases of hazard mitigation planning used in the development of the Northern and Eastern Dutchess County Communities Regional Hazard Mitigation Plan. The last five how-to guides address special topics that arise in hazard mitigation planning such as using benefit-cost analysis and integrating man-made hazards. The use of worksheets, checklists, and tables make these guides a practical source of guidance to address all stages of the hazard mitigation planning process. They also include special tips on meeting DMA 2000 requirements.

Post-Disaster Hazard Mitigation Planning Guidance for State and Local Governments. FEMA, DAP-12, September 1990. This handbook explains the basic concepts of hazard mitigation, and shows State and local governments how they can develop and achieve mitigation goals within the context of FEMA’s post-disaster hazard mitigation planning requirements. The handbook focuses on approaches to mitigation, with an emphasis on multi-objective planning.

Mitigation Resources for Success CD. FEMA 372, September 2001. This CD contains a wealth of information about mitigation and is useful for State and local government planners and other stakeholders in the mitigation process. It provides mitigation case studies, success stories, information about Federal mitigation programs, suggestions for mitigation measures to homes and businesses, appropriate relevant mitigation publications, and contact information.

A Guide to Federal Aid in Disasters. FEMA 262, April 1995. When disasters exceed the capabilities of State and local governments, the President’s disaster assistance program (administered by FEMA) is the primary source of Federal assistance. This handbook discusses the procedures and process for obtaining this assistance, and provides a brief overview of each program.

The Emergency Management Guide for Business and Industry. FEMA 141, October 1993. This guide provides a step-by-step approach to emergency management planning, response, and recovery. It also details a planning process that companies can follow to better prepare for a wide range of hazards and emergency events. This effort can enhance a company’s ability to recover from financial losses, loss of



market share, damages to equipment, and product or business interruptions. This guide could be of great assistance to Northern and Eastern Dutchess County industries and businesses located in hazard prone areas.

Important Websites

The following are important websites that provide focused access to valuable planning resources for communities interested in sustainable development initiatives.

- <http://www.fema.gov> - Web site of the Federal Emergency Management Agency includes links to information, resources, and grants that communities can use in planning and implementation of sustainable measures.
- <http://www.planning.org> – Web site of the American Planning Association, a non-profit professional association that serves as a resource for planners, elected officials, and citizens concerned with planning and growth initiatives.
- <http://www.ibhs.org> – Web site of the Institute for Business and Home Safety, an initiative of the insurance industry to reduce deaths, injuries, property damage, economic losses, and human suffering caused by natural disasters. Online resources provide information on natural hazards, community land use, and ways you can protect your property from damage.

Federal Technical Assistance and Funding

The Federal government offers a wide range of funding and technical assistance programs that communities can access to assist in their long-term recovery. Some of these programs are geared to disaster preparedness and mitigation planning, while the focus of others is the long-term vitality of the communities. To assist communities in their rebuilding efforts and to better prepare for the future, the information in Table 4-4 is divided under the headings of conservation and environment, economic development, emergency management, historic preservation, housing, infrastructure, and mitigation.

For further information on these and other Federal programs, see the Catalog of Federal Domestic Assistance (CFDA) available online at <http://www.cfda.gov/>.



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
CONSERVATION & ENVIRONMENT								
DOC; NOAA	Habitat Conservation	Cooperative grants to support a wide variety of research, habitat restoration, construction, management and public education activities for marine and estuarine habitats.	To benefit US fisheries, conserve protected resources, and add to the economic and social well being of the nation.	Local governments, universities and colleges, Indian Tribes, private profit and non-profit research and conservation organizations and individuals.	State coordinating official.	Submit application through Grants.gov. Proposals are evaluated for technical merit, soundness of design, competency of applicant to perform the proposed work, potential contribution of the project to national goals and appropriateness and reasonableness of costs.	90 days prior to the start date of the project.	Regional or local office. http://www.nmfs.noaa.gov/regional.htm
DOC; NOAA; Marine Fisheries Service	Unallied Management Costs	Cooperative grants to support management activities for high priority marine and estuarine resources.	To provide economic, sociological, public policy and other information needed by administrators for conserving and managing fishery resources and protected species in their environment.	Local governments, universities and colleges, Indian Tribes, private profit and non-profit research organizations and individuals.	State coordinating official.	Submit application through Grants.gov. Proposals are evaluated for technical merit, soundness of design, competency of applicant to perform the proposed work, potential contribution of the project to national goals and appropriateness and reasonableness of costs.	90 days prior to the start date of the project.	Southeast Federal Program Officer http://www.nmfs.noaa.gov/regional.htm (727) 824-5304.
DOD; USACE	Beach Erosion Control Projects	Specialized services to design and construct projects under a cost share method.	To protect beach and shore erosion through projects not specifically authorized by Congress.	Political subdivisions of the state and other responsible local agencies.	Consult with the nearest District Engineer.	Formal letter to District Engineer. Approval is subject to the availability of funds.	None.	Corps of Engineers District Office. http://www.usace.army.mil/howdoi/where.html
DOI; FWS	Conservation Grants Private Stewardship for Imperiled Species	Grants to fund voluntary restoration management, or enhancement of habitat on private lands for endangered, threatened, proposed, candidate or other at risk species.	To provide Federal financial and other assistance to individuals and groups engaged in local, private and voluntary conservation efforts to be carried out on private lands that benefit species listed or proposed as endangered or threatened.	Sponsored organization, individuals/families, specialized groups, public non-profit institutions/organizations, private non-profit institutions/organizations, small business, profit organizations and other private institutions/organizations.	See www.grants.gov or http://endangered.fws.gov/grants/private_stewardship/index.html	See www.grants.gov or http://endangered.fws.gov/grants/private_stewardship/index.html	See www.grants.gov or http://endangered.fws.gov/grants/private_stewardship/index.html	Regional or local office. http://endangered.fws.gov/grants/private_stewardship/index.html
DOI; FWS	North American Wetland	Grants to acquire real property interest in lands and water,	To provide grant funds for wetland conservation projects.	Public or private organizations or to individuals who have	Grants.gov	Submit applications.	March and July of each year.	Regional or local office. http://www.fws.gov/birdhabitat/Grants/NAWCA/Council



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
CONSERVATION & ENVIRONMENT								
	Conservation Fund	including water rights, and to restore, manage, and/or enhance wetland ecosystems and other habitats for migratory birds, and other fish and wildlife.		developed partnerships to carry our wetland conservation projects.				Act.shtm
DOI; National Park Service	Save America's Treasures	Project Grants to protect and preserve nationally significant historical sites and wall as nationally significant collections of intellectual and cultural artifacts.	To provide matching grants for preservation and/or conservation work on nationally significant intellectual and cultural artifacts and nationally significant historical structures and sites.	Intrastate, interstate, local agencies, public or private non-profit institutions/organizations, public or private colleges and universities, including state colleges and universities and federally recognized Indian tribes.	Contact Save American Treasures at http://www.cr.nps.gov/hps/treasures/ (202) 513-7270, ext. 6.	Contact Save American Treasures at http://www.cr.nps.gov/hps/treasures/ (202) 513-7270, ext. 6.	Contact Save American Treasures at http://www.cr.nps.gov/hps/treasures/ (202) 513-7270, ext. 6.	Contact Save American Treasures at http://www.cr.nps.gov/hps/treasures/ or (202) 513-7270, ext. 6.
EPA; Office of Brownfields Cleanup and Redevelopment, Office of Solid Waste and Emergency Response	Brownfields Assessment and Cleanup Cooperative Agreements.	A revolving loan fund and project grants to provide funding to inventory, characterize, assess and conduct planning and community involvement related to Brownfield sites; to capitalize a revolving loan fund and provide sub-grants to carry out cleanup activities at the sites; and, to carry out cleanup activities on land owned by the grant recipient.	To assist in the expansion, redevelopment, or reuse of sites complicated by the presence of a hazardous substance, pollutant, or contaminant.	A general purpose unit of local government, a land clearance authority or a quasi – government entity acting under the authority of the local government, a regional council or a group of general purpose units of government, a redevelopment agency, Indian Tribes, and non-profit organizations (subject to conditions).	EPA Regional Office. http://www.epa.gov/epahome/locate2.htm	Competitive grant program. See Grant Announcement available from EPA.	Contact Regional Office. http://www.epa.gov/epahome/locate2.htm	Brownfields Regional Office Coordinator, Dallas, Texas (214) 665-6737. http://www.epa.gov/epahome/locate2.htm
EPA, Office of	Regional Wetland	Project Grants to encourage wetland	To assist State, Tribal, local government	Tribes, local governments,	EPA Regional Office.	EPA Regional Office will review grant application and any grants will be	Contact EPA Regional Office.	EPA Regional Office, Wetland Coordinator.



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
CONSERVATION & ENVIRONMENT								
Water	Program Development Grants	program development by promoting the coordination and acceleration of research, investigations, experiments, training, demonstration, survey and studies related to the causes, effects, extent, prevention, reduction and elimination of water pollution.	agencies and interstate/intertribal entities to build capacity to protect, manage and restore wetlands.	interstate agencies and intertribal consortia.		awarded by the regional Administrator.	http://www.epa.gov/epahome/locate2.htm	http://www.epa.gov/epahome/locate2.htm
USDA; Forest Service	Forest Land Enhancement Program	Project Grants for technical assistance to develop management plans, educational programs and assistance to increase awareness, and cost-share assistance to implement sustainable forestry practices on the ground.	Sustainable management of non-industrial private forests and other rural land suitable for sustainable forest management.	State Forestry Agencies and Landowners, managers of non-industrial private forests lands, nonprofit organization, consultant foresters, universities, other state, local and private organization and agencies.	State Forestry Agency. http://www.fs.fed.us/spf/coop/programs/loa/flep.shtml	The State must prepare a State Priority Plan that is approved by the Forest Service. After Approval a property owner is eligible for cost share assistance.	Deadlines are determined by State Forestry Agencies. http://www.fs.fed.us/spf/coop/programs/loa/flep.shtml	Regional or local office of US Forest Service. http://www.fs.fed.us/spf/coop/programs/loa/flep.shtml
USDA; Forest Service	Urban and Community Forestry Program	Project grants for assistance in urban forestry programs.	To plan for, establish, manage and protect trees, forests, green spaces and related resources in and adjacent to cities and towns.	State Forestry, interested members of the public, private nonprofit organizations in urban and community forestry programs in cities and communities.	Contact Regional Offices.	Contact Regional Offices.	Contact Regional Offices. http://www.fs.fed.us/ucf/	Regional or local office of US Forest Service. http://www.fs.fed.us/ucf/



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
ECONOMIC DEVELOPMENT								
DOC; EDA	Economic Adjustment Assistance	Project Grants to help local interests design and implement strategies to adjust or bring about changes in the economy.	Aids the long-range economic development of areas with severe unemployment, and low family income problems, aids in the development of public facilities and private enterprises to create new, permanent jobs.	Economic Development Districts, cities or other political subdivisions of the state or a consortium of political subdivisions, Indian tribes or a consortium of Indian tribes, institutions of higher learning or a consortium of such institutions, or public or non-profit organizations or association acting in cooperation with the political subdivisions.	Meet with EDA's Economic Development Representative (EDR) to determine whether the preparation of a project proposal is appropriate.	After meeting with EDR the Regional Director will decide whether to invite an application. More information will be given at that time.	Continuing basis.	Regional or Local Office. http://www.eda.gov/Contact/Contacts.xml
DOC; EDA	Economic Development Support for Planning Organizations	Project grants to establish economic development strategies designed to reduce unemployment and increase incomes.	To strengthen economic development planning capacity.	Economic Development Districts, Indian Tribes, units of local government, institutions of higher education and private non-profit organizations.	Submit a letter of interest, a statement of distress and a proposed work program not to exceed 10 pages and SF 424 to regional or Local Office.	Following invitation by agency a formal application is made to the regional office and to the EDA state representative.	None.	Regional or Local Office. http://www.eda.gov/Contact/Contacts.xml
DOD; Office of Economic Adjustment	Growth Management Planning Assistance	To provide project grants to assist local governments to undertake community economic adjustment planning activities.	Planning in response to the establishment or expansion of Department of Defense military Installation.	Local governments or regional organizations.	http://www.oea.gov	Application is reviewed and approved by the Department of Defense's Office of Economic Adjustment.	None.	Regional or Local Office. http://www.eda.gov/Contact/Contacts.xml
DOL	Disaster Unemployment Assistance	Direct Payments for Specified Use; Provision of	Disaster Unemployment Assistance provides financial assistance to	In order to qualify for this benefit your employment	An applicant should consult the office or officials designated as	Claims should be filed in accordance with the state's instructions published in announcements about the availability	Applications for DUA must be filed within 30 days after the date of the SWA	More information about this program and where to apply for benefits under this



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
ECONOMIC DEVELOPMENT								
		Specialized Services.	individuals whose employment or self-employment has been lost or interrupted as a direct result of a major disaster declared by the President of the United States. Before an individual can be determined eligible for Disaster Unemployment Assistance, it must be established that the individual is <u>not</u> eligible for regular unemployment insurance benefits (under any state or federal law). The program is administered by states as agents of the federal government.	or self-employment must have been lost or interrupted as a direct result of a major disaster and you must have been determined not eligible for regular state unemployment insurance. With exceptions for persons with an injury and for self-employed individuals performing activities to return to self-employment, individuals must be able to work and available for work, which are the same requirements to be eligible for state unemployment insurance benefits.	the single point of contact in his or her State for more information on the process the State requires to be followed in applying for assistance, if the State has selected the program for review.	of Disaster Unemployment Assistance, or contact the State Unemployment Insurance agency.	announcement regarding availability of DUA. When applicants have good cause, they may file claims after the 30-day deadline. However, no initial application will be considered if filed after the 26th week following the declaration date.	program is available at: http://workforcesecurity.dol.gov/unemploy/disaster.asp To determine your eligibility for unemployment insurance (UI) benefits, you should contact the state unemployment insurance agency in the state where you are located as soon as possible after becoming unemployed. In some states, you can now file a claim by telephone and the Internet.
EDA	Economic Development and Adjustment Program, Sudden and Severe Economic Dislocation (Title IX)	Grants	To help States and localities to develop and/or implement strategies that address adjustment problems resulting from sudden and severe economic dislocation.	States, Localities, Non-Profit Organizations, and Indian Tribes.	Information regarding EDA's program procedures, regulations, and other requirements are available at EDA's website, www.eda.gov	Project grants can be funded in response to natural disasters including improvements and reconstruction of public facilities.	Contact the Disaster Recovery Coordinator, Economic Adjustment Division.	Disaster Recovery Coordinator, Economic Adjustment Division, EDA, DOC, Herbert C. Hoover Building, Washington, DC 20230. Telephone: 800.345.1222 or 202.482.6225. http://www.doc.gov/eda/html/prgtitle.htm
FHWA; Maritime	Development and Promotion	Advisory Services and Counseling,	Promote and plan for the development and	Local government Agencies,	Regional or Local Office.	Personal Conference or Explanation of Problem.	None.	Regional or Local Office. http://www.marad.dot.gov/w



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
ECONOMIC DEVELOPMENT								
Administration	of Ports and Intermodal Transportation	Technical Information.	utilization of domestic waterways, ports and port facilities.	Metropolitan Planning Organizations, Public Port and Intermodal Authorities, Trade Associations and Private Intermodal and Terminal Operators.				elcome/regional%20off_dir ectory.html
HUD: Community Planning and Development	Community Development Block Grants / Brownfields Economic Development Initiative	Project Grants to carry out economic development projects on contaminated buildings or land.	To return Brownfields to productive economic use.	Units of local government.	Application Procedures will be published in Notice of Funding Availability in the Federal Register.	The Process will be published in Notice of Funding Availability in the Federal Register.	Deadline will be published in Notice of Funding Availability in the Federal Register.	Regional or local Office. http://www.hud.gov/offices/cpd/economicdevelopment/programs/bedi/index.cfm
HUD: Office of Community Planning and Development	Community Development Block Grants Section 108 Loan Guarantees	Guaranteed/Insured Loans for financing of economic development, housing rehabilitation, public facilities, and large scale physical development projects.	To provide communities with a source of financing for economic development, housing rehabilitation, public facilities, and large scale physical development projects.	Metropolitan Cities and Urban Counties.	See 24 Code of Federal regulations, Section 570.704 for application requirements.	See 24 Code of Federal regulations, Section 570.704 for application process.	Continuing basis.	Regional or Local Office. http://www.hud.gov/offices/cpd/communitydevelopment/programs/108/index.cfm
HUD: Office of Community Planning and Development	Community Development Block Grants / Technical Assistance Program	Project Grants (Cooperative Agreements) to transfer skills and knowledge of planning, developing and administering CDBG programs to eligible block grant entities.	To help units of local government, Indian tribes and area wide planning organizations to plan, develop and administer local CDBG programs.	Units of local government, national or regional non-profit organizations that have membership comprised predominantly of entities or officials of entities of CDBG recipients, professional and technical service companies, public or private non-profit organizations	In answer to competitions and solicitations. They will be detailed in the Federal Register.	Applicants will be notified of acceptance or rejections.	Deadlines are in solicitation documents.	Regional or Local Office. http://www.hud.gov/offices/cpd/communitydevelopment/programs/index.cfm



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
ECONOMIC DEVELOPMENT								
				including educational institutions and area-wide planning organizations.				
HUD; Policy Development and Research	Hispanic-Serving Institutions Assisting Communities	Project Grants for neighborhood revitalization, housing and economic development projects.	To assist Hispanic serving institutions of higher education to expand their role and effectiveness in addressing community development needs in their localities, consistent with the purposes of Title 1 of the housing and Community Development Act of 1974.	Nonprofit accredited Hispanic serving institutions of higher education that are on the US Dept. of Education's list of eligible HSI's or certify that they meet the statutory definition of an HIS.	Application Procedures will be published in Notice of Funding Availability in the Federal Register.	The Process will be published in Notice of Funding Availability in the Federal Register.	Deadline will be published in Notice of Funding Availability in the Federal Register.	HUD Office of University Partnerships http://www.oup.org/ (202) 708-3061.
HUD; Policy Development and Research	Historically Black Colleges and Universities Program	Project Grants for those activities that are eligible for CDBG funds as listed in 24 Code of Federal regulations, part 570, subpart C, particularly paragraphs 570.201 through 570.206.	To assist historically black colleges and universities to expand their role and effectiveness in addressing community development needs in their localities, including neighborhood revitalization, housing, and economic development, principally for persons of low-moderate income.	Historically Black Colleges and Universities as determined by the U.S. Dept. of Education.	Application Procedures will be published in Notice of Funding Availability in the Federal Register.	The Process will be published in Notice of Funding Availability in the Federal Register.	Deadline will be published in Notice of Funding Availability in the Federal Register.	HUD Office of University Partnerships http://www.oup.org/ (202) 708-3061.
USDA; Rural Utilities Service	Assistance to High Energy Cost Rural Communities	Project Grants and Direct loans use to acquire construct, extend, upgrade and improve energy generation, transmission, or distribution facilities in rural communities where the average expenditure on	Assistance to rural communities with extremely high energy costs.	Political subdivisions of states, for-profit and non-profit businesses, cooperatives, association, organization, and other entities organized under the laws of States,	Application Procedures will be published in Notice of Funding Availability in the Federal Register.	Grants Awarded on a Competitive Basis.	Deadline will be published in Notice of Funding Availability in the Federal Register.	DOA Electric Program http://www.usda.gov/rus/electric/regs/fedreg.htm (202) 720-9545.



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
ECONOMIC DEVELOPMENT								
		home energy cost is at least 275% of the national average.		Indian tribes, tribal entities, and individuals.				
USDA; Rural Business-Cooperative Service	Business and Industry Loans	Direct Loans and Guaranteed/Insured Loans. Direct Loans for modernization, development cost, purchasing and developing land, easements, rights-of-way, buildings, facilities, leases or materials, purchasing equipment, leasehold improvements, machinery and supplies, and pollution control and abatement equipment. Guaranteed Loans are for the same actions mentioned above plus for agricultural production, when not eligible for the Farm Service Agency farmer program assistance and when it is part of an integrated business also involved in the processing of agricultural products.	To assist public, private and cooperative organizations, Indian Tribes or individuals in rural areas to obtain quality loans for the purpose of improving, developing or financing business, industry, and employment and improving the economic and environmental climate in rural communities including pollution abatement controls.	A cooperative, corporation, partnership, trust or other legal entity organized and operated on a profit or nonprofit basis, an Indian tribe, a municipality, county or other subdivision of state or individuals in rural areas.	Rural Development State Office.	Contact the Rural Development State Office or the State Coordinating Agency. http://www.rurdev.usda.gov/recd_map.html	Not Applicable.	Rural Development State Office. http://www.rurdev.usda.gov/recd_map.html
USDA; Rural Utilities Service	Community Connect Grant Program	Project grants for the deployment of broadband transmission services to critical community facilities,	To encourage community oriented connectivity in rural areas where such service does not currently exist.	Indian Tribe or tribal organization, local units of government or other legal entity, including	Application in accordance with 7 Code of Federal regulations, Section 1739.	Grants Awarded on a Competitive Basis.	Deadline will be published in Notice of Funding Availability in the Federal Register.	DOA Telecommunications Program http://www.usda.gov/rus/telcom/index.html (202) 720-9554.



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
ECONOMIC DEVELOPMENT								
		rural residents and rural businesses and for the construction, acquisition, expansion, and/or operation of a community center which would provide such services free to residents for at least 2 years.		cooperatives or private corporations of limited liability companies organized on a for profit or nonprofit basis, and have the legal authority to own and operate the broadband facilities as proposed in its application, to enter into contracts and to comply with federal statutes and regulations.				
USDA; Rural Housing Service	Community Facilities Loans and Grants	Guaranteed/Insured Loans, Direct Loans or Project Grants for community facilities such as child care facilities, food recovery and distribution centers, assisted living facilities, group homes, mental health clinics, shelters and education facilities. Projects comprise community, social, cultural, transportation, industrial park sites, fire and rescue services, access ways, and utility extensions. All facilities must be for	To construct, enlarge, extend or otherwise improve community facilities providing essential service to rural residents.	City and County agencies, political and quasi-political subdivisions of the state, associations including corporations, Indian tribes and existing private corporations which are operated on a not-for-profit basis, have or will have the authority necessary for constructing operating and maintaining the proposed facility or service and for obtaining, giving security for and repaying the loans, and are	Obtain SF-424 from the rural Development Area Office for a pre-application.	The pre-application is reviewed by the Rural Development area office and state office and the applicant is advised whether to file an application.	None.	Regional or local office. http://www.rurdev.usda.gov/rd/pubs/pa1557.htm



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
ECONOMIC DEVELOPMENT								
		public use.		unable to finance the project from its own resources or through commercial credit at a reasonable rate.				
USDA; Cooperative State Research, Education, and Extension Service	Community Food Projects	Project grants a comprehensive approach to develop long term solutions to help ensure food security in communities by linking the food sector to community development, economic opportunity, and environmental enhancement (50/50 program).	To support the development of community food projects designed to meet the food needs of low income people; increase the self-reliance of communities in providing their own needs; and promote comprehensive responses to local food, farm, and nutrition issues.	Private nonprofit entities.	Application Procedures will be published in Notice of Funding Availability in the Federal Register.	The Process will be published in Notice of Funding Availability in the Federal Register.	Deadline will be published in Proposal Solicitation in the Federal Register.	DOA Competitive Research Grants and Awards Management (202) 401-1761.
USDA	Livestock Assistance Program	Direct Payments.	To provide direct payments to eligible livestock producers who suffered grazing losses due to drought, hot weather, disease, insect infestation, fire, hurricane, flood, fire, earthquake, severe storm, or other disasters during the 2000 crop year. Benefits will be provided to eligible livestock producers only in those counties where a severe natural disaster occurred. A county must have been approved as a primary disaster area under a Secretarial disaster designation or Presidential disaster declaration after January 1, 2000, and	Citizens of, or legal resident alien in the United States; a farm cooperative, private domestic corporation, partnership, or joint operation in which a majority interest is held by the members, stockholders, or partners who are citizens of, or legal resident alien of the United States; Indian tribe or tribal organization of the Indian Self-Determination and Education Assistance Act; any organization		Applicants visit the county or parish Farm Service Agency (FSA) office in the eligible county or parish to make application, certify eligibility and report percent of grazing loss, number of grazing acres, and number of eligible livestock by type and weight on Form CCC-740.	Sign-up for assistance under the 2000 LAP began January 18, 2000. Date for ending the sign-up will be determined at a later date.	Regional or Local Office: Consult the local phone directory for location of the nearest county FSA office. If no listing, contact the appropriate State FSA office listed in the Farm Service Agency section of Appendix IV of the Catalog or on the WEB at http://www.fsa.usda.gov/ed/so/ Headquarters Office: Department of Agriculture, Farm Service Agency, Production, Emergencies, and Compliance Division, Emergency Preparedness and Program Branch, Stop 0517, 1400 Independence Avenue SW., Washington, DC 20250-0517. Telephone: (202) 720-



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
ECONOMIC DEVELOPMENT								
			subsequently approved for participation in the Livestock Assistance Program (LAP) by the Deputy Administrator for Farm Programs.	under the Indian Reorganization Act or Financing Act; and economic enterprise under the Indian Financing Act of 1974.				7641. http://www.fsa.usda.gov
USDA; Rural Business-Cooperative Service	Renewable Energy Systems and Energy Efficient Improvements Program	To create a program to make direct loans, loan guarantees and grants to agricultural producers and rural businesses to help reduce energy costs and consumption.	To create a program to make direct loans, loan guarantees and grants to agricultural producers and rural businesses to help reduce energy costs and consumption and help meet critical energy needs.	Agricultural producer or rural small business.	Rural Energy Coordinator in the State.	Application must be submitted to the rural Energy Coordinator who will score it and submit to the National Office. The Highest scored application nationally will receive funding.	Continual sign-up process.	The Rural Business-Cooperative Service State Office.
USDA; Rural Business-Cooperative Service	Rural Business Enterprise Grants	Project Grants to create, expand or operate rural distance learning networks or programs for education, job training instruction related to potential employment, job advancement; development, construction, acquisition, land, buildings, plants, equipment, access streets and roads, parking areas, utility extensions, water supply, waste water disposal facilities, refinancing, services and fees or to establish a revolving loan fund.	To facilitate the development of small emerging business, industry and related employment for improving the economy of rural areas.	Public bodies and nonprofit corporations serving rural areas.	From the Rural Business Cooperative Service or the State Coordinating Agency.	The pre-application is filed with the local office. After review it will be reviewed and processed by the State office.	None.	Regional or local office.
USDA; Rural	Rural Business	Project grants to be used to assist in	To promote sustainable economic development	Public bodies, nonprofit	From the Rural Development State	Applications will be scored and awards announce.	None.	Regional or local office.



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
ECONOMIC DEVELOPMENT								
Business– Cooperative Service	Opportunity Grants	economic development of rural areas by providing technical assistance, training, and planning for business and economic development.	in rural communities with exceptional needs.	corporations, Indian tribes and cooperatives with members that are primarily rural residents and that conduct activities for the mutual benefit of their members.	office or the State Coordinating Agency.			
USDA; Rural Business– Cooperative Service	Rural Cooperative Development Grants	Project Grants to facilitate the creation or retention of jobs in rural area through the development of new rural cooperative, value added processing and rural business.	To improve economic conditions in rural areas through cooperative development.	Nonprofit corporation and institutions of higher learning.	From the Rural Business Cooperative Service or the State Coordinating Agency.	The National Office reviews all applications, scores and ranks them.	Published in Federal Register.	Regional or local office.
USDA; Rural Business– Cooperative Service	Rural Economic Development Loans and Grants	Direct Loans and Project Grants for project feasibility studies, start-up costs, incubator projects and other reasonable costs for the purpose of fostering rural development.	For rural economic development and job creation projects.	Electric and telephone utilities that have current loans with the Rural Utilities Service or rural telephone Bank loans or guarantees outstanding.	Rural Development State Office.	See 7 Code of Federal Regulation, Section 1703.34.	None.	Regional or local office.
USDA; Farm Service Agency	Tree Assistance Program	Direct payments with unrestricted use to tree, bush and vine owners who have trees, bushes and vines lost to a natural disaster, to replant or rehabilitate said vegetation and produce annual crops for commercial.	To assist producers whose trees, bushes or vines are damaged or destroyed in natural disasters.	Individual owners.	A form provided by FSA; a written estimate of the number or trees, bushes or vines lost or damaged which is prepared by the owner or someone who is a qualified expert, as determined by the county Committee; the number of acres on which the loss was suffered; and sufficient evidence of the loss to allow the County	The County Committee makes recommendations and eligibility determinations on those determinations that it wants to recommend to a higher approval official.	To be announced.	Regional or local office.



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
ECONOMIC DEVELOPMENT								
					Committee to calculate whether an eligible loss occurred.			
USTREAS	Casualties, Disasters, and Theft	Tax relief.	The program offers tax relief for casualty losses that result from the destruction of, or damage to your property from any sudden, unexpected, or unusual event such as a flood, hurricane, tornado, fire, earthquake or even volcanic eruption.	A victim of a Presidentially declared disaster and you must be a taxpayer who is interested in receiving tax information and preparation assistance.	Contact IRS, http://www.irs.gov/taxtopics/tc515.html	Casualty losses are claimed on Form 4684 (PDF), <i>Casualties and Thefts</i> . Section A is used for personal-use property and Section B is used for business or income-producing property. If personal-use property was destroyed or stolen, you may wish to refer to Publication 584, <i>Casualty, Disaster, and Theft Loss Workbook</i> , to help you catalog your property. If the property was business or income-producing property, refer to Publication 584B (PDF), <i>Business Casualty, Disaster, and Theft Loss Workbook</i> .	Check website, http://www.irs.gov/pub/irs-pdf/p547.pdf	For additional information contact: Internal Revenue Service Tax forms and Publications W:CAR:MP:FP 1111 Constitution Ave NW Washington, DC 20224. http://www.irs.gov/taxtopics/tc515.html



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
EMERGENCY MANAGEMENT								
DHS	Community Disaster Loans	Loan.	To provide loans subject to Congressional loan authority, to any local government that has suffered substantial loss of tax and other revenue in an area in which the President designates a major disaster exists. The funds can only be used to maintain existing functions of a municipal operating character and the local government must demonstrate a need for financial assistance	Applicants must be in a designated major disaster area and must demonstrate that they meet the specific conditions of FEMA Disaster Assistance Regulations 44 CFR Part 206, Subpart K, Community Disaster Loans.		Upon declaration of a major disaster, application for a Community Disaster Loan is made through the Governor's Authorized Representative to the Regional Director of FEMA. The Associate Director of the Response and Recovery Directorate approves or disapproves the loan. The Designated Loan Officer will execute a Promissory Note with the applicant. The promissory note must be co-signed by the State, or if the State cannot legally co-sign the note, the local government must pledge collateral security.	The loan must be approved in the fiscal year of the disaster or the fiscal year immediately following.	Regional or Local Office. http://www.dhs.gov
DHS	Disaster Legal Services	Legal assistance.	To provide legal assistance to individuals affected by a major Federal disaster.	Low-income individuals, families, and groups.	Applicants should consult the office or official designated as the single point of contact in his or her State for more information on the process the State requires to be followed in applying for assistance, if the State has selected the program for review.	Upon declaration of an emergency or major disaster, individuals and households may register an application for assistance with FEMA via a toll-free number or by visiting a Disaster Recovery Center.	Not applicable.	Regional or Local Office. http://www.dhs.gov



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
EMERGENCY MANAGEMENT								
DHS	Disaster Unemployment Assistance	Direct Payments for Specified Use; Provision of Specialized Services.	To provide special federally funded weekly benefits to workers and self-employed individuals who are unemployed as a direct result of a Presidentially-declared major disaster, and who are not eligible for regular Unemployment Insurance benefits paid by States.	Disaster victims who have experienced direct loss of employment as a result of a Presidentially-declared major disaster designated for DUA.	From the local State Workforce Agency (SWA).	Upon declaration of a major disaster declaration designated for DUA, individuals may apply with their local State Workforce Agency (SWA).	Generally, applications for DUA must be filed within 30 days after the date of the SWA announcement regarding availability of DUA. When applicants have good cause, they may file claims after the 30-day deadline. However, no initial application will be considered if filed after the 26th week following the declaration date.	Regional or Local Office.
DOC; NOAA; Marine Fisheries Service	Fisheries Disaster relief	Cooperative Grants (75/25)	Assessment of the effects of Commercial Fishery failures, restoring fisheries, preventing future failures and assisting fishing communities affected by failures.	Fishing Communities.	National Marine Fisheries Service (NMFS).	Submit completed forms to NMFS through Grants.GOV	120 days before start of project.	National Marine Fisheries Service. http://www.nmfs.noaa.gov/
DOD	Emergency Rehabilitation of Flood Control Works or Federally Authorized Coastal Protection Works	Repair of Flood Control or Coastal Protection Works.	To assist in the repair and restoration of flood control works damaged by flood, or federally authorized hurricane flood and shore protection works damaged by extraordinary wind, wave, or water action.	Owners of damaged flood protective works, or State and local officials of public entities responsible for their maintenance, repair, and operation must meet current guidelines to become eligible for Public Law 84-99 assistance.	District Engineer or Corps of Engineers	Written application by letter or by form request if such form is locally used by the District Engineer of the Corps of Engineers.	Thirty days after a flood or unusual coastal storm.	Regional or Local Office: U.S. Army Corps of Engineers Division or District Engineers. Headquarters Office: Commander, U.S. Army Corps of Engineers, Attn: CECW-OE, Washington, DC 20314. Telephone: (202) 272-0251. FTS is not available. http://www.usace.army.mil/business.html
SBA	Economic Injury Disaster Loans	Loans to businesses suffering economic injury from Presidential, SBA, or Agricultural Disaster.	To provide working capital to small business, small agricultural cooperatives or nurseries who have actual economic injury.	Business owners who have suffered economic injury.	SBA Disaster Office.	File with nearest SBA Disaster Office.	Deadline established after each declaration.	SBA Disaster Office.
SBA	Physical Disaster Loans	Loans to victims of declared disasters for	To repair or replace damaged or destroyed real and/or personal	Loans to homeowners, renters, business and non-profit organizations	SBA Disaster Office.	File with nearest SBA Disaster Office.	60 days from disaster declaration unless extended by SBA.	SBA Disaster Office.



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
EMERGENCY MANAGEMENT								
		uninsured or otherwise uncompensated physical damage.	property to its pre-damage condition. The loan limit may increase by 20% to provide protective measures.	who have suffered physical loss do to a Presidential or SBA declared disaster.				
USDA	Direct Housing, Natural Disaster Grants and Loans	Repair or replace damaged Property.	To meet emergency assistance needs not provided by FEMA Programs.	Very-Low income owner-occupants of rural housing in declared disaster areas. Must be 62 years or older.	Rural Development Field Office of the applicants County.	Complete Form 410-4 and return to field office.	From Date of Declaration until appropriated funds are exhausted.	U.S.D.A. Rural Development Field Office.
USDA	Disaster Reserve Assistance	Direct Payments for Specified Use.	To provide emergency assistance to eligible livestock owners, in a State, county, or area approved by the Secretary or designee, where because of disease, insect infestation, flood, drought, fire, hurricane, earthquake, hail storm, hot weather, cold weather, freeze, snow, ice, and winterkill, or other natural disaster, a livestock emergency has been determined to exist.	An established producer or husbandry of livestock or a dairy producer. a farm cooperative, private domestic corporation, partnership, or joint operation in which a majority interest is held by the members, stockholders, or partners who are citizens of, or legal resident aliens of the United States. Any Indian tribe or tribal organization of the Indian Self-Determination and Education Assistance Act. Any organization under the Indian Reorganization Act or Financing Act.	Visit the county FSA office in the eligible county.	Applicants visit the county FSA office in the eligible county to make application, certify eligibility and report feed loss, feed available, and eligible livestock related to the disaster occurrence; and (2) applicants also receive authority to participate in the program as provided by the approving official.	Feeding periods for the disaster reserve assistance program begin (a) the first day of the 1996 crop year in counties approved for 1995 or 1996 livestock feed programs; (b) the date the producer filed an application, if the natural disaster began after the beginning of the 1996 crop year; the date of the occurrence for sudden natural disasters that occurred after the beginning of the 1996 crop year.	Regional or Local Office http://www.fsa.usda.gov
USDA	Emergency Loans	Direct Loans.	To assist established (owner or tenant) family farmers, ranchers and aquaculture operators with loans to cover losses resulting from major and/or natural disasters, which can be used for annual farm operating	Be an established family farmer, rancher, or aquaculture operator (either tenant-operator or owner-operator), who was conducting a farming operation at the time of occurrence of the disaster either as an individual proprietorship, a partnership, a	Consult the appropriate FSA State office.	Application Form FSA 410-1 provided by the Farm Service Agency must be presented, with supporting information, to the FSA county office serving the applicant's county. FSA personnel assist applicants in completing their application forms. This	Deadline for filing applications for actual loss loans is 8 months from the date of declaration/designation for both physical and production losses. Applicants should consult the FSA county office serving their area for application deadlines.	Regional or Local Office http://www.fsa.usda.gov



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
EMERGENCY MANAGEMENT								
			expenses, and for other essential needs necessary to return disaster victims' farming operations to a financially sound basis in order that they will be able to return to private sources of credit as soon as possible.	cooperative, a corporation, or a joint operation. Have suffered qualifying crop loss and/or physical property damage caused by a designated natural disaster. Be a citizen of the United States or legal resident alien, or be operated by citizens and/or resident aliens owning over a 50 percent interest of the farming entity. Have sufficient training or farming experience in managing and operating a farm or ranch. Be a capable manager of the farming, ranching, or aquaculture operations.		program is excluded from coverage under OMB Circular No. A-110.		



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
HISTORIC PRESERVATION								
DOI; National Park Service	Civil War Battlefield Land Acquisition Grants	Grants for Fee simple acquisition of land, or for the acquisition of permanent protective interests in land at Civil War Battlefields.	To preserve threatened civil war battlefields.	Local governments or private non-profit organization in partnership with local governments.	SF 424 and attached documents including hard copies of proposals. See application requirements for list of attachments.	File forms with National Park Service Office.	Ongoing.	National Park Service. http://www.nps.gov/
DOI; National Park Service	National Maritime Heritage Grants	Education activities and preservation activities or projects, such as: 1) activities associated with acquiring ownership of, or responsibility for, historic maritime properties for preservation purposes; 2) preservation planning; 3) documentation of historic maritime properties; 4) protection and stabilization of historic maritime properties; 5) preservation restoration, or rehabilitation of historic maritime properties; 6) maintenance of historic maritime properties; and 7) reconstruction or reproduction of well-documented historic maritime properties.	To preserve historic maritime resources and increase public awareness and appreciation.	Local governments and private non-profit organizations.	National Maritime Initiative.	State Historical Preservation Office or National Maritime Initiative.	Contact State Historical Preservation Office or National Maritime Initiative.	National Park Service Office, National Maritime Initiative. http://www.cr.nps.gov/Maritime/
DOI; National Park Service	Technical Preservation Service	Advisory services and counseling, dissemination of technical information, provision of specialized services.	To assist local governments and owners of certified historical structures to preserve and maintain properties.	Local governments and individuals.	Historic Preservation Certification Application through Appropriate State Official or NPS Office.	File through State Official or NPS Office.	None.	National Park Service Office. http://www.nps.gov/



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
HOUSING								
DHS	Disaster Housing Assistance To Individuals And Households In Presidential Declared Disaster Zones	Direct Payments for Specified Use.	To provide assistance to affected individuals and households within Presidential-declared disaster zones to enable them to address disaster-related housing and other necessary expenses and serious needs, which cannot be met through other forms of disaster assistance, insurance, or through other means.	Individuals and households, in areas declared an emergency or major disaster by the President, whose primary residence has been damaged or destroyed and whose losses are not covered by insurance are eligible to apply for this program. Must be a citizen of the United States, a non-citizen national, or a qualified alien.	An applicant should consult the office or official designated as the single point of contact in his or her State for more information on the process the State requires to be followed in applying for assistance, if the State has selected the program for review.	A Presidential Disaster or Emergency Declaration must be issued, before individuals and households can register an application for assistance with FEMA via a toll-free number or by visiting a Disaster Recovery Center.	Generally, individual and household applications for disaster assistance must be filed within 60 days of the disaster declaration.	Regional or Local Office.
DHS	Disaster Housing Program	Grant.	The Disaster Housing Program provides housing assistance in the form of a grant to individuals whose homes sustained damage as a result of a Presidentially declared disaster. To qualify for assistance, the damaged home must be your primary residence, and be located in the	Applicant must be a national, citizen or dual citizen of the US whose home was destroyed or damaged by a Presidentially declared major disaster.	Contact FEMA.	Individuals can apply for assistance by calling 1-800-621-FEMA. Insured homeowners should first file a claim with their home insurer before contacting FEMA. An inspection is performed and a determination is made on your eligibility	Contact FEMA.	Additional general information can be found at: http://www.fema.gov/tabs_disaster.shtm



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
HOUSING								
			disaster-declared area. If insured, a claim should be filed. This program provides grants for lodging expense reimbursement, minimal home repairs and rental assistance. A determination of the types of housing assistance you are eligible to receive will be made if you apply.			for one of the following types of assistance: Lodging expense reimbursement, minimal home repairs, rental assistance and Mortgage and Rental Assistance.		
DHS	Federal Assistance To Individuals And Households- Disaster Housing Operations	Direct Payments for Specified Use.	To address disaster-related housing needs of individuals and households suffering hardship who are within an area declared as a disaster zone, by the President.	Individuals and households, in areas declared an emergency or major disaster by the President, whose primary residence has been damaged or destroyed and whose losses are not covered by insurance are eligible to apply for this program. The individual or a member of the household must be a citizen of the United States, a non-citizen	An applicant should consult the office or official designated as the single point of contact in his or her State for more information on the process the State requires to be followed in applying for assistance, if the State has selected the program for review.	Upon declaration of an emergency or major disaster, individuals and households may register an application for assistance with FEMA via a toll-free number or by visiting a Disaster Recovery Center.	Generally, individual and household applications for disaster assistance must be filed within 60 days of the disaster declaration.	Regional or Local Office.



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
HOUSING								
DOI, Bureau of Indian Affairs	Indian Housing Assistance	Construction of housing, technical assistance to establish housing plans and determine extent and use of the Bureau's housing Improvement Program.	To eliminate substantially substandard Indian owned to inhabited housing for very low income individuals living in tribal service areas.	national, or a qualified alien. Individual members of Federally recognized tribes or tribal governments or organizations.	An informal conference should be scheduled with Bureau of Indian Affairs. Applications for Tribes or Tribal organizations should be submitted to Bureau of Indian affairs local office. Individuals may submit applications to the Bureau or to the tribal Servicing Housing Office.	Process is determined through annual Tribal work plan.	For Tribes or Tribal Organizations there is no deadline. For individuals the deadline is set at the local office.	Regional or Local Office of the Bureau of Indian Affairs.
HUD	Community Development Block Grant (CDBG)	Grant.	To develop viable urban communities by providing decent housing and a suitable living environment. Principally for low-to moderate-income individuals.	Eligible CDBG grant recipients include States, units of general local government (city, county, town, township, parish, village or other general purpose political subdivision determined to be eligible for assistance by the Secretary), the District of Columbia, Puerto Rico, Guam, the Virgin Islands, American Samoa, the Commonwealth of the Northern Marianas, and recognized Native American tribes	http://www.hud.gov/offices/cpd/about/cpd_programs.cfm	Community Development activities that meet long-term needs. These activities can include acquisition, rehabilitation, reconstruction of properties and facilities damaged by a disaster, and redevelopment of disaster affected areas.	Consolidated Plans may be submitted between November 15 and August 16 of each fiscal year in which the State will administer funds.	State and Small Cities Division, Office of Block Grant Assistance, CPD, HUD, 451 7th Street, S.W., Washington, DC 20410-7000. Telephone: 202.708.3587. http://www.hud.gov/bdfy2000/summary/cpd/cdbg.html



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
HOUSING								
HUD	Demolition and Revitalization of Severely Distressed Public Housing (HOPE VI)	Demolition of all or parts of severely distressed public housing projects, relocation cost of affected resident, disposition activities, rehabbing of units or community facilities, development of new units or community facilities, homeownership activities, acquisition activities, management improvements and administrative cost, community and supportive services.	To fund revitalization of severely distressed public housing developments.	Public housing authorities and Indian Housing Authorities, plus local governments for HOPE VI Main Street Grants. and Alaskan Native villages.	Submission requirements and application are listed in Notice of Federal Assistance in the Federal Register.	HUD HQ reviews the application and rates them. Highest rated applications are funded.	As indicated in the Federal Register Notice.	HUD local or regional Office.
HUD	Mortgage insurance- Homes for Disaster Victims	Guaranteed / Insured Loans.	To insure lenders against losses on mortgage loans used to finance purchase or reconstruction of one-family home that will be the principal residence of a borrower that is a victim of a disaster.	Individuals and Families that are victims of a disaster designated by the President.	Mortgagee submits Application to HUD Field Office.	Mortgagee submits Application to HUD Field Office.	None.	HUD local or regional Office.
HUD	Rehabilitation Mortgage Insurance	Guaranteed / Insured Loans.	To insure lenders against losses on mortgage loans	Individual purchasers.	A HUD Approved Lending Institution	Review by Lending Institution.	None.	HUD local or regional Office.



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
HOUSING								
			for 1 to 4 unit structures used to finance the purchase of a structure and land and rehabilitate the structure; the purchase, relocation and rehabilitation of a structure from another site; refinance existing debt and rehabilitating a structure; finance the rehabilitating of a structure.					
HUD	Rural housing and Economic Development	Grants for Capacity Building, Support of Innovative Housing and Economic Development Activities.	To build capacity for rural housing and economic development activities in rural areas.	Local Rural Non-Profit Organizations, Community Development Corporations, Indian Tribes, State agencies.	Submission requirements and application are listed in Notice of Federal Assistance in the Federal Register	As indicated in the Federal Register Notice.	As indicated in the Federal Register Notice.	HUD local or regional Office.
HUD	Self-Help Homeownership Opportunity Program (SHOP)	Land Acquisition and Infrastructure Improvements	To facilitate and encourage innovative homeownership opportunities were homeowner are low-income and contribute a significant amount of sweat equity.	National or regional non-Profit Organizations or Consortia.	Submission requirements and application are listed in SHOP Notice of Federal Assistance in the Federal Register.	As indicated in the Federal Register Notice.	As indicated in the Federal Register Notice.	HUD local or regional Office.
HUD	Supplemental Loan Insurance-	Financing of repairs, additions and improvements	To insure lenders against losses on loans	Owners of Multifamily projects or	HUD Multifamily HUB and Program Center.	Pre-application conference and then submittal	Case-by-case basis.	HUD local or regional Office.



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
HOUSING								
	Multifamily Rental Housing	to multifamily projects, group practice facilities, hospitals and nursing homes already insured by HUD.	to finance additions and improvements to eligible properties.	facilities subject to mortgage insured by HUD or individual s/families and owners of multifamily projects.		of formal application through HUD approved mortgage.		
USDA	Direct Housing-Natural Disaster	Direct loans.	To assist qualified lower income rural families to meet emergency assistance needs resulting from natural disaster to buy, build, rehabilitate, or improve dwellings in rural areas. Funds are only available to the extent that funds are not provided by the Federal Emergency Management Agency (FEMA). For the purpose of administering these funds, natural disaster will only include those areas identified by a Presidential declaration.	Applicants must be without adequate resources to obtain housing or related facilities. Applicants must be unable to secure the necessary credit from other sources at prevailing terms and conditions for residential financing.	Rural Development Field office.	Applicants must file Form RD 410-4 at the Rural Development field office serving the county where the dwelling is located. This program is excluded from coverage under OMB Circular No. A-110.	Applicants must file applications from the date of declaration/designation and until supplemental appropriated funds are exhausted.	Regional or Local Office. Consult your local telephone directory under United States Department of Agriculture for Rural Development field office number. If no listing, contact appropriate Rural Development State Office at: http://www.rurdev.usda.gov/recd_map.html .



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
HOUSING								
USDA; Rural Housing Service	Farm Labor Housing Loans and Grants	Project grants and Guaranteed/insured Loans for the construction, repair or purchase of year-around or seasonal housing; acquiring land and making improvements for housing; developing related support facilities.	To provide decent, safe and sanitary low-rent housing and related facilities for domestic farm laborers.	Farmers, farm family partnerships, family farm corporations, or an association of farmers.	Applicant must furnish the following information: the number of farm laborers currently being used in the area; the kind of labor performed; the future need for labor; the kind, condition, and adequacy of current housing; the ownership of current housing; the ability of workers to pay rent; and information that it is unable to provide housing from its own resources or terms and conditions that would enable it to provide labor housing.	Applications will be scored and reviewed by State and National Offices.	None.	Regional or Local Office of Rural housing Service. http://www.rurdev.usda.gov/rhs/
USDA; Rural Housing Service	Rural Housing Preservation Grants	Loans, grants or other assistance to individual homeowners, rental properties or coops to pay any part of the cost for repair and rehabilitation of structures.	To assist very low- and low-income residents individual homeowners, rental property owners (single/multi-unit and consumer cooperative housing projects to complete necessary repairs and rehabilitation of dwellings.	Political subdivision of state, public non-profit corporation, or Indian tribal Corporations authorized to receive and administer housing preservation grants, private nonprofit corporations, or consortia.	Contact your regional or local office.	Consult with Rural Development Office prior to application and submit pre-application. An Environmental Impact Assessment is required.	See Federal Register of Notice of Funds Availability.	Regional or Local Office of Rural housing Service. http://www.rurdev.usda.gov/rhs/
USDA; Rural Housing Service	Section 538 Rural rental Housing Guaranteed Loans	Guaranteed/Insured Loans to supply affordable multi-family housing in rural areas.	To encourage private and public lenders to make loans for affordable rental properties.	Lenders.	Lender provides documentation required by RHS.	RHS will review applications for compliance and issue conditional Commitment of guarantee with conditions. Once Conditions are met the final Contract of guarantee will be issued.	See Federal Register of Notice of Funds Availability.	Regional or Local Office of Rural housing Service. http://www.rurdev.usda.gov/rhs/



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
HOUSING								
USDA; Rural Housing Service	Very Low- Income housing Repair Loans and Grants	Direct Loans and Project Grants to Very-Low Income Homeowners in rural areas to repair, improve or modernize their dwellings or to remove health and safety hazards.	To make essential repairs to homes to make them safe and remove health hazards.	Applicant must own and occupy the home in a rural area, have sufficient income to repay a loan, be 62 years of age or older and be unable to repay a loan for that part of the assistance that comes as a grant.	Rural Development State or District Office.	The Loan must be submitted to RHS field office serving county where structure is located.	None.	Regional or Local Office of Rural housing Service. http://www.rurdev.usda.gov/rhs/
USDA; Rural Housing Service	Very Low to Moderate Income Housing Loans	Direct and Guaranteed Loans to buy, build, or improve applicant's permanent residence. New manufactured loans on a permanent site may also be approved.	To assist very low, low- income, and moderate households to obtain modest, decent, safe, and sanitary housing for use as a permanent residence in a rural area.	Very low, low- income, and moderate households.	For Direct Loans the application is made to the local Rural Development Office. For Guaranteed Loans application is made to the lender.	For Direct Loans the Rural Development Office makes a decision within 30 – 60 days. For Guaranteed Loans the decision is made within 3 days.	None.	Regional or Local Office of Rural housing Service. http://www.rurdev.usda.gov/rhs/



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
INFRASTRUCTURE								
DHS	National Dam Safety Program	State grants distributed directly to State dam safety programs.	To reduce the risks to life and property from dam failure in the United States through the establishment and maintenance of an effective national dam safety program to bring together the expertise and resources of the Federal and non-Federal communities in achieving national dam safety hazard reduction.	For a State to be eligible for primary assistance under the National Dam Safety Program, the State dam safety program must be working toward meeting the following criteria: The authority to review and approve plans and specifications to construct, enlarge, modify, remove, and abandon dams; the authority to perform periodic inspections during dam construction to ensure compliance with approved plans and specifications. All inspections be performed under the supervision of a State-registered professional engineer with experience in dam design and construction.	www.fema.gov/fima/damsafe	States wishing to participate in the National Dam Safety Program must submit a proposal with their application package including a program narrative statement, goals and objectives, performance measures, travel budget and related activities.	Applications should be submitted to FEMA by November 30 of each fiscal year.	<i>Headquarters Office:</i> Director, National Dam Safety Program, Mitigation Directorate, FEMA, DHS, 500 C Street SW., Washington, DC 20472; Telephone: (202) 646-3885. Additional information is available on the National Dam Safety Program web site, www.fema.gov/fima/damsafe
DOC; EDA	Grants for Public Works and Economic Development Facilities	Project grants for water and sewer improvements, industrial access roads, industrial and business parks, port facilities, railroad sidings, distance learning facilities, skill-training facilities, redevelopment of brown fields, eco-industrial facilities, business incubator	To promote long-term economic development in areas experiencing substantial economic stress.	Cities, counties, institutions of higher education or a consortium of institutions of higher education, other political subdivision, Indian Tribes, Economic Development Districts and non-profit organizations.	The Economic Development Representative servicing the state or EDA.	Meet with EDR. If deemed appropriate the applicant will be invited to apply.	30 days after invitation.	Regional or Local Office. http://www.eda.gov/Contacts/Contacts.xml



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
INFRASTRUCTURE								
		facilities, and telecommunication infrastructure improvement needed for business retention and expansion.						
DOC; National Telecommunication and Information Administration	Public Telecommunications Facilities Planning and Construction	Grants for planning and construction of public telecommunications facilities.	To assist in the planning, acquisition, installation, and modernization of public telecommunications facilities through planning grants and matching construction grants.	Public or noncommercial educational broadcast station, noncommercial telecommunication entity, non-profit foundation, corporation, institution or association organized primarily for educational or cultural purposes, local government, tribal government or an agency thereof, or a political or special purpose subdivision of the state.	Request from agency or go to the web at: www.ntia.doc.gov/ptfp .	File application form, project narrative, project budget forms, relevant exhibits, CD-511, CD 346, SF 424B, and SF LLL. Contact State telecommunications agency where applicable.	See annual notification in the Federal Register.	Regional or Local Office. http://www.ntia.doc.gov/
DOD; USACE	Flood Control Works / Emergency Rehabilitation	Provision of Specialized Services.	To assist in the repair and restoration of public works damaged by flood, extraordinary wind, wave, or water action.	Owners of damaged flood protective works, or State and local officials of public entities responsible for their maintenance, repair, and operation.	Regional or Local Office: U.S. Army Corps of Engineers Division or District Engineers.	The Corps provides public works and engineering support to supplement State and local efforts toward the effective and immediate response to a natural disaster.	Thirty days after a flood or unusual coastal storm.	Program Manager PL 84-99 USACE, 20 Massachusetts Ave, N.W. Washington, DC 20314 Telephone: 202.761.0001. http://www.spd.usace.army.mil/hqgam.html
DOD; USACE	Protection of Essential Highways, Highway Bridge Approaches and Public Works	Protection of highways, highway bridges, essential public works, churches, hospitals, schools and other non-profit public services.	To provide bank protection for locations endangered by flood-caused erosion.	Political subdivision of states and other responsible local agencies established under state law with full authority and ability to undertake legal and financial responsibilities.	Formal letter to District Engineer.	Consult with District Engineer.	None.	Regional or Local Office. http://www.usace.army.mil/business.html



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
INFRASTRUCTURE								
DOI; Bureau of Reclamation	Water Desalination Research and Development Program	Demonstration and development projects and related activities.	To develop cost-effective, technically efficient and implementable methods by which water can be produced.	Local entities, public/nonprofit institutions/organizations, other public institutions/organizations.	A proposal solicitation is announced by the Bureau of Reclamation.	There will be a general solicitation and one for pilot plants or demonstration projects, SF 424 and DI-2010 forms are required.	Varies, contact Bureau of Reclamation.	Bureau of Reclamation http://www.usbr.gov/ (303) 445-2432.
FHWA; FAA	Airport Improvement Program	Project Grants and advisory services and counseling.	Integrated airport system planning and airport master planning, construction and rehabilitation at public-use airports.	Counties, municipalities, other public agencies, Indian tribes, private owners of public-use reliever airports or airports having at least 2,500 passengers boarding annually and receiving scheduled passenger aircraft.	Contact the States single-point contact for aviation.	Pre-application is filed with the FAA office and reviewed regionally and/or in Washington D.C.	January 31 or another date specified in the Federal Register.	Regional or Local Office. http://www.faa.gov/about/office_org/
FHWA; FTA	Federal transit Capital Investment Grants	Formula Grants and Project Grants.	To assist in financing the acquisition, construction, reconstruction and improvement of facilities, rolling stock and equipment for use in public transportation service.	Municipalities and other subdivisions of the state, public agencies and instrumentalities of one or more states, public corporations, Boards and commissions.	Federal Transportation Authority or State single point of contact.	Applicant should contact the State single point of contact.	Contact FTA.	Regional or local office. http://www.fta.dot.gov/4_ENG_HTML.htm
FHWA; FTA	Transit Planning and Research	Project Grants, Technical Information, and Training.	Increase public ridership, improve safety and emergency preparedness, improve capital operating efficiencies, protect the environment and promote energy independence.	Public bodies, non-profit institutions, local agencies, universities and legally constituted public agencies and operators of public transportation services, and non-profit organizations.	Federal Transportation Authority.	Pre-Application Coordination.	None.	Associate Administrator for Research, Demonstration and Innovation, FTA (202) 366-4209. http://www.fta.dot.gov/4_ENG_HTML.htm



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
INFRASTRUCTURE								
FHWA	Transportation: Emergency Relief Program	Special funding and technical assistance to States and Federal agencies.	To provide aid for repair of Federal-aid roads.	State highway/transportation agency or Federal agency.	www.fhwa.dot.gov	It is the responsibility of individual States to request ER funds for assistance in the cost of necessary repair of Federal-aid highways damaged by natural disasters or catastrophic failures. A notice of intent to request ER funds filed by the State Department of Transportation with the FHWA Division Office located in the State will initiate the ER application process.	Contact FHWA.	Director, Office of Engineering, FHWA, DOT, 400 7th Street, S.W., Washington, DC 20590. Telephone: 202.366.4655. http://www.fhwa.dot.gov/programadmin/erief.html
USDA; Rural Utilities Service	Water and Waste Disposal Systems for Rural Communities	Project Grant, Direct Loans, guaranteed/Insured Loans for the installation, repair, improvement or expansion of rural water facilities including distribution lines, well pumping facilities and cost related thereto, and the installation, repair, improvement, or expansion or rural waste disposal facilities including the collection, and treatment of sanitary, storm and solid wastes.	To provide basic human amenities, alleviate health hazards and promote orderly growth of rural area.	Municipalities, counties and other political subdivisions of a states, such as authorities, associations, cooperatives, corporations operated on a not for profit basis, and federally recognized tribes. Serving rural businesses and rural residents.	Local USDA Rural Development Office.	Application is reviewed at the local level and forwarded to Rural Development State Director for review.	None.	Regional or local office. http://www.rurdev.usda.gov/recd_map.html



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
INFRASTRUCTURE								
USDA; Rural Utilities Service	Water and Waste Disposal Loans and Grants (Section 306C)	Project Grants, Direct Loans to construct enlarge, extend or otherwise improve community water or waste systems; extend lines; and connect individual residences to the system.	Provide water and waste disposal facilities and services to low income rural communities whose residents face significant health risks.	Local levels of government, federally recognized tribes and non-profit associations. Per capita income may not exceed 70% of national average, unemployment rate is not less than 125% of national average, and residents must face significant health risks due to not having access to an affordable community water and/or waste disposal system.	Local USDA Rural Development Office.	Application is reviewed at the Rural Development State office and must compete on a national basis for review.	None.	Regional or local office. http://www.rurdev.usda.gov/recd_map.html



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
MITIGATION								
DHS	Emergency Management Performance Grants (EMPG)	Formula Grants.	To encourage the development of comprehensive emergency management, including for terrorism consequence management, at the State and local level and to improve emergency management planning, preparedness, mitigation, response, and recovery capabilities.	Funding provided to States, which can be used to educate people and protect lives and structures from natural and technological hazards.	An applicant should consult the office or official designated as the single point of contact in his or her State for more information on the process the State requires to be followed in applying for assistance, if the State has selected the program for review. Technical assistance is available for application preparation from the FEMA Regional Offices.	Applications must be submitted online using the OJP GMS and must contain information and meet the requirements outlined in the program guidelines and application kit.	Applications will be made available on December 2, 2004, and must be received by ODP no later than January 16, 2005.	Office of Financial Management, FEMA, 500 C Street, S.W., Washington, DC 20472 Telephone: 202.646.7057. http://www.fema.gov
DHS	Flood Mitigation Assistance Program	Grants to States.	To help States and communities plan and carry out activities designed to reduce the risk of flood damage to structures covered under contracts for flood insurance.	The State or community must first develop (and have approved by FEMA) a flood mitigation plan that describes the activities to be carried out with assistance provided under this program. The plan must be consistent with a comprehensive strategy for mitigation activities, and be adopted by the State or community following a public hearing.	Applications can be obtained from the State Hazard Mitigation Officer. Eligible projects include acquisition, elevation, or relocation of National Flood Insurance Program (NFIP)-insured structures, especially those that have been repetitively flooded or substantially damaged.	The State Hazard Mitigation Officer applied to the Federal Emergency Management Agency for annual funds.	Annual.	Risk Reduction Branch, Mitigation Division, FEMA, DHS 500 C Street SW., Washington, DC 20472; Telephone: (202) 646-2856. Additional information is available on FEMA's web site, www.fema.gov/fima/planfma.shtml



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
MITIGATION								
DHS	Hazard Mitigation Grant Program	Grants.	To prevent future losses of lives and property due to disasters; to implement State or local hazard mitigation plans; to enable mitigation measures to be implemented during immediate recovery from a disaster; and to provide funding for previously identified mitigation measures to benefit the disaster area.	State and local governments; certain private and nonprofit organizations or institutions; Indian tribes or authorized tribal organizations; and Alaska Native villages or organizations.	For more information on where to obtain application go to website, http://www.fema.gov/fima/hmgrp/hmgrp_ref.shtml	Eligible applicants apply for the program through the State, as the State administers the program. Applicants are encouraged to contact the State Hazard Mitigation Officer for details. Each State has a hazard mitigation administrative plan that explains procedures for administering the HMGP. When the State requests a disaster declaration, it must also request that HMGP funding be made available. Individuals applying for a Hazard mitigation Grant can do it through their communities.	The State will submit all selected local applications or summaries to the Regional Director within 90 days after the State Hazard Mitigation Plan is approved. (Approximately 9-18 months after disaster declaration.)	Branch Chief, Risk Reduction Branch, Mitigation Division, FEMA, DHS, 500 C Street SW., Washington, DC 20472; Telephone: (202) 646-2856. Additional information is available on FEMA's web site, www.fema.gov
DHS	National Flood Insurance Program	Formula grants to States.	To enable persons to purchase insurance against physical damage to or loss of buildings and/or contents therein caused by floods, mudslide (i.e.,	Flood insurance can be made available in any community (a State or political subdivision thereof with authority to	Contact State Hazard Mitigation Officer for details.	Community officials must submit an NFIP eligibility application form, which is available from the FEMA, together with: copies of adopted	Communities with one or more identified special flood hazard areas must enter the program within 1 year after the	Regional or Local Office. Contact the appropriate FEMA regional office, or the State office responsible for coordinating the program's activities.



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
MITIGATION								
			mudflow), or flood-related erosion, thereby reducing Federal disaster assistance payments, and to promote wise floodplain management practices in the Nation's flood-prone and mudflow-prone areas.	adopt and enforce floodplain management measures for the areas within its jurisdiction) that submits a properly completed application to FEMA.		floodplain management measures meeting the minimum standards of 44 CFR Section 60.3(a), 60.3(b), 60.3(c), 60.3(d), and/or 60.3(e), as appropriate for the type of flood hazards identified; a list of any incorporated communities within the applicant's boundaries; and estimates of population and, by kind, of buildings situated in the known flood-prone areas of the community. Such Applications should be submitted to the Mitigation Directorate, FEMA, Washington, DC 20472. This program is excluded from coverage under OMB Circular No. A-110.	identification of those areas or else prohibitions against Federally related financial assistance for acquisition or construction purposes in identified special flood hazard areas take force. Once the community does qualify, after the prescribed date, these prohibitions are removed. Adequate floodplain management measures must be in effect within 6 months of the date that the special flood hazard area is identified and within 6 months of the date flood water surface elevations are provided.	
DHS	Public Assistance Program	Grants to States and Communities.	To provide supplemental assistance to States, local governments, and certain private nonprofit organizations to	State and local governments and any political subdivision of a State, Indian tribes, and Alaskan Native	An applicant should consult the office or official designated as the point-of-contact in the State for more information.	Application for Public Assistance (PA) is made through the Governor's Authorized Representative	A Request for Public Assistance is normally submitted by the applicant within 30 days	Public Assistance Branch, Recovery Division, FEMA, DHS, 500 C Street SW., Washington, DC 20472; or the State Emergency office. Additional information is available on FEMA's web site, http://www.fema.gov/rrt/pa/



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
MITIGATION								
			alleviate suffering and hardship resulting from major disasters or emergencies declared by the President.	villages are eligible. Also eligible are private nonprofit organizations that operate educational, utility, emergency, or medical facilities, or that provide custodial care or other essential services of governmental nature to the general public. As a condition of grants under the Stafford Act, applicants are encouraged to mitigate natural hazards.		to the FEMA Regional Director in accordance with FEMA Disaster Assistance Regulations, 44 CFR 206, except as provided in Part 206.35(d) for emergency declarations involving primarily Federal responsibility.	of a declaration.	
DOC; NOAA; NWS	Automated Flood Warning Systems	Funding for creating, renovating, or enhancing Automated Flood Warning Systems.	To provide funding to communities with flood or flash flood problems that affect safety of life and property for warning systems.	Counties, municipalities, educational institutions and non-profit organizations.	http://www.ofa.noaa.gov/%7Egrants/appkit.html . Applicants must also provide statement of work, project description and detailed budget narrative and justification.	Submit to: NOAA/NWS, 1325 East-West Highway, AFWS Program Manager, W/OS31, Room 13396, Silver Spring, MD. 20910.	Check with local NWS Office.	AFWS Operations Manager (631) 224-0112.
DOC; Census Bureau	Census Geography	Provide Computer generated set of maps for use in conducting surveys.	Showing results of surveys geographically, determine names and current boundaries of selected statistical areas.	Interested persons, organizations and government agencies.	Written request.	None.	None.	Regional or Local Census Bureau Office http://www.census.gov/field/www/



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
MITIGATION								
DOC; NOAA	Geodetic Surveys and Services	To provide national, coordinated spatial reference system at various specified intervals which provide scale, orientation, coordinated positions and elevation of specific points for use in surveying, boundary delineations and demarcation, mapping, planning, and development.	To provide assistance to State local and regional agencies in the development and implementation of Multipurpose Land Information Systems/Geographic Information Systems pilot projects and spatial reference system development and/or enhancement and height modernization.	Local, municipal, universities and regional agencies.	NOAA Grants Management Division (301) 713-3228.	45-90 day review time after submittal of all documents.	Must be submitted at least 90 days in advance of desired effective date.	NOAA Grants Management Division http://www.ago.noaa.gov/grants/ (301) 713-3228.
DOD; USACE	Flood Control Projects	Design and construction of projects.	To reduce flood damages through projects not specifically authorized by Congress.	Political subdivisions of States, or other responsible agencies established under state law. Project must be engineering feasible, complete within itself and economically justified. Non-federal sponsor will share equally in feasibility study, project cost,	Formal Letter to District Engineer From A Prospective Sponsoring Agency.	Consult with the District Office.	None.	District Office. http://www.usace.army.mil/howdoi/where.html



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
MITIGATION								
				provide a cash contribution for land enhancement benefits and for features other than flood control, prevent future encroachments which might interfere with function and maintain the project.				
DOD; USACE	Flood Plain Management Services	Advisory Services and Counseling; Dissemination of Technical Information.	To promote appropriate recognition of flood hazards in land and water use planning and development through the provision of flood and floodplain related data, technical services and guidance.	Political subdivisions of States, other non-public organizations and the public.	None needed. A letter should be sent to the District Engineer of the Corps of Engineers.	Send letter of Request.	None.	District Office. http://www.usace.army.mil/howdoi/where.html
DOD; USACE	Snagging and Clearing for Flood Control	Design and construction of projects. Non-federal sponsor must provide land, easement, right-of-way; provide costs in excess of the Federal limit; maintain project; Hold US free from damages; cost share for land enhancement or special benefits;	To reduce flood damages.	Political subdivisions of States, or other responsible agencies established under state law.	Formal Letter to District Engineer From A Prospective Sponsoring Agency.	Consult with the District Office.	None.	District Office. http://www.usace.army.mil/howdoi/where.html



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
MITIGATION								
		prevent future encroachments which will interfere with proper functioning of project.						
DOI	National Fire Plan - Wildland Urban Interface Community Fire Assistance	Project Grants; Use of Property, Facilities, and Equipment; Provision of Specialized Services; Advisory Services and Counseling; Dissemination of Technical Information; Training.	To implement the National Fire Plan and assist communities at risk from catastrophic wildland fires by providing assistance in the following areas: Provide community programs that develop local capability including; assessment and planning, mitigation activities, and community and homeowner education and action; plan and implement hazardous fuels reduction activities, including the training, monitoring or maintenance associated with such hazardous fuels reduction activities, on federal land, or on adjacent nonfederal land for activities that mitigate the threat of catastrophic fire to communities and natural resources in high risk areas; enhance local and small business employment opportunities for rural communities; enhance the knowledge and fire	States and local governments at risk as published in the Federal Register, Indian Tribes, public and private education institutions, nonprofit organizations, and rural fire departments serving a community with a population of 10,000 or less in the wildland/urban interface.	Contact the appropriate State Office or the National Interagency Fire Center's web site at: http://www.nifc.gov .	Wildland Urban Interface Community Assistance is coordinated by Bureau State and Field Offices. No specific application forms apply, except for grants awarded, the standard application forms furnished by the Federal agency and required by 43 CFR Part 12, Subpart C, "Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments," and 43 CFR Part 12, Subpart F, "Uniform Administrative Requirements for Grants and Agreements With Institutions of Higher Education,	None.	Regional or Local Office. http://www.blm.gov/nhp/index.htm http://www.nifc.gov



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
MITIGATION								
			protection capability of rural fire districts by providing assistance in education and training, protective clothing and equipment purchase, and mitigation methods on a cost share basis.			Hospitals, and Other Nonprofit Organizations", must be used by this program.		
DOI; National Park Service	Technical Preservation Services	Advisory Services, Technical Information, Specialized Services.	Technical information is provided to assist local governments and owners to preserve and maintain historic properties.	Local governments and individuals.	State historic Preservation Office.	Apply through appropriate state official or NPS Regional Office.	None.	Regional or local office.
USDA; Natural Resources Conservation Service	Soil Survey	Dissemination of Technical Information.	Soil surveys for planners, environmentalists, engineers, zoning commissions, tax commissions, homeowners, farmers, ranchers, developers, landowners and operators.	Individuals and Groups that have a need for soil survey.	Contact Natural Resources conservation Service Office.	Request from Natural Resources Conservation Service District Office	None	Natural Resources Conservation Service District Office http://www.nrcs.usda.gov/
USDA; Natural Resources Conservation Service	Watershed Protection and Flood Prevention	Project Grants sharing the cost of watershed protection measures, flood prevention, agricultural water management, sediment control, wildlife, recreation and in extending long term credit for these projects. Advisory Services and	Project Grants sharing the cost of watershed protection measures, flood prevention, agricultural water management, sediment control, wildlife, recreation and in extending long term credit for these projects. Advisory Services and Counseling in designing and installing watershed works of improvement.	Counties, groups of counties, municipalities, towns or townships, soil and water conservation districts, flood prevention or flood control districts, Indian tribes or tribal organizations, and non-profit agencies with authority under state law to	Standard Application obtained from NRCS.	Details available in State and field offices of NRCS.	None.	Natural Resources Conservation Service District Office http://www.nrcs.usda.gov/



Table 4-4: Federal Technical Assistance and Funding

Agency	Program	Type of Assistance/ Projects Funded	Purpose	Eligible Applicants	Where To Obtain Application	Application Process	Application Deadline	For More Information
MITIGATION								
		Counseling in designing and installing watershed works of improvement.		carry out, maintain and operate watershed works of improvement.				
USDA; Natural Resources Conservation Service	Watershed Surveys and Planning	Technical assistance for planning activities to help solve water and land related resource problems.	To help solve problems of upstream rural community flooding, water quality improvement, wetland preservation and drought management.	Local water resource agency concerned with water and related land resource development, counties, municipalities, towns or townships, Indian Tribe and Tribal Organizations, and non-profit organizations.	NCRS Offices and Letter of request Addressed to State Conservationist.	NCRS Offices and Letter of request Addressed to State Conservationist.	None.	Natural Resources Conservation Service District Office http://www.nrcs.usda.gov/



SECTION 5 - MITIGATION GOALS

Goals were developed by taking into consideration both state and jurisdictional goals for mitigation. The goals in this multi-jurisdictional plan are broadly aligned with the goals of the State Hazard Mitigation Plan. In fact, the Northern and Eastern Dutchess County Communities Regional Hazard Mitigation Plan Goals are in support of furthering the State's goals in many ways.

New York State Hazard Mitigation Plan Goals

New York State's Hazard Mitigation Vision Statement reads:

"To create communities whose daily activities reflect a comprehensive commitment by government, business, non-profit organizations, and the public to eliminate or reduce risks and adverse impacts from natural, technological, and human-caused hazards."

As outlined in the New York State Hazard Mitigation Plan (approved by FEMA January 4th, 2008), the State's generic goals are:

- 1) Promote hazard mitigation awareness and education throughout the State.
- 2) Build a State and Local hazard mitigation infrastructure within the State and promote mitigation as the most effective means to reduce future disaster losses.
- 3) Implement, maintain, and update a comprehensive State Multi-Hazard Mitigation Plan.
- 4) Reduce risk to lives and property from frequent natural, technological and human caused disasters. Set priority on hazards that are repetitive and pose severe risk to life and property.
- 5) Promote the implementation of flood mitigation plans and projects in flood prone areas of the State, in accordance with the FMA program as well as the Severe Repetitive Loss (SRL) program.
- 6) Encourage the development and implementation of long-term, cost-effective and environmentally sound mitigation projects at the local level.
- 7) Promote Hazard Resistant Construction, especially in residential buildings throughout the State.

Northern and Eastern Dutchess County Communities Regional Hazard Mitigation Plan Goals

The Northern and Eastern Dutchess County Communities Regional Hazard Mitigation Plan Goals are broad, long-term statements of what the participating jurisdictions will work to achieve over time through implementation of the plan. They are based on the findings of the risk assessment, and will apply to each jurisdiction adopting this plan.

1. Promote disaster-resistant development.
2. Build and support local capacity to enable the public to prepare for, respond to, and recover from disasters.
3. Reduce the possibility of damage and losses due to drought.
4. Reduce the possibility of damage and losses due to flooding caused by floods, hurricanes and nor'easters.
5. Reduce the possibility of damage and losses due to earthquakes.
6. Reduce the possibility of damage and losses due to lightning strikes.
7. Reduce the possibility of damage and losses due to ice jams.



8. Reduce the possibility of damage and losses due to dam failure.
9. Reduce the possibility of damage and losses due to wildfires.
10. Reduce the possibility of damage and losses due to winter storms.
11. Reduce the possibility of damage and losses due to extreme temperatures.
12. Reduce the possibility of damage and losses due to tornadoes and high winds caused by windstorms, hurricanes and nor'easters.
13. Reduce the possibility of damages to emergency and critical facilities from damage due to flooding, wildfires, and extreme winds.



SECTION 6 - RANGE OF ALTERNATIVE MITIGATION ACTIONS CONSIDERED

The following table represents a range of types of mitigation actions to address each of the hazards identified in this plan. This table is intended to be used as a launching point for the discussion and development of specific mitigation actions for each municipality, in conjunction with a mitigation action items “Tip Sheet”, which was also distributed to members of the Core Planning Group. In addition to listing examples of mitigation actions, the Tip Sheet also provided background information regarding the selection of mitigation actions and information regarding the eligibility of mitigation actions under the various FEMA grant programs.

At working sessions of the Core Planning Group on April 16, 2009 and January 29, 2010, participating jurisdictions considered this range of actions and identified a mitigation strategy for their jurisdiction. Mitigation actions have been identified and analyzed by all participating jurisdictions for a comprehensive range of mitigation actions and projects for each hazard, and address reducing the effects of hazards on both new and existing buildings and infrastructure.

Note to FEMA reviewer: The next section of this plan, entitled, “Action Item Evaluation and Prioritization” will explain the criteria used by Planning Group members to evaluate and prioritize this range of actions.

**Table 6-1
Types of Actions Considered to Achieve Mitigation Goals**

Goals		Actions	
Goal Number	Description	Action Number	Description
1	Promote disaster-resistant development.	1.A	Join the National Flood Insurance Program (for non-participating or suspended communities).
		1.B	Ensure that local comprehensive plans incorporate natural disaster mitigation techniques by requiring a courtesy- review of draft plans by the County Emergency Management Agency.
		1.C	Explore the need for hazard zoning, high-risk hazard land use ordinances, subdivision regulations, and development density controls.
		1.D	Organize an annual event / fair for homeowners, builders and county and local jurisdictions that includes sale of NOAA weather radios, dissemination of information brochures about disasters and building retrofits, demonstration of “defensible-space” concept and fire resistant construction materials (for roofs/exterior finishes and inflammable coverings for openings like chimneys and attics) etc.
		1.E	Develop a stormwater management plan that includes subdivision regulations to control run-off; both for flood reduction and to minimize saturated soils on steep slopes that can cause landslides.



**Table 6-1
Types of Actions Considered to Achieve Mitigation Goals**

Goals		Actions	
Goal Number	Description	Action Number	Description
2	Build and support local capacity to enable the public to prepare for, respond to, and recover from disasters.	2.A	Expand and disseminate GIS and other hazard information on the internet.
		2.B	Develop a plan and seek funding for backup electric and telecommunications systems in local government-owned critical facilities.
		2.C	Support and fund Community Emergency Response Team (CERT) programs that also include a mitigation component.
		2.D	Create a Hazard Information Center – a virtual and physical library that contains all technical studies, particularly natural resources.
		2.E	Implement public awareness, education, and outreach programs for all or targeted hazards.
		2.F	Expand GIS to collect and develop more sophisticated hazard mapping. Use information to update plan. Ensure information will be available to the public and to relevant communities and agencies.
		2.G	Provide training for inspection and enforcement of adopted codes and ordinances.
3	Reduce the possibility of damage and losses due to drought.	3.A	Encourage citizens to implement water conservation measures by distributing water saving kits which include replacement shower heads, flow restrictors, and educational pamphlets which describe water saving techniques. Also encourage conservation by offering rebates for ultra-low-flow toilets.
		3.B	Modify rate structure to influence consumer water use including: increasing rates during summer months and imposing excess use charges during times of water shortage.
		3.C	Reduce water use for landscaping by imposing mandatory water-use restrictions during times of water shortage. Also, develop a demonstration garden to exhibit water conservation techniques.
		3.D	Publish and distribute pamphlets on water conservation techniques and drought management strategies.
		3.E	Develop and adopt an emergency water allocation strategy to be implemented during severe drought.
		3.F	Implement water metering and leak detection programs followed by water main repair/replacement to reduce losses.
		3.G	Encourage beneficial re-use of treated wastewater effluent through cooperative projects with dischargers, agriculture and other major water users to distribute or provide this alternative source of water.
4	Reduce the possibility of damage and losses due to flooding caused by floods, hurricanes,	4.A	Join the National Flood Insurance Program (NFIP). As a participant, floodplains within the participating community will be identified and mapped. In return, the participating community will become eligible for flood insurance as long as the local governing body adopts and enforces a floodplain ordinance.
		4.B	Join the NFIP Community Rating System (CRS), under which communities implementing actions that go beyond the specified NFIP minimum are eligible for discounted flood insurance premiums.



**Table 6-1
Types of Actions Considered to Achieve Mitigation Goals**

Goals		Actions	
Goal Number	Description	Action Number	Description
	and nor'easters.	4.C	Obtain specialist training and certification (e.g. Certified Floodplain Manager) for local staff tasked with enforcement of relevant codes and flood-related ordinances.
		4.D	Limit uses in floodways to those tolerant of occasional flooding, including but not limited to agriculture, outdoor recreation, and natural resource areas.
		4.E	Develop a Countywide gauging and warning system for flash and riverine flooding.
		4.F	Continue to implement best management practices for floodplain areas.
		4.G	Identify and document repetitively flooded properties. Explore mitigation opportunities for repetitively flooded properties, and if necessary, carry out acquisition, relocation, elevation, and flood-proofing measures to protect these properties.
		4.H	Identify locations/structures suitable for construction of floodwalls and other barriers such as raised roads.
		4.I	Conduct a routine stream maintenance program (for currently non-participating communities) and seek financial assistance to clean out stream segments with heavy sediment deposits.
		4.J	Develop specific mitigation solutions for flood-prone roadways and intersections. This can include, but is not limited to, actions such as culvert upgrades, drainage improvements, road raisings, etc.) Develop a work plan for when sites will be surveyed and what role can the local government play in selection and implementation of mitigation activities (e.g. any monetary or contextual support through the local capital improvement plan).
		4.K	Implement wetlands development regulations and restoration programs.
		4.L	Implement identified stormwater recharge, rate or volume projects identified in Regional Stormwater Management Plans to decrease "flash" in streams during/after storm events.
		4.M	Implement and enforce open space preservation programs.
		4.N	Implement specific actions to enhance/improve participation in/compliance with National Flood Insurance Program (NFIP).
5	Reduce the possibility of damage and losses due to earthquakes.	5.A	Retrofit/Reconstruct old critical facilities.
		5.B	Acquire dilapidated vulnerable structures.
		5.C	Public awareness through video/brochures about simple steps homeowners can take to mitigate damage.
		5.D	Examine provisions for earthquake resistant retrofits for existing structures and infrastructure, paying particular attention to unreinforced masonry structures built prior to the adoption of building codes requiring earthquake resistant design for new construction.
		5.E	Implement hillside and steep slope development regulations.
6	Reduce the possibility of	6.A	Carry out inventory of compliance with existing local codes/standards, especially for critical facilities.



**Table 6-1
Types of Actions Considered to Achieve Mitigation Goals**

Goals		Actions	
Goal Number	Description	Action Number	Description
	damage due to lightning strikes	6.B	Adopt building safety codes such as National Fire Protection Association (NFPA) -780 Standard for the Installation of Lightning Protection Systems (1997).
		6.C	Public awareness/outreach regarding use of ground outlets and surge protectors in homes and businesses.
7	Reduce the possibility of damage and losses due to ice jams	7.A	Implement monitoring and early warning measures at key locations
		7.B	Investment in ice-clearing/breaking equipment and appropriate training for county personnel.
		7.C	Construction of ice control structures such as booms, tension weirs and sloped-block barriers.
8	Reduce the possibility of damage and losses due to dam failures.	8.A	Enforce participation in/compliance with National and NYSDEC / NYSEMO Dam Safety Programs.
		8.B	Investigate sources of funding to assist private dam owners to complete required repairs/maintenance. Investigate low interest loans to owners and/or jurisdiction acting as guarantor of private owners' loans.
		8.C	Notify owners of property in dam break inundation areas of risks, implement restrictions for new development in these areas.
9	Reduce the possibility of damage and losses due to wildfires	9.A	In consultation with NYSDEC Forest Protection & Fire Management and local forest rangers, develop detailed mapping of wildland/urban interface areas.
		9.B	Develop inventory of addresses for route alerting during wildfire emergencies that require public warning and information.
		9.C	In consultation with NYSDEC Forest Protection & Fire Management and local forest rangers, review local EOPs for possible wildfire components regarding Fire-Rescue, Alert Warning Communications, and Evacuation.
		9.D	Implement and enforce open space preservation programs.
		9.E	Prescribed burning for hazard reduction.
		9.F	Initiate a public outreach program for homeowners.
		9.G	Retrofit buildings with fire resistant materials, especially roofing.
		9.H	Relocate structures (in particular critical facilities) out of hazard areas.
		9.I	Community brush and debris removal and hazard fuels reduction.
		9.J	Firewise landscaping in higher risk areas.
		9.K	Mitigation for streets, highways, and roads that provide key fire access and fuelbreaks.
9.L	Implement hillside and steep slope development regulations.		
10	Reduce the possibility of damage and losses due to winter storms.	10.A	Promote (or purchase, for critical facilities) NOAA weather radios.
		10.B	Educate residents about driving in winter storms and handling winter-related health effects
		10.C	Planting ice and windstorm-resistant trees and implementing landscaping practices to reduce tree-related hazards, public education to encourage these practices



**Table 6-1
Types of Actions Considered to Achieve Mitigation Goals**

Goals		Actions	
Goal Number	Description	Action Number	Description
		10.D	Bury or otherwise protect utility lines to avoid power outage due to winter storms (if risk is very high then only this action might be cost-effective)
11	Reduce the possibility of damage and losses due to extreme temperatures.	11.A	Develop and distribute outreach tools for homeowners and building permit applicants on protection of structures against cold weather damage and proper maintenance of heating/cooling systems.
		11.B	Review existing emergency response plans for enhancement opportunities: work with social support agencies, homeowners associations and general public to develop and implement monitoring and warning systems focused on vulnerable populations and provision of adequate shelter facilities.
12	Reduce the possibility of damage and losses due to tornadoes and high winds caused by windstorms, hurricanes and nor'easters.	12.A	Adopt an ordinance to require safe rooms in mobile home parks
		12.B	Provide low interest loans (or other form of financial assistance) for building safe rooms.
		12.C	Provide technical assistance for building safe rooms.
		12.D	Adopt an ordinance to require hurricane clips on new construction.
		12.E	Install hurricane clips and wind shutters on existing development-particularly emergency facilities and shelters built before existing codes were adopted to offer some degree of wind protection.
13	Reduce the possibility of damages to emergency facilities from flooding, wind damage and wildfire damage.	13.A	Conduct a study to determine the year-built and level of protection (flood, wind) for each emergency facility.
		13.B	On completion of 11.A, seek funding for mitigation projects for emergency facilities not currently designed for protection from flooding, high wind, or wildfire damage.

In addition to these general types of mitigation actions, the Core Planning Group and JATs also considered a series of more specific mitigation actions that had been identified throughout the course of the planning process as specific problems and/or problem areas were brought to light.

The following three sources of additional information on types of hazard mitigation actions were also recommended to the Planning Group as reference sources when developing jurisdiction-specific mitigation strategies:

- Mitigation Action Items Tip Sheet
- Mitigation Job Aid (from FEMA's How-To #3 Appendix D)
- Mitigation Glossary of Terms (from FEMA's How-To #3 Appendix A)

During the planning process, the question arose as to how individual municipalities were to proceed with their development of mitigation strategies and actions in situations where other agencies such as the U.S.



Army Corps of Engineers are known to be considering the implementation of (possibly large-scale) mitigation measures in the same area.

The Planning Group was advised that the full implementation of such proposed projects is not guaranteed, and that even if such projects are approved and funded, it can be many years before they are initiated. With that in mind, the communities were advised to decide whether they would be willing to risk the chance of damage over that interim period between the current planning process and the assumed completion of studies and subsequent projects that are not guaranteed to be implemented.

However, if the community decides to defer mitigation actions pending studies by other agencies, it is recommended that the study be revisited at the five year update to ensure that sufficient progress is being made towards completion of a project, or to determine if another strategy is needed. It is also recommended that each community include at least one mitigation project regardless of hazard or any other plans or proposals, in order to receive credit from FEMA for having a mitigation plan which may be used to aid applications for grants to reduce risks from hazards not affected by the proposed plans.



SECTION 7 - ACTION ITEM EVALUATION AND PRIORITIZATION

This section includes information regarding the methodology and process followed by participating jurisdictions to evaluate and prioritize unique hazard mitigation actions for their particular communities.

The action item evaluation and prioritization was undertaken during a working session of the Core Planning Group on April 16, 2009 (and again on January 29, 2010 to address FEMA's review comments), and by individual JATs. Mitigation actions have been identified and analyzed by all participating jurisdictions for a comprehensive range of mitigation actions and projects for each identified hazard, and address reducing the effects of hazards on both new and existing buildings and infrastructure. To initiate the evaluation and prioritization of potential mitigation actions, jurisdictional representatives who attended the working session were asked to complete a brief survey ranking six generic types of mitigation actions according to how they perceived each type of action would be preferred or appropriate to their community. Eight participating jurisdictions took part in the survey, scoring the measures in the order that they were considered to be most preferred by the community, with a score of "1" being most preferred, and a score of "6" being the least preferred. The overall results of this survey indicated that the most favored type of action was likely to be structural projects, while the least favored types of actions were likely to be those related to public information:

<u>Activity</u>	<u>Ranking</u>
<i>Most preferred/appropriate:</i>	
Structural Projects (e.g. Floodwalls/Levees, drainage, dams)	1
Preventive Measures (e.g. Regulations, building codes, and zoning)	2
Asset Protection (e.g. Structure retrofits for flood, wind and fireproofing)	Tied – 3,4
Emergency Services (e.g. Communication systems, response resources)	Tied – 3,4
<i>Least preferred/appropriate:</i>	
Natural Resource Protection (e.g. Open space, wetlands preservation)	5
Public Information (e.g. education and outreach)	6

The working session continued with an evaluation and prioritization of action items, and development of an implementation strategy for selected measures. After reviewing the many types of possible action items suggested in Section 6 and the "Tip Sheet" compiled specifically for this stage of the planning process, and adding any new items that might be unique for their community, each participant was asked to select a manageable number of action items which they felt their jurisdiction could reasonably commit to achieving in the next five years (the first plan maintenance cycle), and to evaluate these actions using worksheets developed specifically for this task. Ultimately, the participating jurisdictions evaluated and identified at least two action items for the first plan maintenance cycle.

In order to evaluate and prioritize the mitigation actions, participants identified the *benefits* and *costs* of each action using a planning concept called "STAPLEE". Their evaluation methodology is presented below in Table 7-1.

Now using the STAPLEE factors discussed above for each action, each jurisdiction rated the overall benefits and costs of each action they had selected, and assigned priorities. To determine overall "*benefits*" for a certain action, each jurisdiction considered qualitatively the individual social, technical,



administrative, political, legal, economic, and environmental benefits for the action and then indicated whether the net benefits, overall, could be characterized as high, medium, or low. To determine overall “costs” for a certain action, each jurisdiction considered qualitatively individual social, technical, administrative, political, legal, economic, and environmental costs for that action and then indicated whether the net costs, overall, could be characterized as high, medium, or low. These overall ‘benefits’ and ‘costs’ were noted on the worksheet, and the jurisdictions prioritized each action based on its overall benefits and costs.

Since a qualitative approach was taken for the evaluation and prioritization of mitigation actions, jurisdictions were permitted to apply their own internal weightings to the costs and benefits of actions under each category, hence on the completed worksheets the overall priority of an action may not reflect a straightforward arithmetic comparison of its total “benefits” and total “costs”.

Table 7-1
STAPLEE Criteria

S <u>S</u> ocial	Is the action unfair to one section of the community over others? If yes, it is a social cost associated with the action. If the implementation of the action helps achieve a social goal of the community, it is a social <i>benefit</i> associated with the action.
T <u>T</u> echnical	Is the action a good technical solution to the problem? If yes, it is a <i>benefit</i> associated with the action. The better the solution, the higher the <i>benefits</i> .
A <u>A</u> dmistrative	Is the action difficult to implement because of the administrative problems associated? If yes, it is an administrative <i>cost</i> .
P <u>P</u> olitical	Is the action politically favored? If yes, it is a <i>benefit</i> . If the action is likely to be politically unacceptable, it is a <i>cost</i> associated with the action.
L <u>L</u> egal	Are there perceived legal problems in implementing the action? If yes, it is a <i>cost</i> associated with the action.
E <u>E</u> conomic	Does implementing the action make economic sense? Are the <i>costs</i> too prohibitive? If yes, it is a cost associated with the action.
E <u>E</u> nvironmental	Does the action have adverse environmental effects? If yes, it is a <i>cost</i> associated with the action.

All action items not selected for prioritization by a given community after considering the STAPLEE factors received a low priority. In the future, communities may still seek to pursue other actions which they evaluated but did not select for prioritization at this time, including but not limited to those discussed in Section 6 (and associated studies, funding, etc. for these actions).

In addition to hazard mitigation projects, each jurisdiction was required to evaluate a set of actions specifically aimed at continuing participation in and compliance with FEMA’s National Flood Insurance Program (per FEMA’s new guidance released in July 2008). These actions include updating floodplain management ordinances to comply with the latest FEMA regulations and adopted flood maps, additional employment/training of staff to enforce the ordinances, and participation in FEMA’s Community Rating System (CRS).

Appendix D contains prioritization worksheets completed by each participant for their selected actions. Each participant identified at least two action items for implementation.



Appendix F contains prioritization and implementation strategy worksheets for those actions specifically related to continued and/or enhanced compliance with FEMA’s National Flood Insurance Program. For additional guidance on meeting mitigation planning NFIP participation requirements in future plan maintenance and update efforts, see FEMA Region 2’s Toolkit file, “*A Guide to NFIP Requirements*”.

All participating jurisdictions who will be adopting this plan will undertake the following high priority public outreach actions at a minimum as part of their plan maintenance obligation:

- Each participating jurisdiction will add a link on their jurisdiction’s web page to the overall mitigation planning website, if they have not already done so as part of the plan development process.
- Participating jurisdictions will conduct annual interviews and/or smaller meetings with civic groups, the public and other stakeholders. This will be accomplished through incorporating discussion of the mitigation plan into other regularly attended meetings.
- Participating jurisdictions will consider annual flyers, newsletters, newspaper advertisements, and Radio/TV announcements, and will implement some or all of the above at the discretion of the jurisdiction.

Note to the reviewer: The next section in this plan, entitled “Implementation Strategy,” will expand upon the prioritization step by identifying the hazard addressed, if the action applies to new and/or existing assets, the primary agency responsible for action item completion, any existing local planning mechanisms through which the action item will be implemented, target date for completion, estimated cost, and funding source.

SECTION 8 - IMPLEMENTATION STRATEGY

The implementation strategy developed by participants at the April 16, 2009 Working Session (and the follow-up meeting of January 29, 2010 to address FEMA's review comments) for selected and prioritized action items is community-specific for each participant. Participants were asked to develop an implementation strategy for the action items they selected and prioritized (in Section 7) for their respective communities using worksheets developed specifically for this task. Implementation strategies include actions for each identified hazard.

The implementation strategy developed by each participant was based on each participant's qualitative analysis of social, technical, administrative, political, legal, economic, and environmental benefits and costs associated with each selected action.

Each community addressed how the actions will be implemented and administered. For each selected and prioritized action item, participants identified the hazard addressed, if the action applies to new and/or existing assets, the primary agency responsible for action item completion, any existing local planning mechanisms through which the action item will be implemented, target date for completion, estimated cost, and funding source.

All action items not selected for prioritization by a given community after considering the STAPLEE factors received a low priority. In the future, communities may still seek to pursue other actions which they evaluated but did not select for prioritization at this time, including but not limited to those discussed in Section 6 (and associated studies, funding, etc. for these actions).

All participating jurisdictions who will be adopting this plan will undertake the following high priority public outreach actions at a minimum, as part of their plan maintenance obligation:

- Each participating jurisdiction will add a link on their jurisdiction's web page to the County mitigation planning website, if they have not already done so as part of the plan development process.
- Participating jurisdictions will conduct annual interviews and/or smaller meetings with civic groups, the public and other stakeholders. This will be accomplished through incorporating discussion of the mitigation plan into other regularly attended meetings.
- Participating jurisdictions will consider annual flyers, newsletters, newspaper advertisements, and Radio/TV announcements, and will implement some or all of the above at the discretion of the jurisdiction.

Appendix E contains completed worksheets for community-specific implementation strategies.

Appendix F contains prioritization and implementation strategy worksheets for those actions specifically related to continued and/or enhanced compliance with FEMA's National Flood Insurance Program.



SECTION 9 - PLAN MAINTENANCE

It is required by FEMA (as per 44 CFR Part 201.6(c)(4)(i) that, “[The plan maintenance process shall include a section describing the] method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.” A formal plan maintenance process must take place to ensure that the Hazard Mitigation Plan remains an active and pertinent document after it is ultimately approved by FEMA and formally adopted by the participating municipalities. Regularly scheduled evaluations during the five-year cycle are important to assess the effectiveness of the program and to reflect changes that may affect mitigation priorities.

URS Corporation (URS), as the consulting company, was able to provide the Core Planning Group with guidance on potential means to satisfy the requirement for plan maintenance procedures. However, it was the members of the Core Planning Group who were in the best position to define the process. URS submitted a Guidance Memorandum (Guidance Memorandum #2 – Plan Maintenance Procedures) to Local Liaison Kathryn Palmer-House on February 9, 2009, to summarize FEMA requirements for plan monitoring, evaluation, and updates. It was also posted to the Northern and Eastern Dutchess County Communities (NEDCC) mitigation planning web site soon after for review by Core Planning Group members, the public, and other stakeholders.

Team members were asked to provide feedback regarding their desires for plan maintenance to their Local Liaison, Dr. Kathryn Palmer-House of the Town of Dover. She, in turn, worked with the Consultant to develop this strategy to best reflect expressed preferences. The information presented below represents these decisions, as provided to URS, in addition to conclusions reached by the Core Planning Group when they convened on January 29, 2010 to address FEMA’s review comments on an earlier draft of this document. The approach identified in this plan section will ensure that regular review and updating of the Hazard Mitigation Plan will occur in accordance with the requirements of the Disaster Mitigation Act of 2000, and that it will be a responsibility acknowledged and shared by all partnering municipalities.

Core Planning Group Members. The *plan development* process was undertaken by a Core Planning Group consisting of one designated representative from each of the nine participating jurisdictions. FEMA requires each jurisdiction’s continued participation hereafter in the *plan maintenance* phase in order to continue to remain in good standing with FEMA as part of this multi-jurisdictional endeavor. As evidenced by their adoption resolutions, each Participating Jurisdiction has acknowledged their continued responsibility to maintain a designated representative to serve on the Core Planning Group hereafter. Designated Core Planning Group Members shall be required to contribute to annual Plan Maintenance and Update activities as described in the remainder of this section. In addition to membership from the nine partnering communities, the CPG will contain a tenth member: Mr. Ed Hoxsie from the Dutchess County Soil and Water Conservation District (DCSWCD). Authorized by State Statute, the District is an organization set up to coordinate State and Federal conservation programs at the local level. Mr. Hoxsie is the Executive Director of the organization and through the years, he has provided technical assistance throughout Dutchess County regarding issues including floodplain, stormwater and watershed management. The CPG will utilize the expertise and technical support of the DCSWCD during the plan maintenance phase as county-based resources for local plan implementation.

Core Planning Group Chairperson. CPG member Palmer-House of the Town of Dover has headed-up the activities of the Core Planning Group during the *plan development* phase. This lead role will need to be filled during the *plan maintenance* phase, as well. CPG members have opted to use the term “Core Planning Group Chairperson” to refer to this position. The CPG Chairperson will be designated by the CPG once per year, beginning one month from FEMA’s approval of the plan. This designation will be



based on a group discussion of interest and availability to fill the position, and thereafter determined based on a majority vote of the CPG members.

Monitoring the Plan

An important step in any mitigation planning process is to document the method by which the Core Planning Group will monitor the Hazard Mitigation Plan throughout the five-year period of record.

First, to accomplish this objective, the Core Planning Group has elected to prepare Annual Work Progress Monitoring Reports, prepared by entities responsible for implementing mitigation actions (as identified in the Mitigation Strategy). Progress Monitoring Reports shall be submitted by Core Planning Group members on an annual basis to the CPG Chairperson, beginning one year from the date of FEMA's approval of the Final plan. Work progress reports shall be the FEMA How-To #4 (FEMA 386-4), Worksheet #1, Progress Report and will contain the key performance indicators identified in that document. Using the FEMA Progress Reports will answer the following questions:

- o the hazard mitigation action(s) that the agency is responsible for
- o the supporting agencies/entities responsible for implementation;
- o a delineation of the various stages of work along with timelines (milestones should be included);
- o whether the resources needed for implementation, funding, staff time and technical assistance are available, or if other arrangements must be made to obtain them;
- o the types of permits or approvals necessary to implement the action;
- o details on the ways the actions will be accomplished within the organization;
- o whether the duties will be assigned to agency staff or contracted out;
- o the current status of the project; and
- o identifying any issues that may hinder implementation.

On a case-by-case basis, the CPG Chairperson will determine if site visits, phone calls, and/or meetings would be beneficial to supplement Annual Work Progress Monitoring Reports. If so, the CPG Chairperson will initiate the site visits/calls/meetings as applicable.

Evaluating the Plan

Post adoption, a mitigation plan should be evaluated on a regular basis in order to assess the effectiveness of the plan's implementation and to reflect changes that may affect the mitigation priorities.

To accomplish this objective, the Core Planning Group will convene twice each year: 1) an annual Plan Evaluation Meeting to discuss progress on mitigation actions implemented over the past year, lessons learned, and anticipated actions for the coming year, and 2) a follow-up meeting (within the next quarter) to review and approve Plan Evaluation Meeting minutes and report-related documentation for submission to FEMA and NYSEMO and for distribution to the public.

At each Plan Evaluation Meeting, the Core Planning Group will review Progress Reports, and use the following criteria to evaluate the plan:

- o do the goals and objectives address current and expected conditions?
- o has the nature and magnitude of risks changed?
- o are the current resources appropriate for implementing the plan?



- o are there any implementation problems (such as technical, political and/or legal), or coordination issues with the other agencies and/or Committee members?
- o have the outcomes occurred as expected?
- o have the agencies and other Committee partners participated as proposed?; and
- o where shortcomings are identified, what can be done to bring things back on track?

Following the annual Plan Evaluation Meeting, the CPG Chairperson will prepare meeting minutes summarizing the outcome of the evaluation meeting. The CPG Chairperson will distribute meeting minutes to Core Planning Group members via email and once approved at the follow-up meeting, will post meeting minutes and other documentation on the NEDCC web site. Plan Evaluation Meetings will be conducted within three months after each annual batch of Progress Reports are due (see “Monitoring”, above).

Updating the Plan

As part of the process to maintain FEMA mitigation funding eligibility, a plan update must always be submitted to NYSEMO/FEMA for their review. This must occur within five years of the plan’s approval by FEMA (and during subsequent five-year cycles thereafter).

To accomplish this objective, the participating communities will designate a Regional Liaison (one of the CPG members) to help coordinate the dissemination and collection of follow-up data required for Plan updates with support from the Core Planning Group members. The position of Regional Liaison will be instituted at the third annual Plan Evaluation Meeting (in each five-year cycle) based on a majority vote of the CPG members. The role of the Regional Liaison will be to assist the CPG and partnering communities with coordinating tasks required in the plan update process such as collecting information regarding changes in hazard identification, profiling and land use trends along with progress reports on mitigation strategies and implementation schedules. The Regional Liaison will communicate with FEMA and NYSEMO on the behalf of the partnering communities, conduct Update Appraisals, and will facilitate additional meetings with CPG members as needed to discuss and review documents related to the completion of plan updates.

During the Update Appraisal, the Regional Liaison will evaluate the current Plan, Annual Progress Reports, and Annual Plan Evaluation Meeting Minutes. The Regional Liaison will conduct the Update Appraisals at 3 years from the date of FEMA’s approval of the Final plan, and at the same point in time during subsequent five-year windows (i.e., from the date of FEMA’s approval of the final plan, Update Appraisals will occur at Year 3, Year 8, Year 13, etc.). The Core Planning Group has selected Year 3 as the point for the Update Appraisals to ensure that sufficient time (24 months) will be available to update the document within each five year cycle, receive FEMA’s re-approval, and for local jurisdictions to formally adopt the updated plan.

The plan update will not only involve a comprehensive review and evaluation of each section of the plan, but also a discussion of the results of evaluation and monitoring activities detailed in the Plan Maintenance section of the previously approved plan. Plan updates may validate the information in the previously approved plan, or may involve a major plan rewrite. A plan update cannot be an annex referring to the previously approved plan; it must stand on its own as a complete and current plan.

Other criteria that will be considered during the update include:

- o if changing situations have modified goals/objectives/actions and/or hazards;
- o if additional information is available to perform more accurate vulnerability assessments;
- o if it is determined that participating jurisdictions wish to be added to and/or removed from the Plan; or
- o if it is determined that the Plan no longer addresses current and expected future conditions.



At the time of the update, the Regional Liaison shall consult with FEMA for the latest Guidance in place regarding plan updates to ensure that the latest criteria are addressed in the update process.

At its option, the CPG may choose to retain the services of an outside entity (i.e., consultant or non-profit agency) to undertake future updates of this plan on its behalf, under the direction of the Regional Liaison and the CPG members. The Regional Liaison (or designated entity) will prepare an updated plan, and circulate it to Core Planning Group members via email for their review and comment. Comments will be due back to the Regional Liaison within 14 days; lack of response will be assumed to indicate concurrence with the Regional Liaison appraisal. Comments received which cannot be resolved remotely will trigger an Update Resolution Meeting of the Core Planning Group to resolve differences and develop a joint determination on how to modify the document.

Any plan updates will be released for public review and comment. The updated plan will be posted on the NEDCC web site, and made available in hard copy at the offices of each participating jurisdiction. Notification to the public will also be issued to this same effect, and interested parties will be given 30 days to provide comments to the Regional Liaison.


Monitoring, Evaluating and Updating Timeline

	Months from FEMA approval	Sample Dates Assuming a May 2010 FEMA Approval
Year 1 Activities		
FEMA approval of the plan	<i>to be determined</i>	<i>June-2010</i>
Municipal plan adoptions	<i>as soon as possible after FEMA's approval</i>	<i>as soon as possible after FEMA's approval</i>
Meet to Designate a CPG Chairperson for Year 1	1	July-2010
Annual Work Progress Monitoring Reports for Year 1	12	June-2011
Year 2 Activities		
Annual Plan Evaluation Meeting (discuss Year 1)	15	September-2011
Designate a CPG Chairperson for Year 2	15	September-2011
Annual Work Progress Monitoring Reports for Year 2	24	June-2012
Year 3 Activities		
Annual Plan Evaluation Meeting (discuss Year 2)	27	September-2012
Designate a CPG Chairperson for Year 3	27	September-2012
Annual Work Progress Monitoring Reports for Year 3	36	June-2013
Year 4 Activities		
Annual Plan Evaluation Meeting (discuss Year 3)	37	July-2013
Designate a CPG Chairperson for Year 4	37	July-2013
Designate a Regional Liaison for the Update	37	July-2013
Update Appraisal	38	August-2013
Initiate Plan Updates	39	September-2013
Annual Work Progress Monitoring Reports for Year 4	48	June-2014
Year 5 Activities		
Ongoing Plan Updates	ongoing	ongoing
Annual Plan Evaluation Meeting (discuss Year 4)	51	September-2014
Designate a CPG Chairperson for Year 5	51	September-2014
Submit Updated Plan to FEMA	56	February-2015
Annual Work Progress Monitoring Reports for Year 5	60	June-2015



Public Participation in Plan Maintenance

As per 44 CFR Part 201.6 (c)(4)(iii) states, “[The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.” To meet this requirement, the new Hazard Mitigation Plan should describe what opportunities the public will have during the plan’s periodic review to comment on the progress made to date and on any proposed plan revisions.

The following array of activities was selected by the current CPG Chairperson based on feedback received from all Core Planning Group members.

- The CPG Chairperson will provide information and updates for the NEDCC mitigation planning web site and document repositories. The Town of Dover will continue to be responsible for the actual maintenance of the web site.
- Each participating jurisdiction will add a link on their jurisdiction’s web page to the overall mitigation planning website, if they have not already done so as part of the plan development process.
- The CPG Chairperson will lead efforts to prepare an annual fact sheet on the plan. This fact sheet will be submitted via email to Core Planning Group members for posting on community notice boards, at a minimum, and preferable supplemented with distribution at meetings as applicable. The CPG Chairperson will post the fact sheet on the overall mitigation plan web site.
- The CPG Chairperson will lead efforts to prepare a survey for the public and other stake holders which will be posted on the overall mitigation planning web site and in document repositories. Survey forms will be shared with participating jurisdictions for their use, as well. All feedback will be directed to the CPG Chairperson as a central location. Survey feedback will be a topic of discussion at Annual Plan Evaluation Meetings.
- Participating jurisdictions will conduct annual interviews and/or smaller meetings with civic groups, the public and other stakeholders. This will be accomplished through incorporating discussion of the mitigation plan into other regularly attended meetings.
- Participating jurisdictions will consider annual flyers, newsletters, newspaper advertisements, and Radio/TV announcements, and will implement some or all of the above at the discretion of the jurisdiction.
- Public involvement will also be invited and encouraged via the NEDCC web site.
- Participating jurisdictions will consider offering working groups by topic area (such as land use, hazard, mitigation action, etc.) if deemed necessary based upon feedback obtained during the plan maintenance cycles.
- Participating jurisdictions will each conduct an annual town hall meeting on the progress of the mitigation plan.

Plan Integration

As per 44 CFR Part 201.6(c)(4)(ii), “[The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.”

URS Corporation (URS), as the consulting company, was able to provide the Planning Group with guidance on potential means to satisfy the requirement for plan integration procedures. However, it was the members of the Core Planning Group who were in the best position to define the process. URS



submitted a Guidance Memorandum (Guidance Memorandum #3 – Plan Integration) to participating jurisdictions via the CPG Chairperson on February 9, 2009, to summarize FEMA requirements for integrating the plan into other local planning mechanisms. It was also posted to the NEDCC mitigation planning web site soon after for review by Core Planning Group members, the public, and other stakeholders.

Team members were asked to provide feedback regarding their desires for plan integration to the CPG Chairperson who, in turn, worked with the Consultant to develop this mitigation strategy to best reflect expressed preferences. The information presented below represents these decisions, as provided to URS. These methods will ensure that regular integration of the Hazard Mitigation Plan will occur.

The CPG Chairperson, with input from URS and the Core Planning Group member feedback, noted the following capabilities in relation to mitigation planning and opportunities to integrate the mitigation plan into daily activities. Progress with regard to Plan Integration will be on the agenda for each Annual Plan Evaluation Meetings.

Participating jurisdictions currently use comprehensive land use planning, capital improvements planning and building codes to guide and control development. After the Hazard Mitigation Plan is formally adopted, these existing mechanisms will have hazard mitigation strategies integrated into them, as follows:

- Within six months after adoption of the Hazard Mitigation Plan, Core Planning Group members for each participating jurisdiction will issue a letter to each of its community's department heads to solicit their support and explore opportunities for integrating hazard mitigation planning objectives into their daily activities. Specifically, letters can include:
 - Many participating jurisdictions have Master Plans, General or Comprehensive Plans. In participating jurisdictions where Master Plans, General or Comprehensive Plans exist, Core Planning Group members will work with their respective planning departments to educate them on the Hazard Mitigation Plan and encourage that on the next updates of such plans, hazard mitigation for natural hazards is addressed.
 - Many participating jurisdictions have local building departments responsible for building code enforcement and review of site plans. Local jurisdictions enforce the state-adopted IBC. In these communities, Core Planning Group Members can coordinate with their respective building departments to ensure that they have adopted and are enforcing the minimum standards established in the State-adopted IBC.
 - Many participating jurisdictions participate in FEMA's National Flood Insurance Program and as such have local floodplain management ordinances. In these communities, Core Planning Group Members can coordinate with their respective Floodplain Administrator to determine if enforcement beyond FEMA minimum requirements would be prudent for the community.
 - In participating jurisdictions with local zoning ordinances, Core Planning Group members can work with their zoning boards to educate them on the Hazard Mitigation Plan and encourage consideration of low occupancy, low-density zoning in hazard areas, when practicable.
- Participating jurisdictions will consider working with their department or agency heads to revise job descriptions of government staff to include mitigation-related duties could further institutionalize hazard mitigation. This change would not necessarily result in great financial expenditures or programmatic changes. For example, the How-To presents the following language which could be considered for adding into job descriptions for a



community planner, floodplain manager, emergency manager, building code official, or water resources engineer in the Public Works Department:

Knowledge, Skills and Abilities

- Knowledge.*** *Knowledge of the principles of emergency management, specifically hazard mitigation. Knowledge of the principles and practices of sustainable development and how it is incorporated into hazard mitigation planning. Knowledge of FEMA's pre- and post-disaster mitigation programs, as well as other federal agency programs (HUD, EPA, SBA) that provide technical and/or financial assistance for implementing pre- or post-disaster mitigation planning. Knowledge of private/non-governmental programs that can support reconstruction and mitigation strategies.*
- Skills.*** *Consensus building and team building, communication (verbal and written), and interpersonal skills.*
- Abilities.*** *Ability to apply planning principles and tools to the goals of hazard loss reduction.*

- Instead of solely relying on funding from hazard mitigation programs or other external sources of grant monies, participating jurisdictions will consider a line item for mitigation project funding in their capital or operational budgets. Having a line item in these budgets may not guarantee funding every year, but it is certainly easier to get the money allocated if it is already there. Examples include:
 - A revolving fund to finance a buyout program.
 - A low-interest loan program to fund retrofits.
- Participating jurisdictions with comprehensive plans will add a hazard element to the comprehensive plan as one of the most effective mechanisms to institutionalize hazard mitigation for new construction. A primary benefit of combining these processes is that they both influence the location, type, and characteristics of physical growth, specifically buildings and infrastructure. While planning in and of itself may not be regulatory, it uses regulatory mechanisms (zoning, development ordinances, etc.) for implementing goals and objectives. Additionally, in many parts of the country, the comprehensive planning process is an established activity that is already familiar to the public, and it usually generates a great deal of interest and public participation.

Examples of using existing resources to accomplish mitigation, as excerpted from FEMA's How-To #4, include:

- Core Planning Group members will work with their local Department of Public Works to adopt more rigorous procedures for inspecting and cleaning debris from streams, ditches, and storm drain systems. For example, instead of cleaning only after storms or complaints from citizens, or on an annual basis, the Department could require inspections of streams and ditches at least twice per year and after a significant rain event.
- Participating jurisdictions will seek to add hazard vulnerability to subdivision and site plan review criteria and incorporate any necessary actions at the planning stage.
- The Core Planning Group will seek to identify a community conservation society or other interested voluntary organization could perform inventories of historic sites in hazard areas that might require special treatment to protect them from specific hazards.
- Partners and nonprofit organizations and businesses can assist the planning team in a number of ways, by including lending expertise, discounted materials, staff or volunteer time, or meeting space. The planning team can in response offer these entities opportunities for greater public exposure and thus, greater recognition. The planning team can inform partners about the hazards they potentially face the ways they can mitigate these



hazards and how their staff can mitigate hazards at home. Participating jurisdictions will reach out to partner groups in their communities to identify those who may be willing to donate goods or services and create a database of contact information and indicated goods/services.

- Citizens have an ongoing role to play in project implementation. The planning team should actively seek volunteers to help implement programs and activities. Knowledgeable citizens can also be recruited to provide expertise in specific subject areas. The more the team involves people in implementing the plan, the greater the support it will receive.
- State agencies can lend their time, expertise and funds to the implementation of hazard mitigation projects. The Core Planning Group will make sure the planning team's list of state contacts is very broad, as the resources of one state agency may be unknown to another. The Core Planning Group will assist participating jurisdictions in reaching out to state agencies for support.
- Colleges and universities can provide technical expertise to projects that may require Geographic Information System (GIS), engineering, planning or other technical assistance. They can also provide meeting space, laboratories and other logistical support. The Core Planning Group will assist participating jurisdictions in reaching out to educational institutions for support.
- Community libraries are an excellent source of information and services, including volunteers. Participating jurisdictions will meet once each five years with their local library staff members to discuss the mitigation plan so they are well-versed in its purpose and understand where to direct interested parties for more information, to provide feedback, or to become involved.



SECTION 10 - FOR MORE INFORMATION

If you have any questions or comments on the Northern and Eastern Dutchess County Communities Regional Hazard Mitigation Plan, additional information can be obtained by contacting your Town Supervisor or Village Mayor or:

Dr. Katie Palmer-House, Local Liaison
126 East Duncan Hill Rd., Dover Plains, NY 12522
Phone: (845)877-3410 or (845)877-3335
Fax: (845)877-3335
E-Mail: Hufcut@aol.com