



Columbia County Multi-Jurisdictional

Hazard Mitigation Plan

May 2008



ecology and environment, inc.
International Specialists in the Environment

**Columbia County
Multi-Jurisdictional
Hazard Mitigation Plan**

May 2008

Prepared for:

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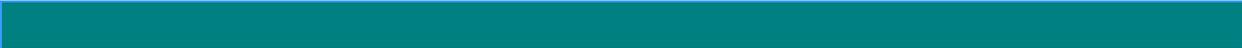
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List of Abbreviations and Acronyms

ASAP	as soon as possible
CCEMO	Columbia County Emergency Management Office
CFR	Code of Federal Regulations
DMA	Disaster Mitigation Act
E & E	Ecology and Environment, Inc.
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
GIS	Geographical Information System
HMP	Hazard Mitigation Plan
HMGP	Hazard Mitigation Grant Program
HIRA-NY	Hazard Identification and Risk Analysis – New York
n/a	not applicable
NOAA	National Oceanic and Atmospheric Administration
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSEMO, SEMO	New York State Emergency Management Office
PGA	Peak Ground Acceleration
Q3	Electronic Flood Zone Data
STAPLEE	Social, Technical, Administrative, Political, Legal, Economic, Environmental

List of Abbreviations and Acronyms (cont.)

TBD	to be determined
US	United States
USACE	US Army Corps of Engineers
USGS	United States Geological Survey
USDA	United States Department of Agriculture

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Introduction

1.1 Purpose, Goal, and Objectives

“Mitigation is any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event. This process has four steps:

- organizing resources
- assessing risks
- developing a mitigation plan
- implementing the plan and monitoring progress”¹

Mitigation allows governments, businesses, and individuals to diminish the amount of damage a hazard can inflict on its population, property, and resources. The purpose of this Multi-Jurisdictional Hazard Mitigation Plan (HMP) is to document the hazard mitigation process undertaken in Columbia County, New York and all participating jurisdictions therein. The policies and mitigation measures designated by this plan are intended to cost effectively reduce the impacts from hazards identified as the most prevalent within Columbia County. By implementing this plan, Columbia County and participating jurisdictions seek to reduce the loss of life, injury, property damage, economic impact, direct cost and community impact resulting from disaster.

1.2 Scope

Columbia County undertook a Hazard Mitigation Planning process to develop this multi-jurisdictional HMP. The scope of the project was to conduct a planning process that involved the County and all participating jurisdictions within it. This multi-jurisdictional plan is applicable to participating municipalities (Table 1-1), as well as to the unincorporated areas of Columbia County, and satisfies the requirements of Title 44 Code of Federal Regulations, Section 201.6.

¹ <http://www.fema.gov/plan/mitplanning/index.shtm>

The Plan describes the process and outcomes of the County’s HMP development initiative and documents the formation and activities of a County mitigation planning team and the means by which the community was involved in the planning process; explains the methodology and results of the team’s comprehensive assessment of natural hazard risks; and establishes a program of mitigation goals and objectives to be fulfilled through the implementation of prioritized, demonstrably cost-effective mitigation actions over the coming years.

1.3 Project Participants

The Columbia County Emergency Management Office (CCEMO), as well as the cities, towns, and villages identified in Table 1-1 below were active participants in the hazard mitigation planning process. All jurisdictions within Columbia County participated in the plan.

Table 1-1 Participating Jurisdictions

Participating Jurisdictions	
Town of Ancram	Town of Austerlitz
Town of Canaan	Town of Claverack
Town of Clermont	Town of Chatham
Village of Chatham	Town of Copake
Town of Gallatin	Town of Germantown
Town of Ghent	Town of Greenport
Town of Hillsdale	City of Hudson
Town of Kinderhook	Village of Kinderhook
Town of Livingston	Town of New Lebanon
Village of Philmont	Town of Taghkanic
Town of Stockport	Town of Stuyvesant
Village of Valatie	

CCEMO engaged the services of an Emergency Planning and Management Consultant, Ecology & Environment, Inc. (E & E), to participate in advisory committee and planning team meetings as a facilitator and to provide technical assistance in the hazard mitigation planning process as well as to draft the actual plan. Also participating as members of the advisory committee were staff of the New York State Emergency Management Office (NYSEMO), Region II to provide plan review and approval. The members of the advisory committee are listed below in Table 1-2. Planning team members, providing representation to the plan development process for participating jurisdictions, are listed below in Table 1-3. All participating jurisdictions were represented on the planning team by at least one municipal official and actively took part in the plan development process.

Participating jurisdictions provided information on hazards and impacts, properties at risk, critical infrastructure identification, and proposed mitigation goals, objectives, and measures. In order to finalize the draft plan, E & E visited Colum-

bia County in October 2007 and met with all jurisdictions to review the plan and ensure the validity of all information contained therein. E & E also met with CCEMO to validate plan assumptions, the proposed implementation strategy and update and maintenance process.

Table 1-2 Advisory Committee Members

Planning Team Members		
Bill Black	Director of Emergency Management	CCEMO
Gary Tuthill	Deputy Director of Emergency Management	CCEMO
Paul D’Onofrio	Deputy Director of Emergency Management	CCEMO
Bill Stelling	Deputy Director of Emergency Management	CCEMO
George Sharpe	Director of Homeland Security	CCEMO
Nadine Macura	Regional Planner	NYSEMO
Edward Lips	Mitigation Planner	NYSEMO
Bernie Kelleher	Director of Highways	Columbia County
Adam Shatzkamer	Emergency Management Planner	E & E
Julie Chang	Economist	E & E
Shawn Fenn	Emergency Management Planner	E & E
Nermin Ahmad	Policy Planner	E & E
Mark Fountain	Emergency Management Planner	E & E
Daniel Husserl	Environmental Planner	E & E

Table 1-3 Planning Team Members

Planning Team Members		
Charles Weed	Department of Public Works	City of Hudson
Melissa Finn	Senior Account Clerk	City of Hudson
James Van Deusen	Fire Coordinator	Columbia County
James MacArthur	Highway Superintendent	Town of Ancram
George Jahn	Town Supervisor	Town of Austerlitz
Robert Meehan	Highway Superintendent	Town of Austerlitz
Gary Flaherty	Town Supervisor	Town of Canaan
Jesse DeGroot	Town Supervisor	Town of Chatham
Tammy Shaw	Confidential Secretary, Highway Department	Town of Chatham
James Keegan	Town Supervisor	Town of Claverack
Harry Harned	Acting Town Supervisor	Town of Clermont
Angelo Valentino	Town Supervisor	Town of Copake
Lawrence Proper	Highway Superintendent	Town of Copake
Earl Coons	Highway Superintendent	Town of Gallatin
Lynda Scheer	Town Supervisor	Town of Gallatin
Richard Jennings	Highway Superintendent	Town of Germantown
Roy Brown	Town Supervisor	Town of Germantown
Larry Andrews	Town Supervisor	Town of Ghent
Mike Losa	Highway Superintendent	Town of Ghent
John M. Rutkey	Town Supervisor	Town of Greenport
John Mongsyski	Water and Sewer Superintendent	Town of Greenport

Table 1-3 Planning Team Members

Planning Team Members		
Mark Gaylord	Highway Superintendent	Town of Greenport
Ann Baldwin	Highway Commissioner	Town of Hillsdale
Art Baer	Town Supervisor	Town of Hillsdale
George Atwood	Highway Commissioner	Town of Hillsdale
Richard Briggs	Highway Superintendent	Town of Hillsdale
John Ruchel	Highway Superintendent	Town of Kinderhook
Peggy Moore	Bookkeeper	Town of Kinderhook
Phillip Williams	Town Supervisor	Town of Livingston
Colleen Teal	Town Clerk	Town of New Lebanon
David Katzenstein	Town Supervisor	Town of New Lebanon
John Leach, Jr.	Highway Superintendent	Town of Stockport
Leo Pulcher	Town Supervisor	Town of Stockport
Bernard Kowalski	Highway Superintendent	Town of Stuyvesant
Valerie Bertram	Town Supervisor	Town of Stuyvesant
Ed Waldron	Highway Superintendent	Town of Taghkanic
Elizabeth Young	Town Supervisor	Town of Taghkanic
Carol Simmons	Clerk/Treasurer	Village of Chatham
David Chapman	Village Trustee	Village of Chatham
Kevin Boehme	Chief of Police	Village of Chatham
Paul Boehme	Mayor	Village of Chatham
John Taylor	Water and Sewer Superintendent	Village of Kinderhook
Nicole Heeder	Village Clerk	Village of Kinderhook
Richard Phillips	Village Trustee	Village of Kinderhook
Clarence Speed	Mayor	Village of Philmont
Gary Stevell	Mayor	Village of Valatie

1.4 Authority

Supported by a grant provided by FEMA and administered by NYSEMO, this plan was prepared in compliance with the Disaster Mitigation Act of 2000² (DMA 2000). DMA 2000 was signed into law on October 30, 2001 to amend the Robert T. Stafford Act of 1988 (Stafford Act). Section 322 of DMA 2000 requires that States and communities have a FEMA-approved mitigation plan in place in order to receive Hazard Mitigation Grant Program (HMGP) funding. The Interim Final Rule³, prepared by FEMA in order to implement DMA 2000 establishes planning and funding criteria for States and local governments.

² Public Law 106-390

³ 44 CFR 201 and 44 CFR 206

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Planning Process and Methodology

2.1 Planning Process

The Columbia County Hazard Mitigation Planning Team and Advisory Committee were formed and an initial kick-off meeting was held in May 2006. See Table 2-1 for attendees and topics discussed at this and each subsequent meeting held in relation to this project. Columbia County municipalities and county departments were invited to help coordinate planning activities, discuss the purpose of the plan, and understand the process of developing a hazard mitigation plan.

Planning Team members, representing all participating jurisdictions, participated in the process by:

- obtaining legislative proclamations declaring support for the hazard mitigation planning process;
- providing jurisdiction-specific data and information including, but not limited to: location, nature and value of critical infrastructure, copies of existing emergency management plans, policies, and procedures, copies of land use and/or zoning maps, FEMA Flood Insurance Rate Maps (FIRMs), descriptions of recent and historical incidents, descriptions of current and past mitigation measures and activities, and completed FEMA Hazard Mitigation Planning Worksheets;
- providing feedback and collaborating with other participating jurisdictions to make decisions throughout the planning process including hazard and risk analysis, establishment of goals and objectives, and prioritization of mitigation measures;
- reviewing, revising, finalizing, and approving the draft plan; and
- adopting the final plan through a formal process.

The Advisory Committee participated by overseeing the plan development process, facilitating meetings, obtaining information that the planning team was unable to locate, facilitating public, private sector, and not-for-profit outreach, supporting county level information gathering and planning, gathering and incorporating comments, and writing the actual plan.

2. Planning Process and Methodology

Beginning in July 2006, municipalities were contacted to begin completing FEMA Hazard Mitigation Planning Worksheets. Hazard analysis workshops were held to guide municipalities through the hazard identification and assessment process and to provide an opportunity to clear up any questions or issues. Municipalities then completed the FEMA worksheets and provided additional information that became inputs to the plan. Hazards identified by the municipalities are listed in Section 4.1.

While municipalities were completing the FEMA worksheets, the Advisory Committee conducted a hazard analysis using NYSEMO's automated system, Hazard Identification and Risk Analysis – New York (HIRA-NY). The HIRA-NY report can be found in Appendix D and results are summarized in section 4.3.

Meetings and conference calls (Table 2-1) were held between the advisory committee and the planning team throughout this process to ensure coordination.

Table 2-1 Meetings Held During the Planning Process

Date	Location	Attendees	Topic
5/22/06	Claverack Firehouse	CCEMO: Bill Black, Gary Tuthill, Paul D'Onofrio Columbia County: Nancy Winch, Dale Rowe, Bernie Kelleher, Valerie Bertram, George Sharpe, James Van Dam, P.J. Keeler City of Hudson: Rick Paolino, Gary Wallace NYSEMO: Mark Ferrari, Rad Anderson, Nadine Macura, Ed Lips E & E: Mark Fountain	<ul style="list-style-type: none"> ■ Project Kick-Off ■ Project timeline ■ Next steps
6/07/06	Chatham Firehouse	CCEMO: Gary Tuthill Gallatin: Earl Coons, Lynda Scheer Taghkanic: Edward Waldron Germantown: Roy Brown Chatham (v): David Chapman Chatham (t): Tammy Shaw New Lebanon: Colleen Teal Stuyvesant: Valerie Bertram Austerlitz: George Jahn Stockport: John Leach, Jr. Copake: Lawrence Proper Hillsdale: George Atwood Ancram: James MacArthur Claverack: James Keegan	<ul style="list-style-type: none"> ■ Organizing project tasks ■ Establishing economic impact
6/14/06	401 State Street	CCEMO: Gary Tuthill E & E: Daniel Husserl	<ul style="list-style-type: none"> ■ Project and next steps discussed at the County Board of Supervisors meeting

Table 2-1 Meetings Held During the Planning Process

Date	Location	Attendees	Topic
6/28/06	Chatham Firehouse	CCEMO: Bill Black, Bill Stelling Columbia County: Bernie Kelleher Hillsdale: George Atwood, Ann Baldwin, Richard Briggs Germantown: Roy Brown, Richard Jennings Chatham (v): David Chapman Stockport: John Leach, Jr., Leo Pulcher Ancram: James MacArthur Kinderhook (v): Richard Phillips, John Taylor Copake: Lawrence Proper Taghkanic: Edward Waldron NYSEMO: Nadine Macura	<ul style="list-style-type: none"> ■ Hazard Analysis Workshop #1
7/05/06	Chatham Firehouse	CCEMO: Gary Tuthill Ghent: Larry Andrews, Mike Losa Stuyvesant: Valerie Bertram, Bernard Kowalski Chatham (v): Kevin Boehme, Paul Boehme Chatham (t): Tammy Shaw Gallatin: Earl Coons, Lynda Scheer Canaan: Gary Flaherty Greenport: Mark Gaylord, John Mongyski Austerlitz: George Jahn New Lebanon: Colleen Teal Taghkanic: Ed Waldron, Elizabeth Young	<ul style="list-style-type: none"> ■ Hazard Analysis Workshop #2
7/17/06	Conference Call	CCEMO: Gary Tuthill E & E: Daniel Husserl	<ul style="list-style-type: none"> ■ Protocol for communicating with jurisdictions
7/25/06	Conference Call	CCEMO: Gary Tuthill, Bill Black E & E Daniel Husserl	<ul style="list-style-type: none"> ■ Project progress and next steps ■ Q3 GIS System
9/12/06	Conference Call	CCEMO: Gary Tuthill, Bill Black E & E Daniel Husserl	<ul style="list-style-type: none"> ■ Project progress and next steps ■ Information received from jurisdictions ■ Developing mitigation measures

Table 2-1 Meetings Held During the Planning Process

Date	Location	Attendees	Topic
9/20/06	Chatham Firehouse	CCEMO: Gary Tuthill, Dave Chapman Columbia County: Bernie Kelleher, James Van Deusen NYSEMO: Nadine Macura, Ed Lips E & E: Daniel Husserl	<ul style="list-style-type: none"> ■ HIRA-NY Hazard Analysis
5/01/07	Conference Call	CCEMO: Gary Tuthill NYSEMO: Ed Lips, Nadine Macura E & E: Adam Shatzkamer, Shawn Fenn, Daniel Husserl	<ul style="list-style-type: none"> ■ Strategies for collecting missing information ■ HIRA – NY hazard analysis results ■ Public outreach
6/13/07	Conference Call	CCEMO: Gary Tuthill E & E Daniel Husserl	<ul style="list-style-type: none"> ■ Next steps
6/29/07	Conference Call	CCEMO: Gary Tuthill E & E: Adam Shatzkamer	<ul style="list-style-type: none"> ■ Project next steps
7/12/07	Conference Call	CCEMO: Gary Tuthill, Bill Black E & E: Adam Shatzkamer, Shawn Fenn, Julie Chang	<ul style="list-style-type: none"> ■ Coordination of research and information collection activities
7/19/07	Conference Call	CCEMO: Gary Tuthill E & E: Adam Shatzkamer	<ul style="list-style-type: none"> ■ Project progress update
8/21/07	Conference Call	CCEMO: Gary Tuthill, Bill Black NYSEMO: Ed Lips, Nadine Macura E & E: Adam Shatzkamer, Julie Chang	<ul style="list-style-type: none"> ■ Confirmation of hazards
9/27/07	Conference Call	CCEMO: Gary Tuthill, Bill Black NYSEMO: Ed Lips, Nadine Macura E & E: Adam Shatzkamer, Julie Chang	<ul style="list-style-type: none"> ■ Public outreach ■ Next steps ■ Adoption process
10/01/07	Conference Call	CCEMO: Gary Tuthill E & E: Adam Shatzkamer	<ul style="list-style-type: none"> ■ Next steps
10/16/07	Conference Call	CCEMO: Bill Black E & E: Nermin Ahmad, Adam Shatzkamer	<ul style="list-style-type: none"> ■ Incorporation of initial comments from SEMO ■ Next steps
10/22/07	401 State Street, Hudson	CCEMO: Bill Black, George Sharpe E & E: Adam Shatzkamer	<ul style="list-style-type: none"> ■ Next steps
10/22/07	610 State Street, Hudson	CCEMO: George Sharpe Stockport: Leo Pulcher E & E: Adam Shatzkamer	<ul style="list-style-type: none"> ■ Review of plan contents ■ Confirmation of Hazards ■ Development trends and future structures ■ Confirmation of Critical Infrastructure list ■ Proposed Mitigation Measures

2. Planning Process and Methodology

Table 2-1 Meetings Held During the Planning Process

Date	Location	Attendees	Topic
10/22/07	Conference Call	Village of Kinderhook: Nicole Heeder CCEMO: George Sharpe E & E: Adam Shatzkamer	<ul style="list-style-type: none"> ■ Review of plan contents ■ Confirmation of Hazards ■ Development trends and future structures ■ Confirmation of Critical Infrastructure list ■ Proposed Mitigation Measures
10/22/07	401 State Street, Hudson	Claverack: James Keegan CCEMO: George Sharpe E & E: Adam Shatzkamer	<ul style="list-style-type: none"> ■ Review of plan contents ■ Confirmation of Hazards ■ Development trends and future structures ■ Confirmation of Critical Infrastructure list
10/22/07	Conference Call	Hillsdale: Art Baer CCEMO: George Sharpe E & E: Adam Shatzkamer	<ul style="list-style-type: none"> ■ Review of plan contents ■ Confirmation of Hazards ■ Development trends and future structures ■ Confirmation of Critical Infrastructure list
10/23/07	Conference Call	Copake: Angelo Valentino CCEMO: George Sharpe E & E: Adam Shatzkamer	<ul style="list-style-type: none"> ■ Review of plan contents ■ Confirmation of Hazards ■ Development trends and future structures ■ Confirmation of Critical Infrastructure list ■ Proposed Mitigation Measures
10/23/07	Conference Call	Town of Germantown: Roy Brown CCEMO: George Sharpe E & E: Adam Shatzkamer	<ul style="list-style-type: none"> ■ Review of plan contents ■ Confirmation of Hazards ■ Development trends and future structures ■ Confirmation of Critical Infrastructure list ■ Proposed Mitigation Measures
10/23/07	Conference Call	Town of Stuyvesant: Bernard Kowalski CCEMO: George Sharpe E & E: Adam Shatzkamer	<ul style="list-style-type: none"> ■ Review of plan contents ■ Confirmation of Hazards ■ Development trends and future structures ■ Confirmation of Critical Infrastructure list ■ Proposed Mitigation Measures

Table 2-1 Meetings Held During the Planning Process

Date	Location	Attendees	Topic
10/23/07	Conference Call	Town of Chatham: Jesse DeGrootd CCEMO: George Sharpe E & E: Adam Shatzkamer	<ul style="list-style-type: none"> ■ Review of plan contents ■ Confirmation of Hazards ■ Development trends and future structures ■ Confirmation of Critical Infrastructure list ■ Proposed Mitigation Measures
10/23/07	Conference Call	Canaan: Gary Flaherty CCEMO: George Sharpe E & E: Adam Shatzkamer	<ul style="list-style-type: none"> ■ Review of plan contents ■ Confirmation of Hazards ■ Development trends and future structures ■ Confirmation of Critical Infrastructure list ■ Proposed Mitigation Measures
10/23/07	520 Warren Street, Hudson	City of Hudson: Melissa Finn, Charles Weed CCEMO: George Sharpe E & E: Adam Shatzkamer	<ul style="list-style-type: none"> ■ Review of plan contents ■ Confirmation of Hazards ■ Development trends and future structures ■ Confirmation of Critical Infrastructure list ■ Proposed Mitigation Measures
10/24/07	Conference call	Village of Philmont: Clarence Speed CCEMO: George Sharpe E & E: Adam Shatzkamer	<ul style="list-style-type: none"> ■ Review of plan contents ■ Confirmation of Hazards ■ Development trends and future structures ■ Confirmation of Critical Infrastructure list ■ Proposed Mitigation Measures
10/24/07	Columbia County Public Safety Building	Town of Taghkanic: Elizabeth Young CCEMO: George Sharpe E & E: Adam Shatzkamer	<ul style="list-style-type: none"> ■ Review of plan contents ■ Confirmation of Hazards ■ Development trends and future structures ■ Confirmation of Critical Infrastructure list ■ Proposed Mitigation Measures

Table 2-1 Meetings Held During the Planning Process

Date	Location	Attendees	Topic
10/24/07	Conference call	Town of Austerlitz: George Jahn, Robert Meehan CCEMO: George Sharpe E & E: Adam Shatzkamer	<ul style="list-style-type: none"> ■ Review of plan contents ■ Confirmation of Hazards ■ Development trends and future structures ■ Confirmation of Critical Infrastructure list ■ Proposed Mitigation Measures
10/24/07	Conference call	New Lebanon: David Katzenstein CCEMO: George Sharpe E & E: Adam Shatzkamer	<ul style="list-style-type: none"> ■ Review of plan contents ■ Confirmation of Hazards ■ Development trends and future structures ■ Confirmation of Critical Infrastructure list ■ Proposed Mitigation Measures
10/24/07	Columbia County Public Safety Building	Ancram: James MacArthur CCEMO: George Sharpe E & E: Adam Shatzkamer	<ul style="list-style-type: none"> ■ Review of plan contents ■ Confirmation of Hazards ■ Development trends and future structures ■ Confirmation of Critical Infrastructure list ■ Proposed Mitigation Measures
10/24/07	Conference call	Gallatin: Linda Scheer CCEMO: George Sharpe E & E: Adam Shatzkamer	<ul style="list-style-type: none"> ■ Review of plan contents ■ Confirmation of Hazards ■ Development trends and future structures ■ Confirmation of Critical Infrastructure list ■ Proposed Mitigation Measures
10/24/07	Conference Call	Ghent: Larry Andrews CCEMO: George Sharpe E & E: Adam Shatzkamer	<ul style="list-style-type: none"> ■ Review of plan contents ■ Confirmation of Hazards ■ Development trends and future structures ■ Confirmation of Critical Infrastructure list ■ Proposed Mitigation Measures

2. Planning Process and Methodology

Table 2-1 Meetings Held During the Planning Process

Date	Location	Attendees	Topic
10/24/07	Conference Call	Village of Chatham: Carol Simmons, Paul Boehme CCEMO: George Sharpe E & E: Adam Shatzkamer	<ul style="list-style-type: none"> ■ Review of plan contents ■ Confirmation of Hazards ■ Development trends and future structures ■ Confirmation of Critical Infrastructure list ■ Proposed Mitigation Measures
10/24/07	Conference Call	Valatie: Gary Stevell CCEMO: George Sharpe E & E: Adam Shatzkamer	<ul style="list-style-type: none"> ■ Review of plan contents ■ Confirmation of Hazards ■ Development trends and future structures ■ Confirmation of Critical Infrastructure list ■ Proposed Mitigation Measures
10/24/07	600 Town Hall Drive, Hudson, NY	Greenport: John M. Rutkey CCEMO: George Sharpe E & E: Adam Shatzkamer	<ul style="list-style-type: none"> ■ Review of plan contents ■ Confirmation of Hazards ■ Development trends and future structures ■ Confirmation of Critical Infrastructure list ■ Proposed Mitigation Measures
10/24/07	Columbia County Public Safety Building	SEMO: Nadine Macura CCEMO: Paul D’Onofrio, George Sharpe, Bill Black, Gary Tuthill E & E: Adam Shatzkamer	<ul style="list-style-type: none"> ■ Response to SEMO’s courtesy review comments ■ Next Steps
10/25/07	Conference Call	Clermont: Harry Harned CCEMO: George Sharpe E & E: Adam Shatzkamer	<ul style="list-style-type: none"> ■ Review of plan contents ■ Confirmation of Hazards ■ Development trends and future structures ■ Confirmation of Critical Infrastructure list ■ Proposed Mitigation Measures
10/25/07	Conference Call	Town of Kinderhook: John Ruchel, Peggy Moore CCEMO: George Sharpe E & E: Adam Shatzkamer	<ul style="list-style-type: none"> ■ Review of plan contents ■ Confirmation of Hazards ■ Development trends and future structures ■ Confirmation of Critical Infrastructure list ■ Proposed Mitigation Measures

Table 2-1 Meetings Held During the Planning Process

Date	Location	Attendees	Topic
10/25/07	Columbia County Public Safety Building	Livingston: Phillip Williams CCEMO: George Sharpe E & E: Adam Shatzkamer	<ul style="list-style-type: none"> ■ Review of plan contents ■ Confirmation of Hazards ■ Development trends and future structures ■ Confirmation of Critical Infrastructure list ■ Proposed Mitigation Measures
10/25/07	Columbia County Public Safety Building	CCEMO: George Sharpe E & E: Adam Shatzkamer	<ul style="list-style-type: none"> ■ Confirmation of Critical Infrastructure list
11/09/07	Conference Call	CCEMO: Gary Tuthill E & E: Adam Shatzkamer	<ul style="list-style-type: none"> ■ Prioritization and finalization of proposed mitigation measures
11/30/07	Conference Call	CCEMO: Gary Tuthill, Bill Black, George Sharpe NYSEMO: Nadine Macura E & E: Adam Shatzkamer,	<ul style="list-style-type: none"> ■ Public Outreach ■ Next Steps ■ Adoption process
12/14/07	Conference Call	CCEMO: George Sharpe E & E: Adam Shatzkamer,	<ul style="list-style-type: none"> ■ Public Outreach comments received

Upon completion of the FEMA Worksheets and Hazard Analysis, CCEMO prepared a draft plan. Municipalities were given the opportunity to identify their mitigation goals as well as identify and prioritize mitigation measures. Municipalities reviewed and commented on the plan in addition to filling in any data gaps prior to the plan being finalized.

Two public, one private sector/non-profit, and one neighboring jurisdiction comment periods were also held and are describe further in Section 2.1.1 below.

Columbia County and the municipalities then adopted the plan. The entire process took approximately 15 months. Copies of resolutions adopting the plan can be found in Appendix G.

The final step in hazard mitigation is implementation and revision of the plan including incorporation of comments from SEMO and FEMA. This will be accomplished through continual monitoring by the municipalities with support from CCEMO. This process is outlined in further detail in Section 6.1.

Figure 2-1 illustrates the discrete steps of the hazard mitigation process.

2.1.1 Public and Private Sector/Non-profit Comment

During the entire month of October 2007, an initial public comment period was held. A survey to gauge the concerns of all the county residents in regard to hazard mitigation was posted on the county website. Legal notices announcing the comment period as well as pertinent information about the survey were sent to all the local jurisdictions and were published in the Hudson Register Star newspaper. The plan and survey were discussed at the county supervisor's monthly meeting. There were no comments sent to Columbia County Office of Emergency Management.

A second public comment period was held in December 2007. The second comment period was discussed at the County public safety and security briefing on November 28, 2007. The press was in attendance at this meeting and the meeting minutes will reflect this. The local cities, towns and villages were also given information on the second comment period. The information was on the website from December 1, 2007 to December 14, 2007 and was published in the Hudson Register Star newspaper. There were no comments received from the public.

No substantial comments were received. The Town of Germantown noted that Taconic Farms is located in both Hudson and Germantown and has grown to 600 employees. COARC stated that their staff has grown to 430 employees. These comments were incorporated into the appropriate sections of the plan. The Town of Germantown also intends to form a committee in the coming year to review the plan and provide further comments. These comments will be incorporated in a future plan revision.

The plan was sent to emergency managers in neighboring Dutchess, Greene, and Rensselaer Counties in New York as well as the adjacent Berkshire County in Massachusetts. There were no comments received from any of these neighboring jurisdictions.

The plan was sent to all Columbia County agencies and comments were incorporated as appropriate.

The plan was sent to the ten largest employers in the county for review in order to satisfy the business requirement outlined in DMA 2000. The list of employers can be found in Section 3, Table 3-3.

The plan was submitted to Columbia Greene College for review with no comments received.

The plan was sent to Columbia Memorial Hospital with no comments received. The mitigation plan was also discussed at the Healthcare Consortium which had hospital, churches, nursing homes and other nonprofit agency representation.



Figure 2-1 Mitigation Process⁴

⁴ FEMA Graphic

2.2 Methodology

In addition to the HIRA-NY results, information was gathered by municipalities and input on the FEMA worksheets by coordinating with local highway and public works supervisors, emergency services, and historians. Information was also gathered through news archives and historical society collections.

E & E developed a Geographical Information System (GIS) website for Columbia County by layering FEMA Q3 flood zone data with tax maps, road maps, locations of bodies of water and other natural features, and locations of critical infrastructure and hazardous material storage sites. Where municipalities were unable to provide information the GIS website was used by CCEMO to fill data gaps regarding structures and infrastructure located within flood zones. CCEMO also coordinated with staff of non-participating jurisdictions to ensure the validity of the information. Other information sources feeding into the plan are listed in section 2.3.

Columbia County utilized much of the guidance available from FEMA in collecting information, decision making, and drafting this plan. The guidance used includes the *FEMA State and Local Mitigation Planning How To Guides* (FEMA 386-1 through 386-7), FEMA Region II's *Hazard Mitigation Plan Development Toolkit* (4-Strat-2, 4-Strat-4, 4-Strat-4b, and 5-Maint-1).

2.3 Incorporation into Existing Planning Mechanisms

For hazard mitigation planning to be successful it must take into account other plans, programs, and policies that may have an effect on hazard identification and implementation of mitigation measures. The following sources were considered and used as information resources for this plan:

- FEMA's Disaster Declaration Archives
- NOAA National Environmental Satellite, Data, and Information Service, National Climactic Data Center's Storm Event Database
- NOAA National Severe Storms Laboratory's Time Series of Annual Cycle of Tornado, Wind, and Hail Probability tool
- US Bureau of Census' 2000 Census
- USGS Earthquake Hazard Peak Ground Acceleration Maps
- USGS Swelling Clays Map of the Conterminous United States
- NYS Hazard Mitigation Plan
- NYS Hazard Mitigation Plan Landslide Susceptibility Maps
- Disaster Mitigation Act of 2000

- Stafford Act
- Public Entity Risk Institute's Presidential Disaster Declaration Site
- Columbia/Hudson Partnership's demographics and employment information
- The Disaster Center's Historical New York Tornadoes Map
- New York State Hazard Mitigation Plan
- Columbia County Agricultural & Farmland Protection Plan
- Town of Copake Comprehensive Plan
- Town of Germantown Comprehensive Plan

In addition to these sources, this HMP will become an integral part of the Columbia County Comprehensive Emergency Management Plan and any master or land use planning that occurs in the future will use this plan as a reference.

The following plans, programs, and policies were developed concurrent to the development of this plan. These were used as information sources for the HMP and incorporate doctrine from the HMP in their contents.

- Town of Taghkanic Comprehensive Land Use Plan
- Town of Chatham Comprehensive Plan

3

Community Profile

3.1 Geography and Present Conditions

Columbia County covers 648 square miles, or approximately 407,000 acres. Twenty-three municipalities are located within the county, including: the Towns of Ancram, Austerlitz, Canaan, Chatham, Claverack, Clermont, Copake, Gallatin, Germantown, Ghent, Greenport, Hillsdale, Kinderhook, Livingston, New Lebanon, Stockport, Stuyvesant, and Taghkanic, the City of Hudson, and the Villages of Chatham, Kinderhook, Philmont, and Valatie.⁵

Columbia County is located in the Hudson Valley region of eastern New York State, bordering Massachusetts and Connecticut. New York's Dutchess County is to the south, Rensselaer County is to the north, and across the Hudson River to the west is Greene County. The Hudson River provides approximately 30 miles of water front along the county's western border while the eastern border is distinguished by the Taconic and Berkshire mountain ranges, reaching elevations of up to 2,110 ft. West of the Taconic Mountains, the county's topography is characterized by broad plains and hills, with expansive flood plains and a series of bluffs lining the Hudson River. Figure 3-1 below shows Columbia County's location within New York State.⁶

The Hudson River and its tributaries, such as the Roeliff-Jansen Kill, Claverack Creek, Kinderhook Creek, and many others serve important roles in the ecological health of the county as well as in the recreational, agricultural and commercial livelihood of the region. The Columbia County watershed predominantly drains into the Lower Hudson Drainage Basin, as well as a small portion of the Housatonic Drainage Basin. Both basins are part of the greater Atlantic Slope Drainage Basin which flows into the Atlantic Ocean. Figure 3-2 below shows a map of Columbia County.⁷

⁵ Columbia Hudson Partnership

⁶ Ibid.

⁷ Ibid.

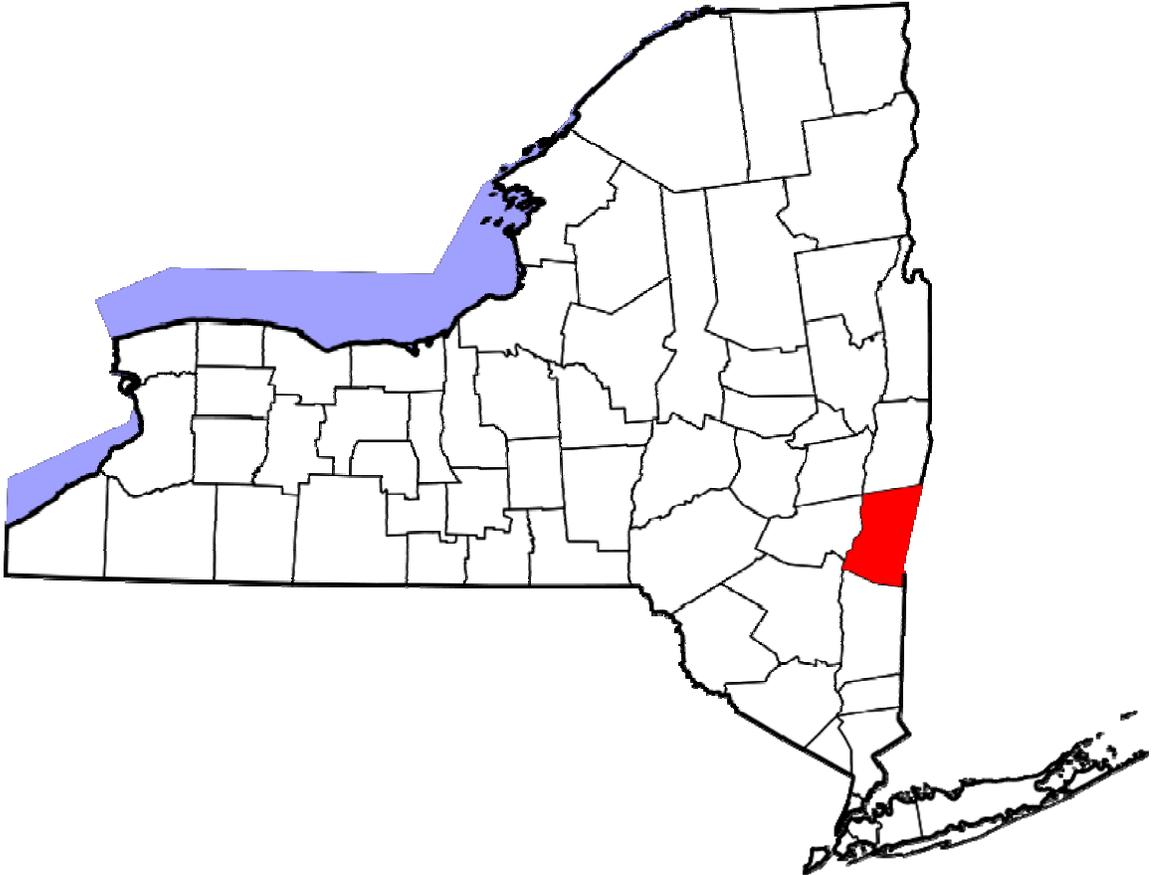


Figure 3-1 Columbia County within New York State

3. Community Profile

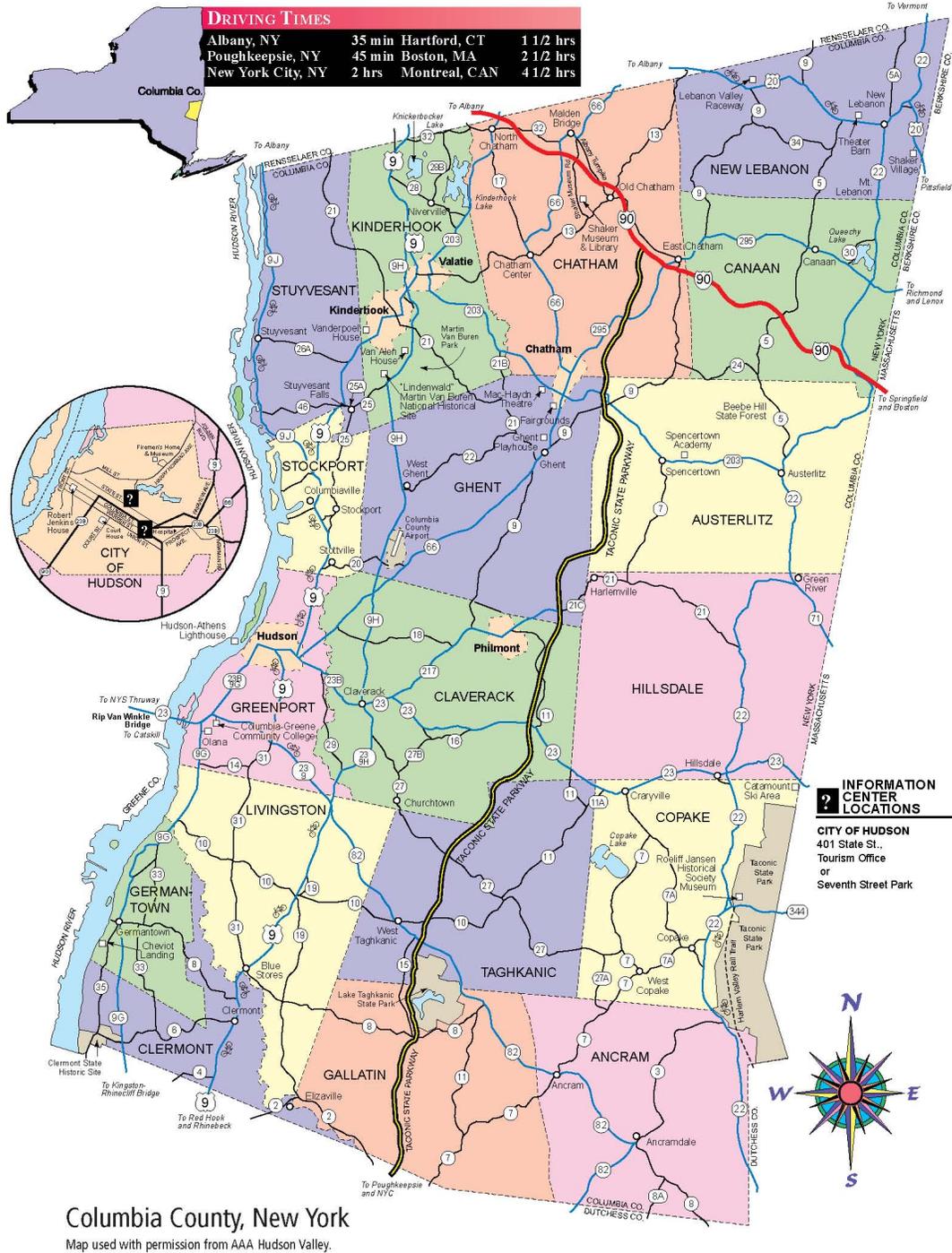


Figure 3-2 Columbia County Map

New York State has a humid continental climate, characterized by changing weather patterns and a broad range of seasonal temperatures. The state receives cold air masses from the north, warm air masses from the south and southwest, and moisture laden air masses from the Northern Atlantic Ocean. In contrast to the rest of the state, the climate of Columbia County and other areas of the lower Hudson Valley is moderated by the close proximity to the Atlantic Ocean. July and August are typically the warmest months in the county while January and February are generally the coldest. The mean temperature in the Hudson Valley for the month of January is 26°F. The coldest winter temperatures for the area range from 0°F-10°F. Temperatures of or exceeding 90°F occur an average of 18-25 days during summer months. The distribution of monthly precipitation is generally uniform during the year reaching a maximum in May and a minimum during winter months. Monthly rainfall averages 4 inches in the summer in the Hudson Valley.

Storm systems generally move eastward across the state or travel northward along the Atlantic coast. The Atlantic storm systems, in particular, have a significant impact on weather conditions in Columbia County and the lower Hudson Valley. Prevailing winds generally move from west to east, with a southwest component during the summer and a northwest component during the colder months.

Tornado activity for Columbia County is well above New York state average and 1.8 times above the U.S. average. Between 1950 and 2007 tornadoes have caused 4 fatalities and 45 injuries. All of the fatalities and the majority of injuries occurred during a category 4 tornado on August 28, 1973 that caused between \$5,000 and 50,000,000 in damages. Since 1950, tornados have caused over \$11.2 million in damages.

Columbia County is also susceptible to frequent severe storms and winter storms. These events have caused injury, death, and damages to the county in the past. Snow storms have cause over \$16.5 million in damages since 1950. Other severe storms have caused over \$8.8 million in damages since 1950.

Climate has a major impact on farm production and a can significantly affect Columbia County's agricultural economy. The climate and arable soils of the county promote the production of diverse commodities including fruit, berries, specialty vegetables, dairy products, and cattle. Agriculture is distinctive to Columbia County with farmland comprising 119,500 acres, or 29% of the total county land area.⁸

3.2 Demographics

According to the 2000 Census, the current population of Columbia County is 63,094. From 1990 to 2000 the countywide population has increased 0.18 percent. The Town of Kinderhook has the largest population with approximately

⁸ Columbia Hudson Partnership

8,296 people, followed by the City of Hudson with 7,524 people. Table 3-1 shows the population of each town and city in Columbia County. The racial composition of the county was 92.09% White, 4.52% Black or African American, 0.21% Native American, 0.80% Asian, 0.03% Pacific Islander, 0.90% from other races, 1.45% from two or more races, and 2.53% Hispanic or Latino of any race.⁹

Table 3-1 Population by Town and City, Columbia County, New York, 2000

Municipality	Population	% of County Population
Town of Ancram	1,513	2.39
Town of Austerlitz	1,453	2.30
Town of Canaan	1,820	2.88
Town of Chatham	4,249	6.73
Village of Chatham	1,758	2.78
Town of Claverack	6,401	10.14
Town of Clermont	1,726	2.73
Town of Copake	3,278	5.19
Town of Gallatin	1,499	2.37
Town of Germantown	2,018	3.19
Town of Ghent	5,276	8.36
Town of Greenport	4,180	6.62
Town of Hillsdale	1,744	2.76
City of Hudson	7,524	11.92
Town of Kinderhook	8,296	13.14
Village of Kinderhook	1,275	2.02
Town of Livingston	3,424	5.42
Town of New Lebanon	2,454	3.88
Village of Philmont	1,480	2.34
Town of Stockport	2,933	4.64
Town of Stuyvesant	2,188	3.46
Town of Taghkanic	1,118	1.77
Village of Valatie	1,712	2.71
County Total	63,094	100

Source: US Census

The 2000 Census also indicates that Columbia County has a total of 24,796 households with an average of 2.42 people per household. In 2000, 71% of the occupied households were owner occupied and 29% were renter occupied, with 18% of the total households reported vacant. Columbia County residents maintain a median household income of \$41,974, placing it in the top 50% of all counties in New York for income. In addition, the average home value was \$111,800, placing Columbia County among the top 25% of all counties in New York State for home value. 81% of Columbia County residents have graduated from high

⁹ US Census

3. Community Profile

school and 22.6% have attained Bachelor's Degrees or higher. Housing and income information for each municipality can be found in Table 3-2.¹⁰

Table 3-2 Housing and Income Information by Town and City, 2000

Municipality	Total Number of Households	Average Persons per Household	Median Home Value (\$)	Average Household Income (\$)
Town of Ancram	823	2.54	118,000	45,726
Town of Austerlitz	906	2.34	137,200	51,369
Town of Canaan	970	2.34	144,300	51,607
Town of Chatham	2,110	2.41	125,600	49,234
Village of Chatham	742	2.33	96,400	39,063
Town of Claverack	2,839	2.44	102,700	41,647
Town of Clermont	725	2.85	128,700	47,039
Town of Copake	2,185	2.45	106,700	42,261
Town of Gallatin	913	2.45	115,500	42,454
Town of Germantown	984	2.41	123,000	42,195
Town of Ghent	2,244	2.50	114,000	43,529
Town of Greenport	1,896	2.28	93,700	37,394
Town of Hillsdale	1,133	2.42	127,500	40,156
City of Hudson	3,347	2.26	74,900	24,279
Town of Kinderhook	3,434	2.52	125,600	52,604
Village of Kinderhook	576	2.34	141,800	57,500
Town of Livingston	1,651	2.41	126,600	37,117
Town of New Lebanon	1,201	2.38	114,100	44,805
Village of Philmont	644	2.54	81,300	31,094
Town of Stockport	1,204	2.62	88,000	42,107
Town of Stuyvesant	929	2.57	106,500	49,904
Town of Taghkanic	713	2.39	134,800	45,804
Village of Valatie	627	2.52	107,800	44,375
County Total	30,207	2.42	111,800	41,915

Source: US Census

As of 2006, Columbia County had a work force of 32,284 and an unemployment rate of 3.7%. Health care and human services comprise the largest employers supplying 17.9% of all the jobs in the county, Manufacturing employs 9.7%, Transportation and Warehousing employ 3.8%, and Finance and Insurance employs 1.8%. The employment growth rate was 0.9% in 2006. A list of the county's largest employers is provided in Table 3-3. In addition to its service and manufacturing economies, Columbia County has also become a center of agribusinesses for the Hudson River Valley, as well as for a large portion of the Northeastern United States. There are 498 farms in the county with a total area of 119,718 acres which produce dairy products, fruit, vegetables, soybeans, grain,

¹⁰ Ibid.

cattle, sheep, goats, as well as other products. Sales of Columbia County agricultural products bring in \$52,194,000 annually.¹¹

Table 3-3 Ten Largest Employers, Columbia County, New York

Company Name	Location	Product/Service Type	Workforce Total
Columbia Memorial Hospital	Hudson	Hospital	1000
Taconic Farms, Inc.	Hudson/ Germantown	Breeder of laboratory animals	700
Hudson City School District	Hudson	Educational programs	602
COARC	Claverack	Human services	430
Kaz Incorporated	Hudson	Electric housewares and fans	400
Berkshire Farm Center & Services	Canaan	Educational programs	390
Barnwell Nursing Home	Valatie	Skilled nursing facility	330
Ichabod Crane Central School System	Valatie	Educational programs	300
Hudson Correctional Facility	Hudson	Government agency	283
Wal-Mart Store 2097	Hudson	Department store	200
Sonoco Crellin	Chatham	Plastic products	200

Source: Columbia-Hudson Partnership

3.3 Development Trends

As a whole, the historically agricultural and forested Columbia County is consistently losing green space to development. Nearly every town identified that farmland and wooded areas are being turned into residential and commercial properties. The City of Hudson indicated that industrial properties are being turned into entertainment facilities; the city has also seen growth in the number of hotels and restaurants. Table 3-4 below lists the development trends identified by each municipality in Columbia County.

Table 3-4 Development Trends

Municipality	Development Trends	New , under construction, and planned properties of note
Town of Ancram	Forested area becoming residential	n/a
Town of Austerlitz	Forested area becoming residential	n/a
Town of Canaan	Little change identified	n/a
Town of Chatham	Farmland is becoming residential	n/a
Village of Chatham	Little change identified	n/a
Town of Claverack	Farmland is becoming residential	n/a
Town of Clermont	Increase in home-based businesses	n/a

¹¹ USDA National Agricultural Statistics Service, 2002

Table 3-4 Development Trends

Municipality	Development Trends	New , under construction, and planned properties of note
Town of Copake	Farmland is becoming residential	130 new affordable housing units are under construction on Mountain View Road
Town of Gallatin	Little change identified	n/a
Town of German-town	Farmland is becoming residential Attempting to preserve open space	n/a
Town of Ghent	Farmland is becoming residential	n/a
Town of Greenport	Farmland is becoming residential, Much new retail and commercial development	Nursing home under construction on Joslen Blvd Shopping center planned for Route 9
Town of Hillsdale	Little change identified	n/a
City of Hudson	Losing industry to arts and entertainment	Low income housing are being built Two new hotels are being developed in the downtown area
Town of Kinderhook	Little change identified	A new housing development is under construction on County Road 21 containing 17 multi-million dollar homes.
Village of Kinderhook	Farmland is becoming residential	n/a
Town of Livingston	Farmland is becoming residential	A new baseball camp is under construction
Town of New Lebanon	Farmland is becoming commercial	n/a
Village of Philmont	Farmland is becoming residential	n/a
Town of Stockport	Little change identified	n/a
Town of Stuyvesant	Farmland is becoming residential	n/a
Town of Taghkanic	Farmland is becoming residential	n/a
Village of Valatie	Little change identified	n/a

4

Hazards in Columbia County

4.1 Hazard Identification and Risk Assessment Process

Prevalent hazards in Columbia County were identified and assessed using a variety of methods. Municipalities were asked to identify the hazards which most concern them by completing the FEMA worksheets. These worksheets also helped to quantify the value of potential losses. Hazards identified by jurisdictions on the FEMA worksheets are shown in Figure 4-1 below. In addition the NYSEMO HIRA-NY system was used to identify hazards of greatest concern. The HIRA-NY system rates hazards most prevalent for a given geographic area. HIRA-NY considers five factors when assigning hazard ratings:

- **Scope:** Areas potentially impacted and the chance of a hazard triggering another hazard causing a cascade effect.
- **Onset:** The time between recognition of an approaching hazard and when the hazard begins to affect the community.
- **Impact:** Analysis of the extent of impact of a hazard to the community.
- **Duration:** The length of time the hazard remains active, the length of time emergency operations continue after the hazard event, and the length of time that recovery will take.
- **Frequency:** How often a hazard has resulted in an emergency or disaster.

Hazards scoring from 321 to 400 in HIRA-NY are ranked as High, from 241 to 320 are ranked as Moderately High, from 161 to 240 are ranked as Moderately Low, and from 44 to 160 are ranked as low.

With the exception of dam failure, drought, and landslides, all of the hazards identified by the municipalities were ranked as having a Moderately High or Moderately Low hazard rating. There were no hazards in Columbia County rated as High. Table 4-1 below shows the hazard ratings for Columbia County, Figure 4-2 below is a graphic representation of the hazard ratings. Table 4-1a below also lists all federal disaster declarations for Columbia County from 1953 to 2006.

4. Hazards in Columbia County

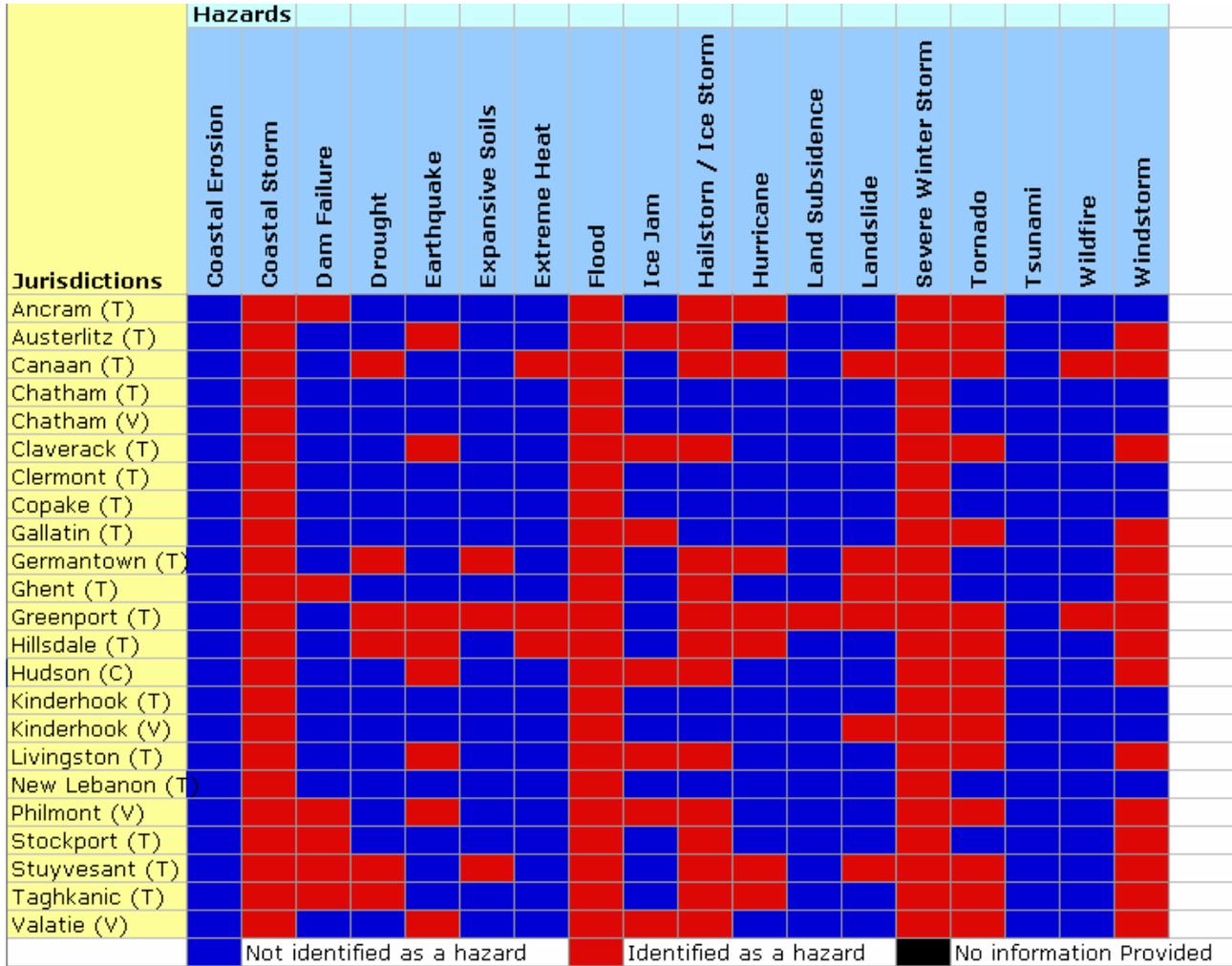


Figure 4-1 Hazards Identified by Jurisdictions

Table 4-1 HIRA-NY Results

Hazard	Score	Rating
Severe Storm	279	Moderately High
Tornado	240	Moderately Low
Flood	232	Moderately Low
Winter Storm (Severe)	187	Moderately Low
Earthquake	182	Moderately Low
Wildfire	151	Low
Dam Failure	138	Low
Landslide	136	Low
Ice Jam	124	Low
Drought	117	Low
Infestation	108	Low

4. Hazards in Columbia County

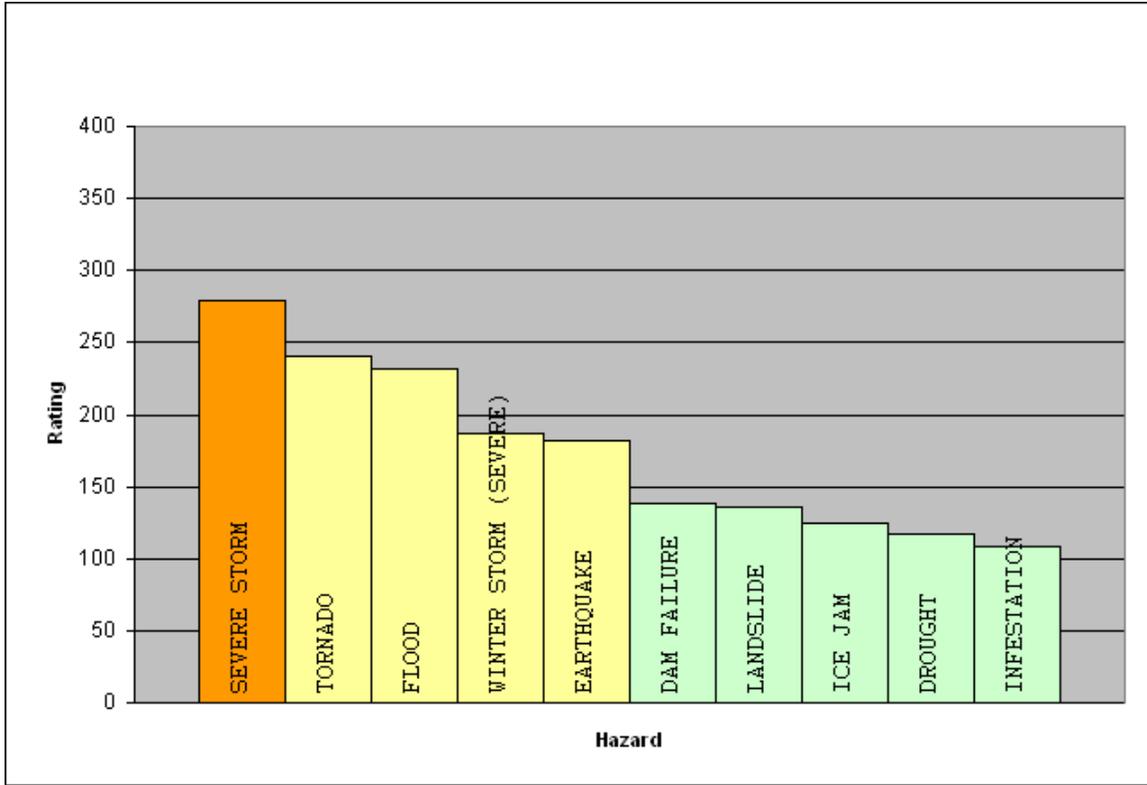


Figure 4-2 HIRA-NY Ratings

Table 4-1a Declared Federal Disasters in Columbia County 1953-2006

Disaster #	County	Date Declared	Event	Damages(\$)
401	Columbia, New York	07/20/1973	SEVERE STORMS & FLOODING	12,824,261
801	Columbia, New York	11/10/1987	SEVERE WINTER STORM	18,928,960
1095	Columbia, New York	01/24/1996	SEVERE STORMS AND FLOODING	184,686,476
1335	Columbia, New York	07/21/2000	SEVERE STORMS AND FLOODING	43,996,401
1391	Columbia, New York	09/11/2001	FIRES AND EXPLOSIONS	0

**Table 4-1a Declared Federal Disasters in Columbia County
1953-2006**

Disaster #	County	Date Declared	Event	Damages(\$)
1486	Columbia, New York	08/29/2003	SEVERE STORMS, FLOODING, AND TORNADOES	33,462,007
1564	Columbia, New York	10/01/2004	SEVERE STORMS AND FLOODING	23,621,160
1589	Columbia, New York	04/19/2005	SEVERE STORMS AND FLOODING	72,284,468

Source: Public Entity Risk Institute <http://www.peripresdecusa.org>

Taking into consideration input from all participating jurisdictions, it was decided by the planning team that this plan would concentrate only on those hazards ranked as high, moderately high, or moderately low with the exception of landslides, a low hazard for two municipalities, the Town of Greenport and the Village of Kinderhook, who identified themselves as susceptible to landslides. This decision was made to ensure that resources are not expended on planning for events that are unlikely to occur. The hazards profiled in this plan are:

- Severe Storm
- Tornado
- Flood
- Winter Storm (Severe)
- Earthquake
- Dam Failure
- Landslide

Coastal storm and hurricane are not included in this plan because due to Columbia County's inland location, the impacts of these events would be limited to wind and rain and be very similar to a severe storm. Ice jam is not included because its effects in Columbia County would be similar, if not identical to, a flood. Wildfire, tsunami, land subsidence, extreme heat, expansive soils, infestation, and coastal erosion are not included in this plan either because of their low HIRA-NY scores or because few jurisdictions identified themselves as susceptible to these hazards or both. While some of the jurisdictions identified themselves as susceptible to drought, it was not included in this plan because of its low HIRA-NY score. However, drought may be incorporated in a future plan revision.

4.2 Risk and Loss Estimates

The tables below represent the property at risk for each hazard in Columbia County. Table 4-2 shows the inventory of structures while tables 4-3 and 4-4 show the exposure within the county to each hazard or the aggregate value of structures and their contents. These values were obtained by identifying structures at risk from a particular hazard, adding up property values from county real estate maps, and then adding contents values estimated using the FEMA methodology. Table 4-5 describes the FEMA contents value estimation method.

Table 4-2 Number of Structures at Risk

Hazard	Location	Number of Commercial Occupancies at Risk	Number of Residential Occupancies at Risk	Number of Critical Infrastructure Sites at Risk
Flood	Town of Ancram	0	9	1
	Town of Austerlitz	1	11	0
	Town of Canaan	1	43	11
	Town of Chatham	2	46	4
	Village of Chatham	0	4	1
	Town of Claverack	6	39	0
	Town of Clermont	4	30	3
	Town of Copake	19	186	9
	Town of Gallatin	1	50	4
	Town of Germantown	0	2	0
	Town of Ghent	0	7	0
	Town of Greenport	0	4	0
	Town of Hillsdale	4	36	1
	City of Hudson	38	118	0
	Town of Kinderhook	3	11	0
	Village of Kinderhook	2	18	0
	Town of Livingston	4	37	4
	Town of New Lebanon	7	89	0
	Town of Stockport	0	40	14
	Town of Stuyvesant	3	19	3
Town of Taghkanic	1	32	4	
Village of Valatie	3	184	1	
Dam Failure	Town of Taghkanic	1	3	2
	Village of Philmont	0	7	1
Landslide	Village of Kinderhook	0	3	0
	Town of Greenport	3	1	1
Severe Storm	Countywide	2,403	31,480	270
Tornado	Countywide	2,403	31,480	270
Winter Storm (Severe)	Countywide	2,403	31,480	270
Earthquake	Countywide	2,403	31,480	270

Table 4-3 Countywide Hazards

4. Hazards in Columbia County

Hazard	Potential Risk	Potential Loss to Commercial Occupancies (\$)	Potential Loss to Residential Occupancies (\$)	Potential Loss to Critical Infrastructures (\$)
Severe Storm	All jurisdictions in Columbia County have at least some risk from Severe Storms	1,530,296,600	7,435,141,749	428,195,815
Tornado	All jurisdictions in Columbia County have at least some risk from Tornadoes	1,530,296,600	7,435,141,749	428,195,815
Winter Storm (Severe)	All jurisdictions in Columbia County have at least some risk from Winter Storms (Severe)	1,530,296,600	7,435,141,749	428,195,815
Earthquake	All jurisdictions in Columbia County have at least some risk from Earthquakes	1,530,296,600	7,435,141,749	428,195,815

Table 4-4 Localized Hazards

Hazard	Potential Risk	Potential Loss to Commercial Occupancies (\$)	Potential Loss to Residential Occupancies (\$)	Potential Loss to Critical Infrastructures (\$)
Flood	The following Jurisdictions in Columbia County have structures and/or critical infrastructure located within flood zones:	N/A	N/A	N/A
	Town of Ancram	0	20,429,748	0
	Town of Austerlitz	719,775	1,765,500	20,400,750
	Town of Canaan	0	13,004,550	15,218,550
	Town of Chatham	1,008,225	16,807,196	141,450,003
	Village of Chatham	53,550	372,300	7,856,874
	Town of Claverack	1,774,800	8,042,070	0
	Town of Clermont	1,872,900	10,893,300	10,236,000
	Town of Copake	6,416,784	3,862,688	25,391,584
	Town of Gallatin	1,977,075	11,735,100	8,000,000
	Town of Germantown	0	1,118,250	0
	Town of Ghent	0	1,371,300	0
	Town of Greenport	0	102,660	0
Town of Hillsdale	2,525,625	6,770,550	2,880,000	

4. Hazards in Columbia County

Table 4-4 Localized Hazards

Hazard	Potential Risk	Potential Loss to Commercial Occupancies (\$)	Potential Loss to Residential Occupancies (\$)	Potential Loss to Critical Infrastructures (\$)
	City of Hudson	11,614,838	11,572,023	0
	Town of Kinderhook	727,875	2,718,405	0
	Village of Kinderhook	1,686,209	5,797,928	0
	Town of Livingston	335,250	7,949,850	10,773,176
	Town of New Lebanon	2,621,025	10,407,000	0
	Town of Stockport	0	4,175,732	16,026,152
	Town of Stuyvesant	862,200	3,315,000	8,250,000
	Town of Taghkanic	96,975	7,208,550	8,800,000
	Village of Valatie	523,418	31,951,028	2,708,000
Landslide	The following Jurisdictions in Columbia County are susceptible to risk from landslides:	N/A	N/A	N/A
Dam Failure	Town of Greenport	1,123,875	320,250	6,265,000
	Village of Kinderhook	0	1,240,102	0
	The following Jurisdictions in Columbia County are susceptible to risk from dam failure:	N/A	N/A	N/A
	Town of Taghkanic	168,700	583,000	1,783,600
	Village of Philmont	0	142,300	89,200

Table 4-5 Contents Value as Percentage of Building Replacement Value

Occupancy Class	Contents Value (%)
Residential	50
Commercial	100
Medical	150
Parking	50
Industrial	150
Construction	100
Agriculture	100
Religious/Non-Profit	100
Emergency Response	150
Government	100
Schools/Libraries	100
Colleges/Universities	150

Source: HAZUS

4.3 Hazard Profiles

4.3.1 Severe Storm

A severe storm is a type of weather condition characterized by high winds and rainfall often accompanied by thunder and lightning. Because of Columbia County's relatively inland location, the effects of hurricanes and nor'easters are similar to severe storms and are therefore included in this section. Severe storms often include hail and can sometimes spawn tornadoes (see Section 4.3.2 below). Precipitation from severe storms can often cause flooding. Winds can reach up to 47 mile per hour in a nor'easter or over 100 miles per hour in a hurricane. Slick roads caused by heavy precipitation may cause serious vehicle accidents.

Geographic Area

All of Columbia County is susceptible to wind damage, localized flooding, and damage from hail and lightning from severe storms.

Extent of Hazard

Past severe storms have caused damage to buildings and power lines, floods, and created conditions that have caused vehicle accidents. Cascading effects from this hazard may include increased vulnerability of life support dependent individuals, blocked roadways, hindered commerce, and damaged infrastructure such as flooded water supply wells. Agriculture, structures, and water supply, communications and power infrastructure in Columbia County are vulnerable to severe storms.

Historical Occurrences

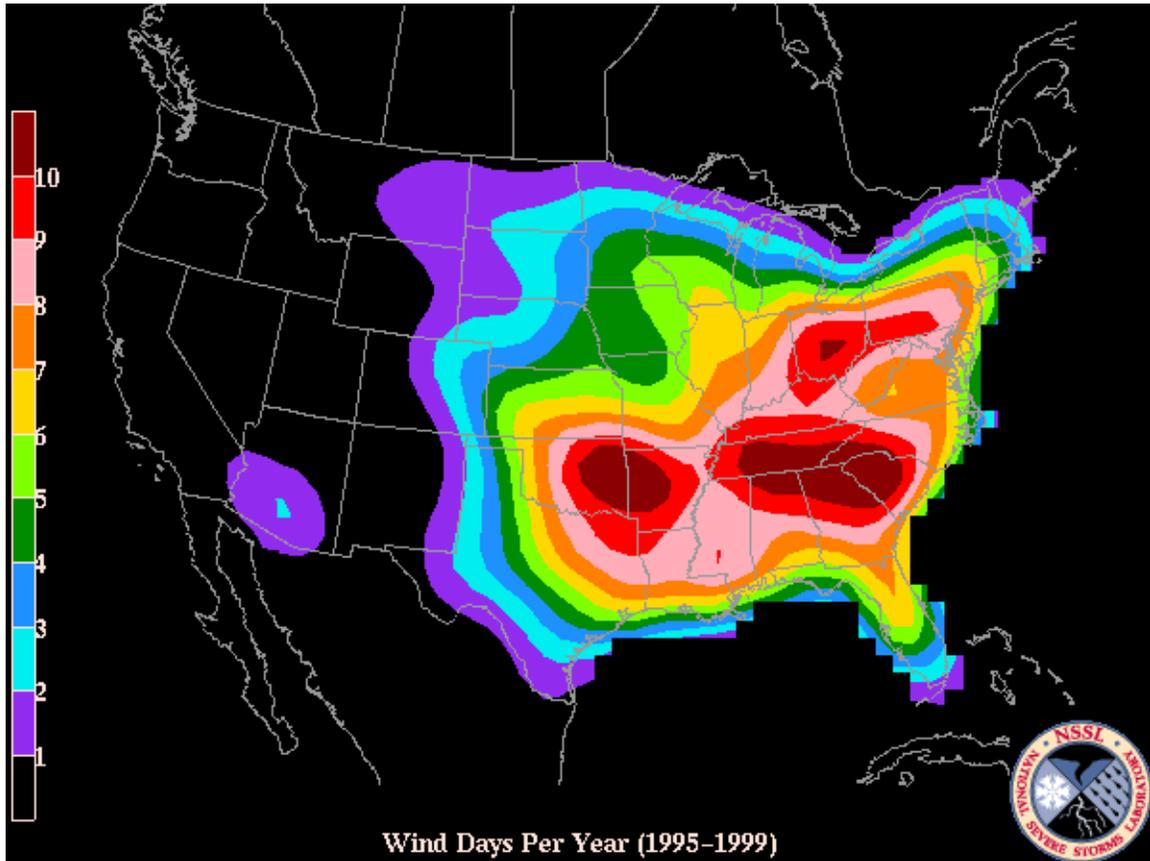
From 1950 to March 2007, Columbia County reported 189 thunderstorm and high wind events causing 1 death, 10 injuries, and \$8,863,000 in property damage. There were also 16 lightning and 35 hail events reported in the same time period. Lightning caused 4 injuries and \$90,000 in property damage while hail caused \$90,000 in property damage and \$1,200,000 in crop damage. No hurricanes have been reported in Columbia County since 1950.

According to the National Climatic Data Center (NCDC), severe storms consisting of thunder, lightning, and/or winds across Columbia County on July 15, 1995, August 4, 1995, October 21, 1995, and July 15, 1996 resulted in a total of \$105,000 in property damage. Since 1993, Clermont, Gallatin, Germantown, Hillsdale, and Livingstone have suffered the most property damage due to severe storms as compared to the rest of Columbia County. Clermont's property damage is totaled at \$105,000, Gallatin at \$117,000, Germantown at \$307,000, \$136,000 at Hillsdale, and Livingstone at \$505,000.

In Stuyvesant, \$200,000 worth of crops were lost after the May 31, 1998 hailstorm; and in Livingstone, a hailstorm on June 2, 2000 resulted in \$1,000,000 in crop damage.

Probability of Future Events

NOAA’s National Severe Storms Laboratory predicts that in any given year, Columbia County will likely see between 6 and 7 days with severe storms characterized by winds of at least 57.5 miles per hour (Figure 4-3)



Source: <http://www.nssl.noaa.gov/hazard/img/twin9599.gif>

Figure 4-3 Wind Days Per Year

4.3.2 Tornado

Tornadoes are nature’s most violent storms. Spawned from powerful thunderstorms, tornadoes can cause fatalities and devastate a neighborhood in seconds. A tornado appears as a rotating, funnel-shaped cloud that extends from a thunderstorm to the ground with whirling winds that can reach 300 miles per hour. Damage paths can be in excess of one mile wide and 50 miles long. Every state is at some risk from this hazard.¹² Generally, tornado season lasts from March though August but can occur any time of the year.

¹² FEMA <http://www.fema.gov/hazard/tornado/index.shtm>

4. Hazards in Columbia County

Geographic Area

All of Columbia County is susceptible to tornadoes. The high winds associated with tornadoes can affect all areas in Columbia County equally. Figure 4-4 below shows FEMA wind speed design zones and past tornado tracks (1961-1990) for New York State. Figure 4-4a, below, clearly shows that Columbia County is squarely within the area at highest risk for a tornado.

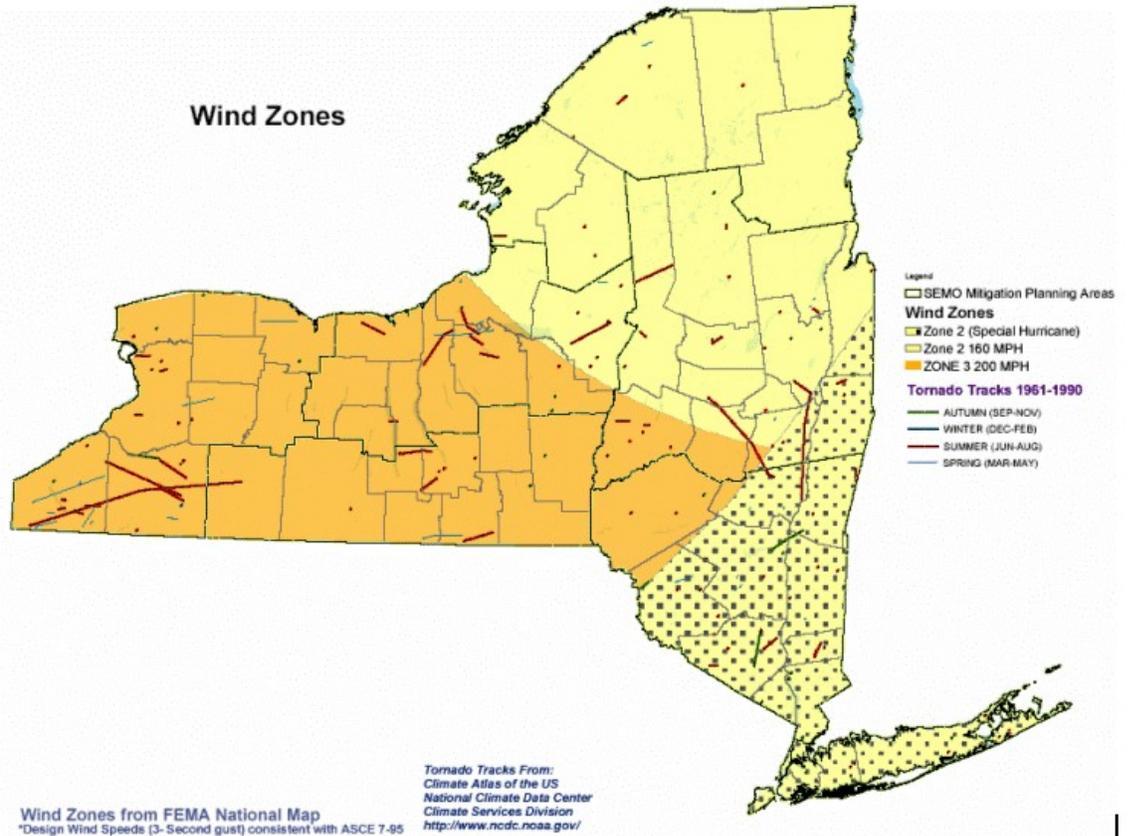


Figure 4-4 Wind Zones

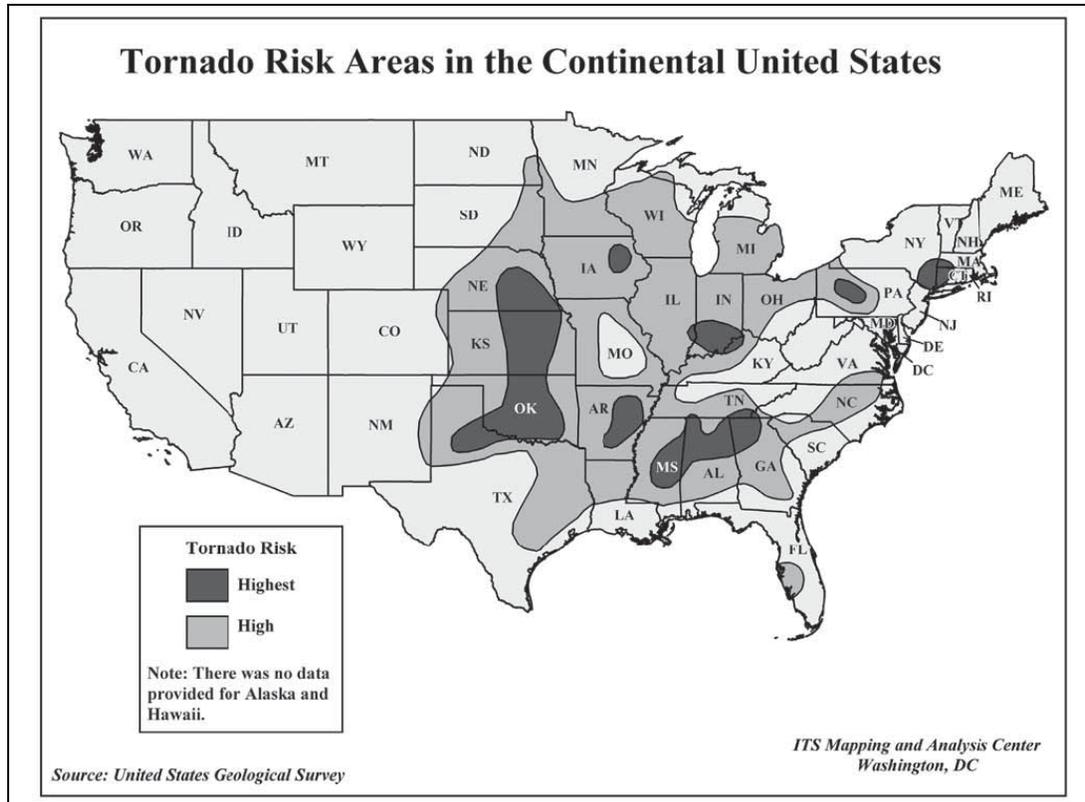


Figure 4-4a Tornado Risk Areas in the United States

Extent of Hazard

Past tornado events have damaged and destroyed buildings and homes, knocked down trees and power lines, destroyed automobiles, and caused crop damage. Susceptible structures are listed in Appendix I. Cascading effects from this hazard may include increased vulnerability of life support-dependent individuals, blocked roadways, hindered commerce, and damaged infrastructure such as flooded water supply wells and damaged electrical infrastructure. Agriculture, structures and power and communications infrastructure in Columbia County are vulnerable to tornadoes.

Historical Occurrences

The New York State Hazard Mitigation Plan shows that between 1950 and 2007 13 tornadoes occurred in Columbia County. On July 15, 1870 a tornado damaged buildings, crops, and fruit orchards and blew off the steeple of the Reformed Church in Kinderhook. On August 28, 1973, a tornado measured at an F4 magnitude on the Fujita Scale passed through Columbia County, resulting in \$25,000 worth of property damage. On May 29, 1995 a tornado caused \$10,000,000 in damages including damage to buildings, trees, cars, and power lines and caused 3 deaths in neighboring Massachusetts. On July 3, 1997 a tornado knocked down trees and power lines as well as damaging buildings in the Town of Copake. From 1950 to March 2007 13 tornadoes were reported in Columbia County with

aggregate property damage of \$11,225,000, crop damage of \$20,000, and 8 injuries.¹³

NCDC query results indicate that a tornado ranging from F0 to F2 on the Fujita Scale passed through Kinderhook and Stuyvesant on the evening of July 21, 2003. The tornado first passed through Kinderhook at 7:32 PM at an F1 magnitude. The tornado then passed through Stuyvesant, Kinderhook, and back through Stuyvesant respectively, each at F0 magnitudes. At 7:43 PM, the tornado finally passed through Kinderhook at an F2 magnitude.

No deaths or crop damages were reported in association with the July 2003 tornado, and one injury in Kinderhook was reported as a result of the F2 tornado. Total property damage sustained during the 2003 tornado was estimated at \$390,000 across both towns. Total property damage was estimated at \$20,000 in Stuyvesant and \$370,000 in Kinderhook.

Figure 4-5 from NOAA depicts the Fujita Scale, created in 1971, that uses damages resulting from a tornado and relates them to the fastest quarter-mile wind at the height of damaged structures.

This original Fujita Scale was used to determine the magnitude of the Columbia County tornadoes reported through 2003. It should be noted that since February 2007 a Modified Fujita Scale is in effect, but no tornadoes have been reported in Columbia County since the new scale was adopted.

Probability of Future Events

NOAA's National Severe Storms Laboratory's Time Series of Tornado Annual Cycle Probability (Figure 4-6) shows that at the peak of tornado season in July Columbia County has on average a 0.25% chance of a tornado in any given year. Although NOAA data suggests that, Columbia County's tornado risk is relatively small, recent history suggests that tornadoes are becoming more prevalent throughout New York State.

¹³ NOAA National Environmental Satellite, Data, and Information Service, National Climatic Data Center's Storm Event Database (Appendix J).

4. Hazards in Columbia County

SCALE	WIND ESTIMATE (MPH)	TYPICAL DAMAGE
F0	< 73	<u>Light damage.</u> Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
F1	73-112	<u>Moderate damage.</u> Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
F2	113-157	<u>Considerable damage.</u> 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	<u>Severe damage.</u> 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	<u>Devastating damage.</u> Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated of structural materials.
F5	261-318	<u>Incredible damage.</u> 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.
NOAA		

Figure 4-5 The Fujita Scale¹⁴

¹⁴ NOAA's National Weather Service, <http://www.spc.noaa.gov/efscale/>

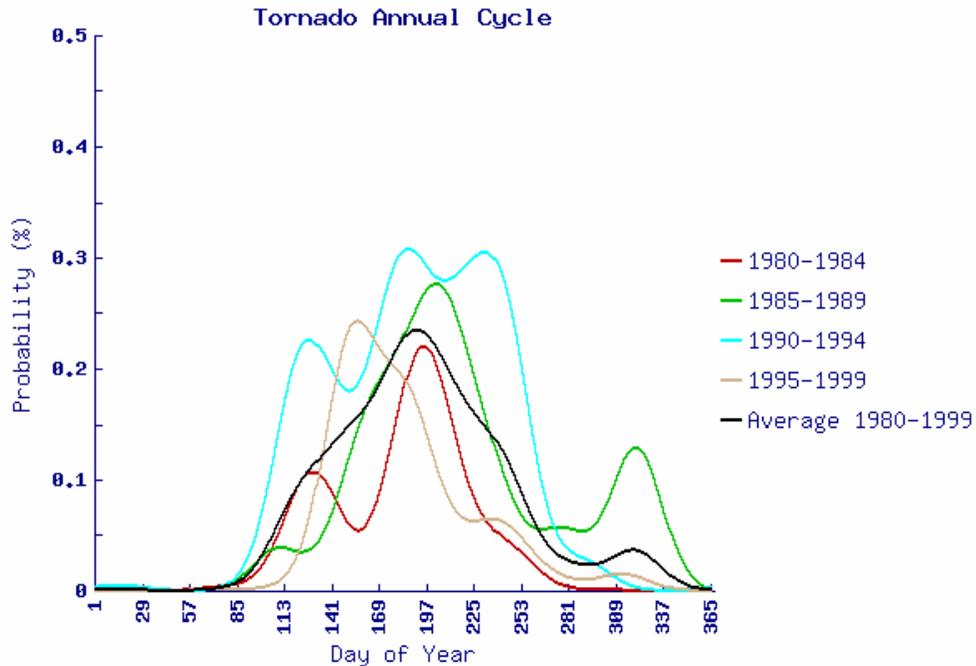


Figure 4-6 Annual Tornado Probability

4.3.3 Flood

A flood is the overflowing of water on to land that is normally dry. Floods can cause great damage to property, infrastructure, agriculture, and human life; and can occur in all 50 states. Although over \$2.4 billion in flood-related property damage occurred nationally between 1995 and 2005, most homeowners still do not have flood insurance.¹⁵

Various weather conditions can result in floods that range in both predictability and severity. The highest risk flood event, for example, is a flash flood as these are typically not predictable, and are associated with violent water flows. This violent flow of water is caused by the rapid flooding of a low lying area resulting from excessive rainfall. Flash flooding may also occur as a result of an ice jam or other blockage of a stream (e.g. dam or bridge collapse). An average flood, however, tends to be more gradual but may still cause significant damage. In addition to rainfall, flooding may be caused by dam failure (see section 4.3.6).

Floods are typically described in terms of their statistical frequency. A “100-year flood zone” describes an area subject to a one percent probability of a certain size flood occurring in any given year. This terminology does not mean such a flood will occur only once in 100 years. It is therefore possible that two 100-year floods could occur within one year or in adjacent years. A “500-year flood zone”

¹⁵ FEMA, <http://www.floodsmart.gov/floodsmart/pages/statistics.jsp>

4. Hazards in Columbia County

describes an area subject to a 0.2 percent probability of a flood occurring in a given year. Most floodplains are mapped by the Federal Emergency Management Agency (FEMA) for their Flood Insurance Rate Maps (FIRMs). FIRMs indicate the boundaries of the 100-year and 500-year flood zones, which are the boundaries most commonly used in hazard mitigation to identify areas where the risk of flooding is significant. Figure 4-7 below illustrates which areas of the Columbia County are located within flood zones in the 100-year floodplain. Figure 4-8 is the key to the flood zone map.

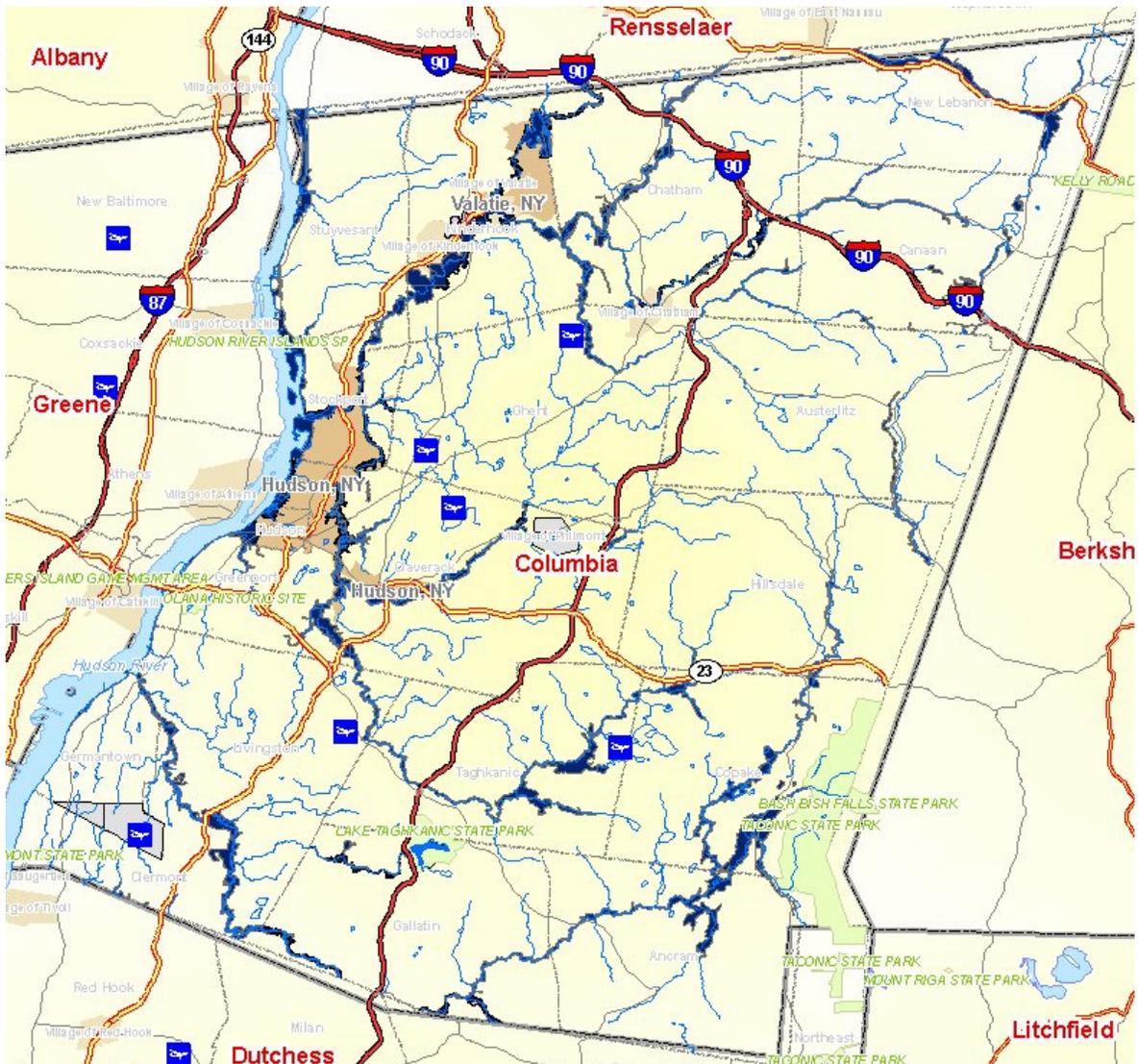


Figure 4-7 Columbia County Q3 Flood Zones

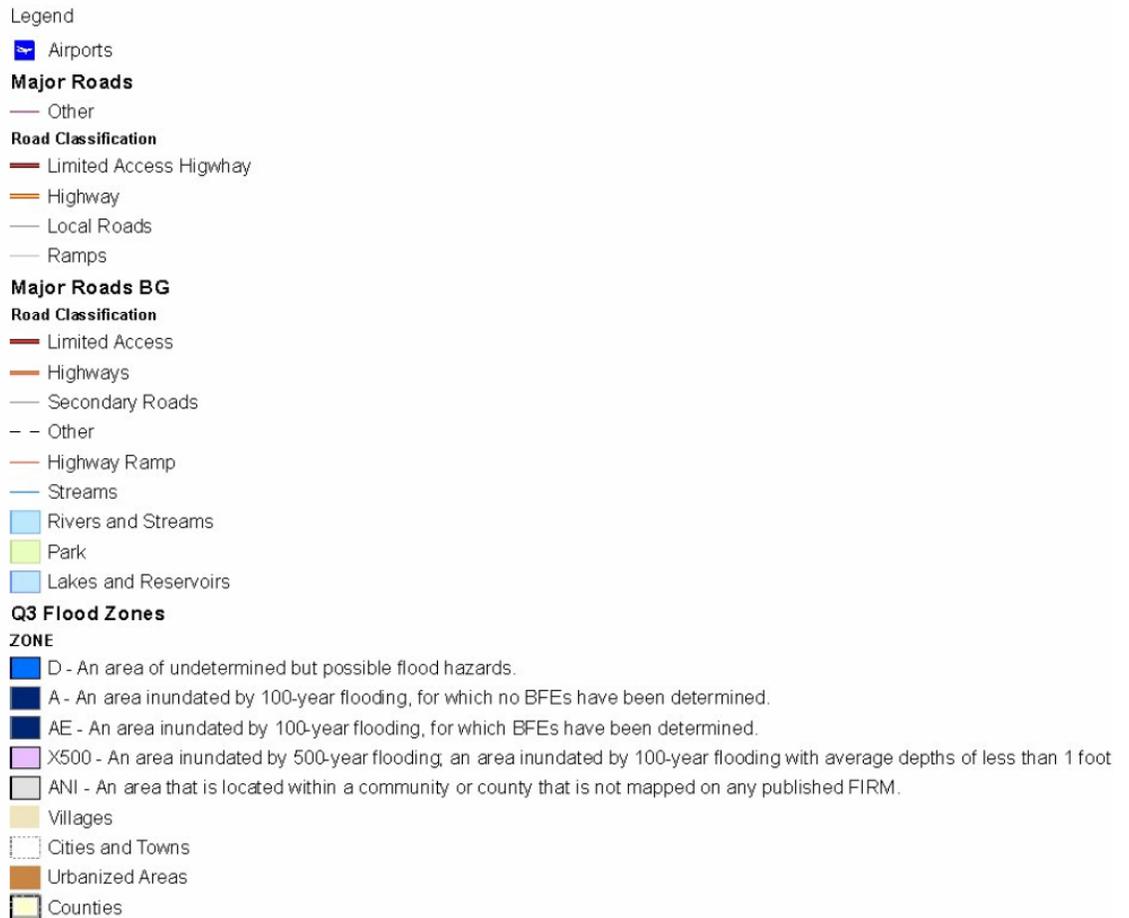


Figure 4-8 Q3 Flood Zone Map Legend

Geographic Area

Columbia County is crisscrossed by streams including, but not limited to, Roeliff-Jansen Kill, Claverack Creek and Kinderhook Creek. The following jurisdictions have structures and/or land located within floodplains as identified by Table 4-2 and in Figure 4-2: Ancram, Austerlitz, Canaan, Chatham town and village, Claverack, Clermont, Copake, Gallatin, Germantown, Ghent, Greenport, Hillsdale, Hudson, Kinderhook town and village, Livingston, New Lebanon, Stockport, Stuyvesant, Taghkanic, and Valatie. Each of these floodplains is subject to flooding. There is also risk of flooding in Columbia County stemming from rainfall due to coastal storms such as hurricanes and nor’easters as well as thunderstorms and downpours in low lying areas. Ice jams may also occur in larger streams and contribute to flooding during the winter.

Extent of Hazard

Past flooding events have affected Columbia County in a variety of ways. Columbia County has suffered bridge collapses, tree and fence loss, road inundation, loss of agricultural products, and other property damage due to floods. In particular, 67 highway and railroad bridges, much critical infrastructure, and many private homes and businesses are at risk. Susceptible bridges and other critical infra-

4. Hazards in Columbia County

structure are listed in Appendix H. Figure 4-9 shows the Columbia County’s building inventory within floodplains. Cascading effects from this hazard may include damaged power lines, blocked roadways, hindered commerce, and damaged infrastructure such as flooded water supply wells and waste water treatment plants. Structures, bridges, and water supply and wastewater infrastructure in Columbia County are vulnerable to flooding. There is much new construction occurring throughout Columbia County that could lead to an increase of flooding potential in all areas of the county. Of note, the NYS Hazard Mitigation Plan states that in Columbia County for every 1 property located in a 100-year flood zone insured by the National Flood Insurance Program (NFIP) there are 5.67 properties that are not insured against flooding. Figure 4-8a, below shows that there are 646 properties in Columbia County within 100 year flood zones with an aggregate property value of \$134,514,908.00. There are 218 NFIP policies written in Columbia County covering a total property value of \$42,976,400.00. Since 1978 NFIP has paid out \$1,113,413.00 in claims in the county. There are 8 repetitive flood loss properties in the county totaling \$806,823.00 in losses that further data must be collected on to determine the best course of action for mitigation these losses.¹⁶

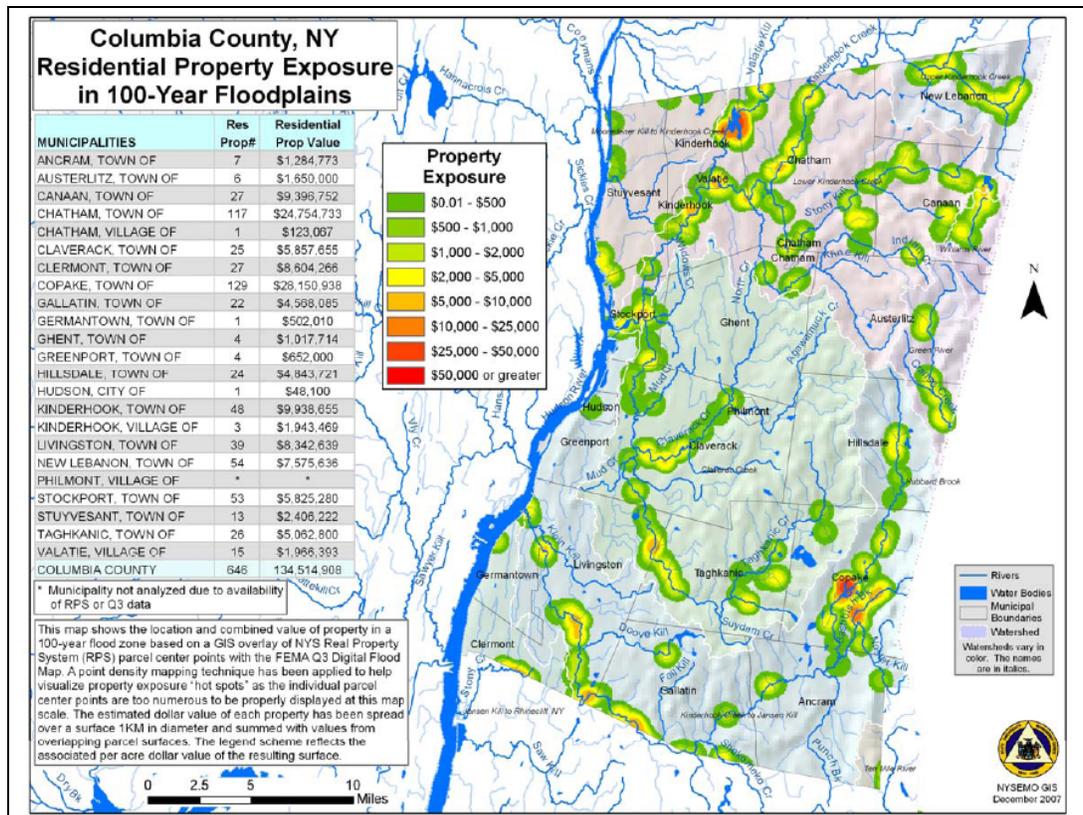


Figure 4-8a Columbia County Residential Property Exposure in 100 Year Floodplains

¹⁶ NYS Hazard Mitigation Plan

Historical Occurrences

Columbia County has a long history of being affected by flooding. Since 1953 there have been 7 presidential disaster declarations for flood events in Columbia County. In 1869 and again in 1945, the covered bridge at Rider's Mills was swept downstream by a flood. In February 1886 the Rider's Mills Bridge was struck by an ice jam being carried by flood waters and again swept downstream. During that same 1886 flood, water and ice also removed a house from its foundation. In 1973 a bridge carrying River Street was damaged by a tree carried by floodwaters, inundated, and left with structural damage. From 1950 to March 2007, Columbia County reported 28 flood events with aggregate property damage of \$8,824,000.¹⁷

According to NCDC query data, no flooding in Columbia County since 1993 has resulted in deaths, injuries, or crop damage. Property damage since 1993 has been reported as high as \$4,000,000 as a result of the countywide flooding on January 19, 1996. The following instances of countywide flooding have caused property damage across Columbia County since 1993: \$500,000 on March 29, 1993; \$20,000 on July 13, 1996; \$600,000 on September 16, 1999, \$75,000 on June 6, 2000, \$1,500,000 on July 2000, and \$100,000 on December 17, 2000.

In Taghkanic, flooding on June 8, 1996 resulted in \$200,000 worth of property damage. Subsequently, on July 13, 1996, flooding caused \$50,000 in property damage in Ancram and \$20,000 in Claverack. Lebanon incurred \$18,000 in property damage on June 2, 2000, and Claverack was hit again with \$15,000 of property damage due to flooding on March 30, 2001. Flooding in Ghent on August 11, 2003 caused \$20,000 in property damage, and in Canaan, flooding on August 30, 2004 flooding caused \$280,000 in property damage.

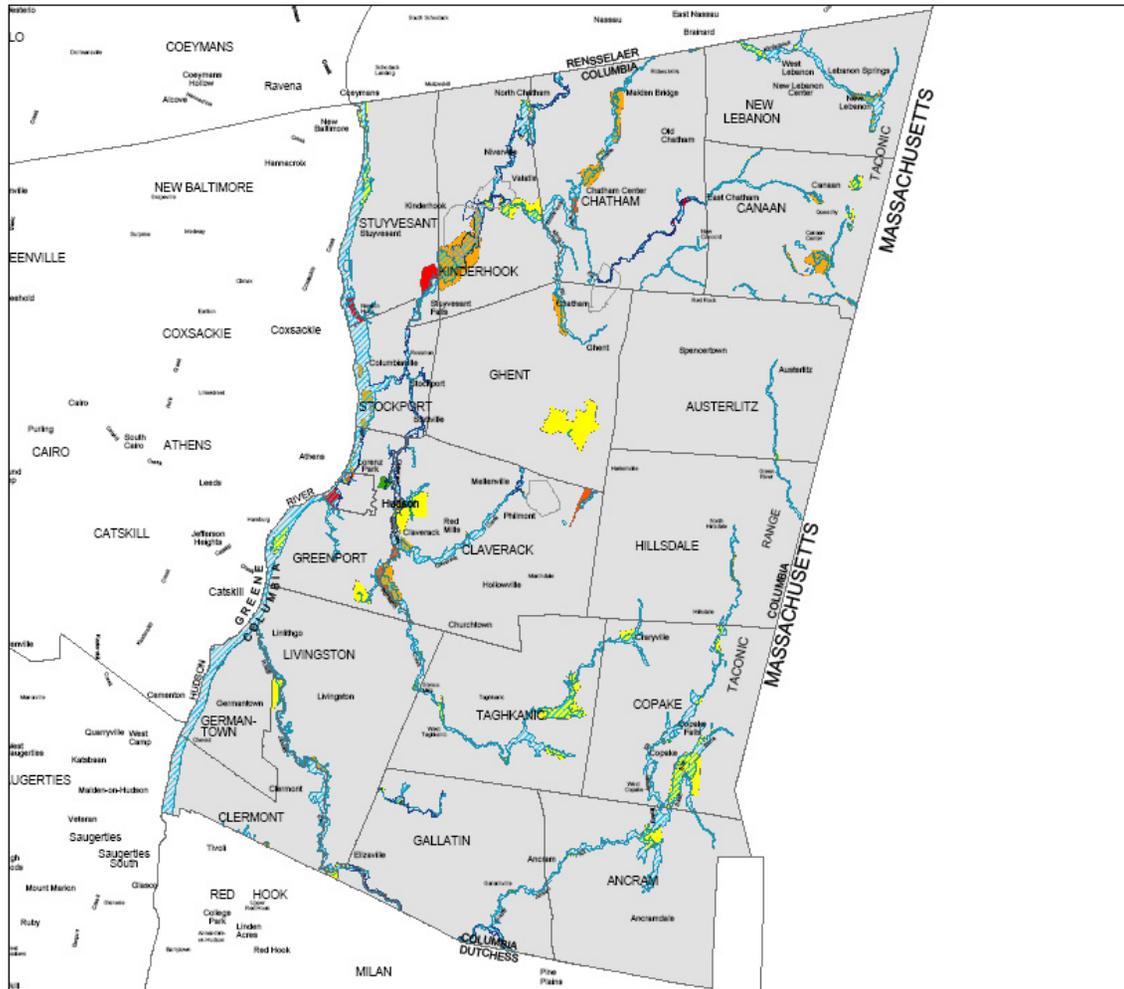
Probability of Future Events

For areas of Columbia County located within 100-year flood zones there is a 1 in 100, or 1% chance annually of a flood. In the 500-year flood zone there is 1 in 500, or 0.2% chance annually of a flood occurring.

4.3.4 Winter Storm (Severe)

A winter storm is a weather phenomenon characterized by near or below freezing temperatures, snowfall, sleet and/or freezing rain. A storm comprised mostly as freezing rain is often referred to as an ice storm. Severe winter storms may be accompanied by high winds, causing low visibility blizzard conditions. Snow left by a winter storm may be picked up by winds at a later date causing the low visibility ground blizzard. According to the National Weather Service, a blizzard is comprised of heavy blowing snow and sustained wind or frequent gusts of 35 miles per hour or great for a period of at least 3 hours. Winter storms can damage

¹⁷ NOAA National Environmental Satellite, Data, and Information Service, National Climactic Data Center's Storm Event Database (Appendix J).



General State	Description	Within 100 Year Floodplain	Total	Percent
POP000		5449	83004	6.5%
HOUSHC0LDS		1582	24796	6.4%
HOUSING UNITS		1536	30007	5.1%
By Occupancy Class				
RES11	Single Family	852	12671	6.7%
RES21	Multi-Family	73	3628	2.0%
RES24	Multi-Family - Duplex	59	683	8.6%
RES3E1	Multi-Family - 3-4 Units	25	187	13.4%
RES3C1	Multi-Family - 5-9 Units	0	9	0.0%
RES3C2	Multi-Family - 10-19 Units	0	2	0.0%
RES3E2	Multi-Family - 20-49 Units	0	0	0.0%
RES3E3	Multi-Family - 50+ Units	0	0	0.0%
RES4	Temporary Lodging	0	0	0.0%
RES9	Institutional Dormitory	1	12	8.3%
RES91	Nursing Home	0	0	ND(V/D)
SubTotal		1056	17742	6.2%
COM11	Retail Trade	0	0	0.0%
COM2	Wholesale Trade	1	3	10.1%
COM3	Personal and Repair Services	4	26	7.6%
COM4	Business/Professional/Technical	0	0	4.7%
COM5	Depository Institutions	1	11	3.5%
COM6	Hospital	0	0	0.0%
COM7	Medical Office/Clinic	5	7	4.9%
COM8	Entertainment and Recreation	2	27	4.5%
COM9	Theaters	0	1	7.1%
COM10	Parking	0	0	0.0%
SubTotal		13	76	17.3%
IND1	Heavy	0	3	3.1%
IND2	Light	0	5	3.6%
IND3	Food/Drugs/Chemicals	0	0	2.5%
IND4	Metals	0	3	0.0%
IND5	Minerals/Processing	0	3	16.7%
IND6	Construction	0	1	5.8%
SubTotal		0	16	0.0%
AGR11	Agriculture	0	4	40.0%
REL11	Church/Membership Organizations	0	13	3.3%
SOV11	General Services	0	4	1.5%
SOV2	Emergency Response	0	1	7.1%
EDU11	Schools/Universities	0	0	0.0%
EDU2	Colleges/Universities	0	0	0.0%
SubTotal		0	22	0.0%
TOTAL		1069	17754	6.2%

*Based on Blockgroup Aggregation
Source: Hazus MH Build 35

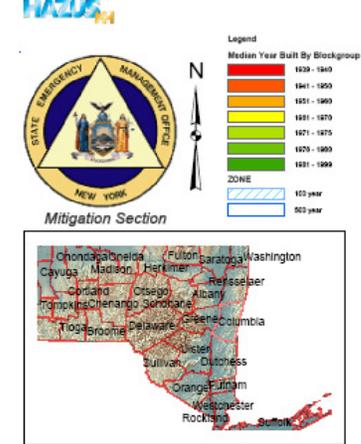


Figure 4-9 Columbia County: Building Inventory within 100 Year Floodplain

and destroy crops, and cause damage to structures from the weight of snow, downed power and communications lines, interfere with wireless and satellite communications transmissions, and create dangerous road conditions.

Geographic Area

All of Columbia County is susceptible to frequent severe winter storms.

Extent of Hazard

Past severe winter storms have affected Columbia County in a variety of ways. Collapsed roofs, damaged and destroyed trees and crops, downed power and communications lines, and motor vehicle accidents have all resulted from winter storms. It is also important to note that cleanup costs resulting from winter storms are often exorbitant. Cascading effects from this hazard may include increased vulnerability of life support-dependent individuals, blocked roadways, and hindered commerce. Structures, agriculture, and transportation infrastructure in Columbia County are vulnerable to severe winter storms.

Historical Occurrences

To some, Columbia County is synonymous with heavy winter snows. Snow on the ground is a predominant feature of Columbia County in the winter months. On October 4, 1987 over a foot of snow fell. Downed power lines caused fires, many traffic accidents were reported, and two were killed by falling trees in Copake and Chatham.¹⁸ Some areas of the county were without electricity for up to two weeks. Columbia County received a federal disaster declaration for this event. From 1950 to March 2007, 71 snow and ice events were reported in Columbia County causing \$16,533,000 in property damage.

According to NCDC query results, a series of winter storms occurred in Columbia County on January 3, February 17, April 4, December 6, and December 14, 2003. On the whole, no deaths, injuries, or crop damages were reported in association with these 2003 winter storms. However, property damage from the January 2003 was estimated at \$430,000 across multiple New York counties including Columbia. Overall since 1993, the most damage to property occurred during the heavy snow storm on January 7, 1996, causing \$640,000 worth of damage across multiple New York counties. Information specific to towns and villages within Columbia County was not provided in the NCDC database.

Probability of Future Events

While it is difficult to predict the probability of future severe winter storms, the map below (Figure 4-10) shows that average annual snowfall from 1971 to 2000 has been 41.8 inches in Columbia County. It is fair to expect that this average will continue for the future.

¹⁸ “Early Snowstorm Covers Northeast,” New York Times, 10/5/87

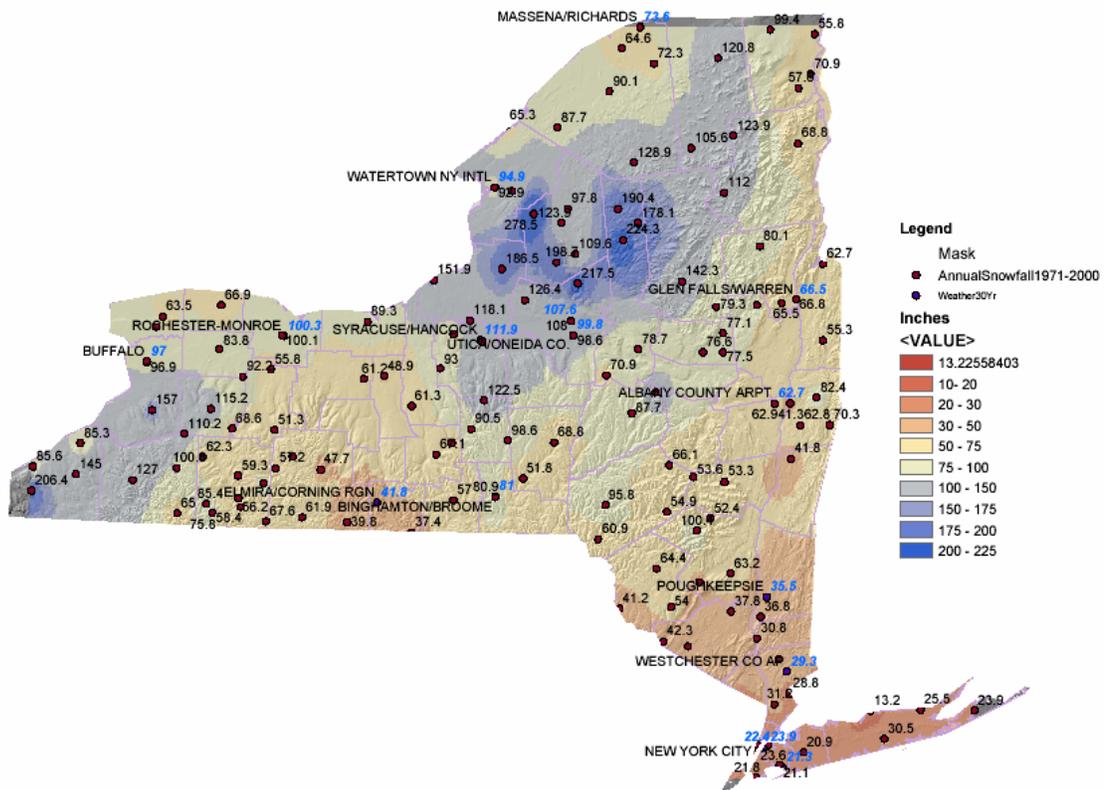


Figure 4-10 Annual Snowfall Normals, 1971-2000

4.3.5 Earthquake

An earthquake is the sudden, sometimes violent movement of the earth's surface from the release of energy in the earth's crust.¹⁹ While earthquakes are not common in New York State, the extended period of time between events leads to laxity and therefore requires planning and preparedness. The magnitude, or intensity, of earthquakes is described in terms of the Richter Scale. The table below (Table 4-6) shows the relationship between earthquake magnitude and what is felt and seen.

Geographic Area

All jurisdictions in Columbia County are equally susceptible to earthquakes.

¹⁹ Center for Earthquake Research and Information, University of Memphis. Retrieved 9/24/07 from: <http://www.ceri.memphis.edu/aware/follies.html>

Table 4-6 Earthquake Magnitude

Richter Magnitudes	Earthquake Effects
Less than 3.5	Generally not felt, but recorded.
3.5-5.4	Often felt, but rarely causes damage.
Under 6.0	At most slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings.
6.1-6.9	Can be destructive in areas up to about 100 kilometers across.
7.0-7.9	Major earthquake. Can cause serious damage over larger areas.
8 or greater	Great earthquake. Can cause serious damage in areas several hundred kilometers across.

Source: Eastern Illinois University, <http://www.ux.1.eiu.edu/~cfjps/1300/magnitude.html>

Extent of Hazard

Earthquakes have not previously occurred in Columbia County, however there is data on how hard the ground would shake if there were an earthquake in Columbia County; measured by Peak Ground Acceleration (PGA). USGS research shows that there is a one in ten chance that Peak Ground Acceleration in Columbia County will exceed 3% of the normal force of gravity in a 50 year period (Figure 4-11). Cascading effects from this hazard may include increased vulnerability of life support dependent individuals, blocked roadways, hindered commerce, and damaged infrastructure such as broken gas and water mains. The damage to physical infrastructure may also make the affected area more susceptible to fires and explosions. Structures, and transportation, power, communications, natural gas, and transportation infrastructure in Columbia County are vulnerable to earthquakes. The NYS Hazard Mitigation Plan states that there is a total exposure of \$4,424,658.00 to earthquakes in the county.

Historical Occurrences

While there is little information on recorded earthquakes in Columbia County, in November 1727 there was an earthquake centered east of Newbury, Massachusetts, an area with the same PGA value as Columbia County, that was felt from Maine to the New York/Pennsylvania border. This earthquake destroyed many stone walls and brick chimneys and changed the direction of the flow of water in some springs.²⁰ Figure 4-12 below shows earthquake epicenters in New York State from 1737 to 1986 including two in Columbia County.

Probability of Future Events

While it is difficult to predict the probability of future earthquakes, many experts believe that New York State is overdue for a major earthquake. In summary, the frequency of damaging earthquakes within and adjacent to New York State has been relatively low. However, large, damaging earthquakes have occurred in the past. This history, combined with the State's high population density and number

²⁰ http://earthquake.usgs.gov/regional/states/events/1727_10_10.php

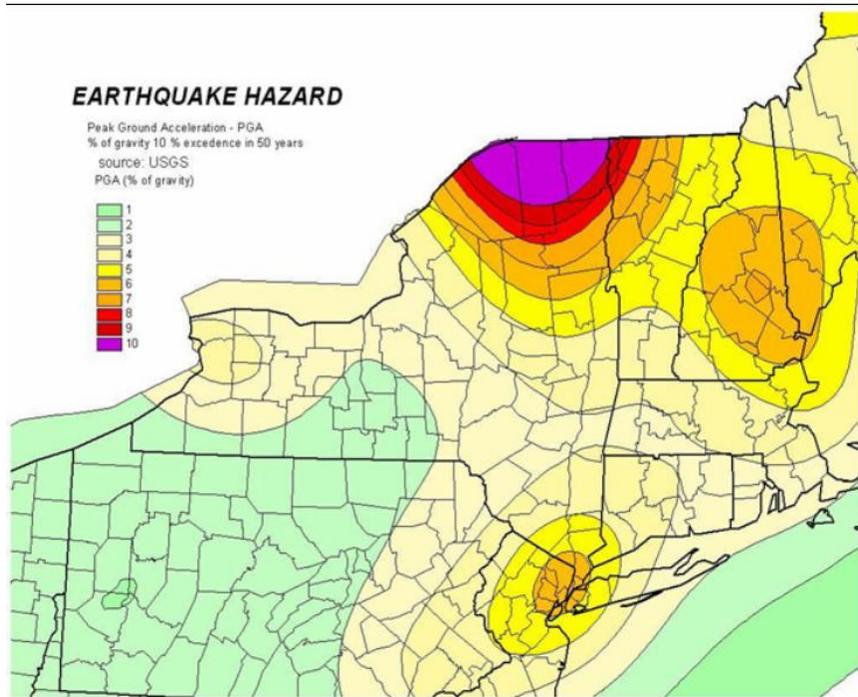


Figure 4-11 Peak Ground Acceleration

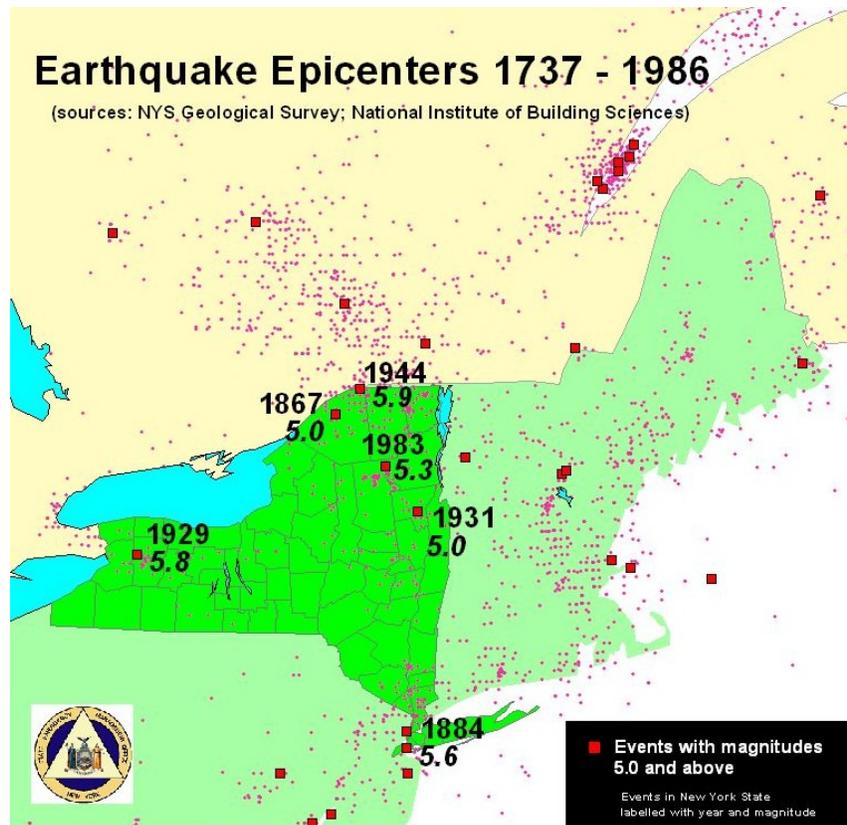


Figure 4-12 Earthquake Epicenters, 1737-1986

of old and deteriorating buildings suggests that many people are at risk from damaging earthquakes in New York State.

4.3.6 Dam Failure

According to the Association of State Dam Safety Officials, 38% of dam failures are caused by overtopping or water flowing over the dam, another 30% are caused by foundation defects such as soil instability, 20% are caused by internal erosion caused by seepage, and the remainder are usually caused by structural failure of materials used to construct the dam. When a dam fails structures located downstream can be destroyed or suffer flood damage, people and livestock can be drowned, and crops destroyed. Dams often facilitate marine navigation, water supply, and/or hydroelectric power generation. Another concern is that these may be interrupted by a dam failure.

Dams are rated into three hazard potential classifications, low, significant, or high, by the US Army Corps of Engineers based upon the effect on essential services and loss of life, property, and natural resources that could result from the failure of that particular dam.

Geographic Area

There are 33 dams located in Columbia County.²¹ Two, the Summit Lake Dam in Philmont and the Churchtown Reservoir Dam in Taghkanic, are rated as high hazard potential dams. All dams located in Columbia County are shown in Figure 4-13 with the two high hazard dams highlighted.

Extent of Hazard

Of the two high hazard classification dams in Columbia County, one, the Summit Lake Dam, is located in a heavily populated area. The population in the area of the Churchtown Dam is less dense. Nevertheless it is expected that the failure of either one of these dams would result in large losses of life, property, and agricultural resources. In addition both of these dams impound water supply reservoirs; this means that a dam failure would have far reaching effects on the availability of drinking water and possibly other municipal services. Cascading effects from this hazard may include increased vulnerability of life support dependent individuals, hindered commerce, and civil unrest. In addition to the vulnerability posed by the resulting floods, water supply infrastructure in Columbia County is vulnerable to dam failure.

Historical Occurrences

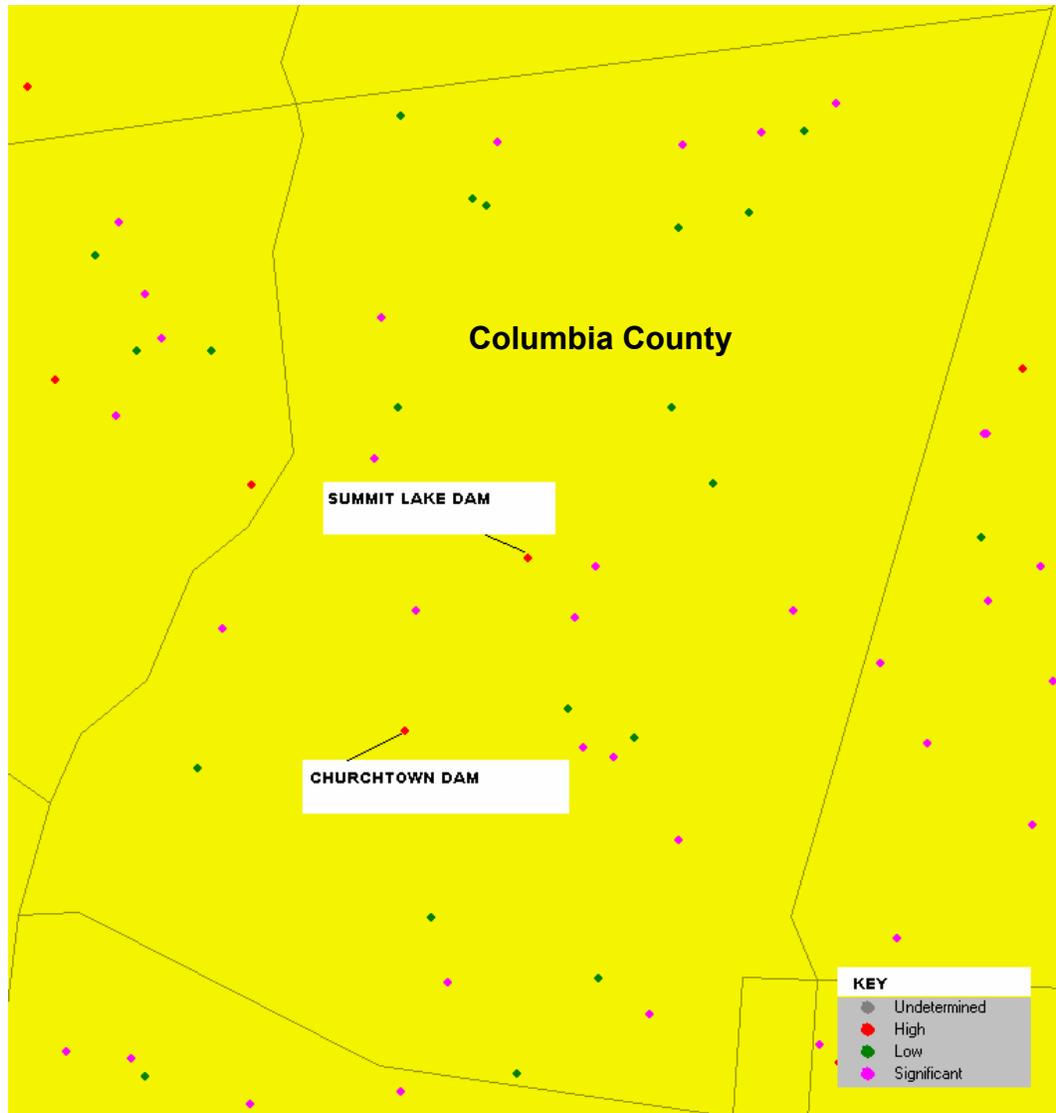
There have been no previous occurrences of dam failure in Columbia County.²²

²¹ US Army Corps of Engineers, National Inventory of Dams

²² http://www.damsafety.org/media/Documents/US_FailuresIncidents.pdf

Probability of Future Events

Determining the probability of future dam failures is an intensive process that must be performed by an engineer and is beyond the scope of this project. Such information may be included in a future revision of the plan. It should be noted however that dams are inspected on a regular basis for structural integrity by NYSDEC and/or USACE.



Source: US Army Corps of Engineers, National Inventory of Dams

Figure 4-13 Dams in Columbia County

4.3.7 Landslide

A landslide is a geological phenomenon that includes rock falls, deep slope failure, or shallow debris flows. Characterized by the sudden fall of earth from a hillside or cliff, landslides are often caused by gravity's action on an over-steepened slope exacerbated by seismic triggers, erosion, or saturation by water.

The resulting flow of debris or earth can carry trees, automobiles, or even buildings, often destroying them in the process. Structures atop a slope susceptible to landslide are also at risk. Clean up can also be a problem when the debris or earth settles upon roads or other infrastructure. Landslides are capable of causing great death and injury; often people trapped in a landslide will not die immediately but suffer from eventual asphyxiation.

Geographic Area

The entire Hudson River Coast of Columbia County has a high incidence of landslides, however only two jurisdictions in Columbia County, the Town of Greenport and the Village of Kinderhook, reported past incidences of and susceptibility to landslides.

Extent of Hazard

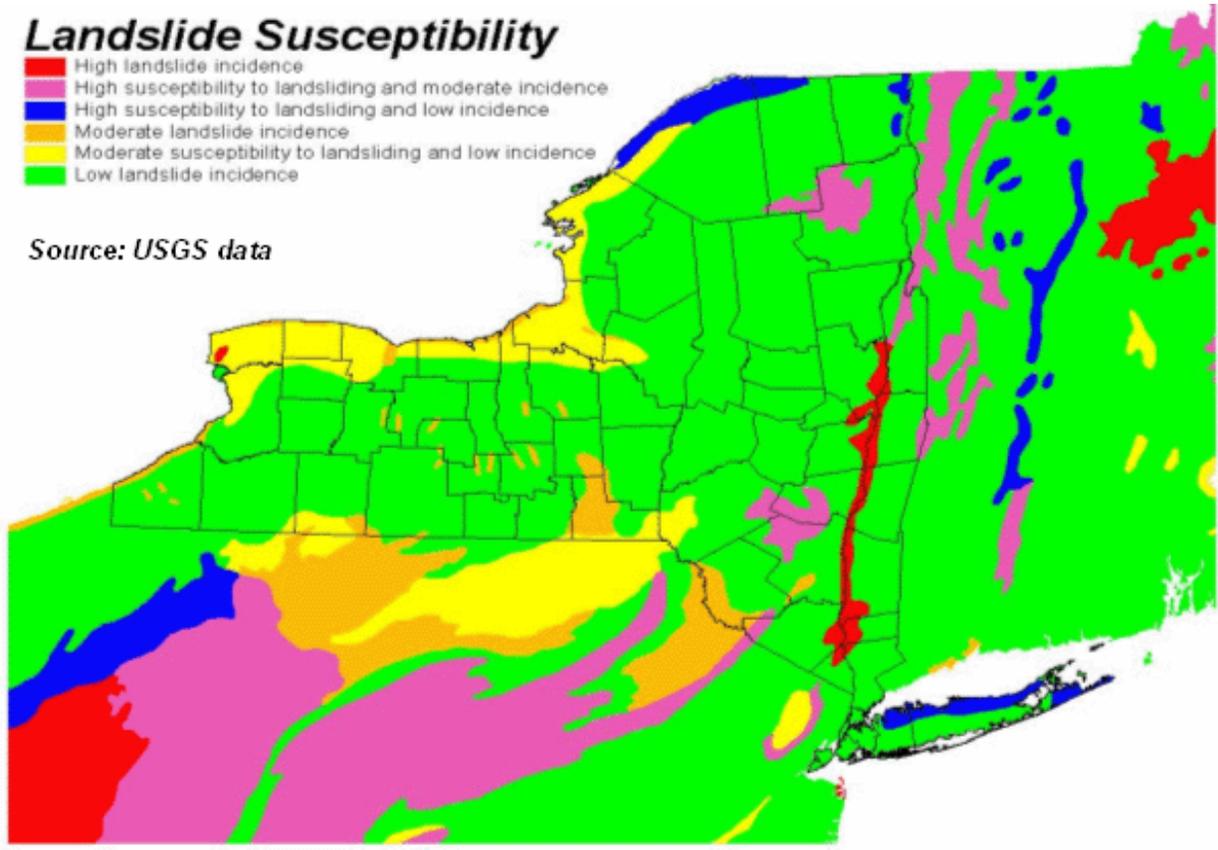
In past landslides in Columbia County parking lots and recreational facilities were destroyed while other buildings were at risk of collapse. One landslide occurred in the area behind the county jail and there was fear that the jail might need to be evacuated. Past landslides have occurred in relatively unpopulated areas and this has limited the amount of damage that has been done. If a landslide were to occur in a more heavily populated area it is expected that greater property damage as well as injuries and even deaths could occur. Cascading effects from this hazard may include increased, blocked roadways, hindered commerce, and damaged infrastructure such as underground power, water, and sewer service. Structures and communications and underground infrastructure in Columbia County may be vulnerable to landslides.

Historical Occurrences

In the Town of Greenport, the area behind the Italian American Club on Bridge Street suffered a landslide on February 2, 2006. In the Village of Kinderhook, the area south of the intersection of Church Street and Sylvester Street suffered a slowly occurring landslide in 2005-2006.

Probability of Future Events

Figure 4-14 below shows areas of New York State susceptible to landslides. The map shows that the area along the Hudson River in Columbia County has a high incidence of landslides, meaning that 15% or more of the red colored area on the map may slide at any given time.



Source: NYSEMO

Figure 4-14 Landslide Susceptibility

5

Hazard Mitigation

5.1 Mitigation Goals and Objectives

In keeping with the FEMA publication entitled *Developing the Mitigation Plan: Identifying Mitigation Actions and Implementing Strategies (FEMA 386-3)*, the Planning Team developed mitigation goals and objectives to support mitigation planning. Mitigation goals were developed using the results of the hazard identification and risk assessment and the detailed information provided in the hazard profiles. Other considerations in setting these goals included existing strategic planning goals and objectives at the County and local level as well as other existing policies, programs, resources and capabilities throughout the County. The mitigation goals are designed to be general guidelines explaining what the County and the participating jurisdictions seek to achieve based on these considerations. The Planning Team then developed objectives to support the accomplishment of the mitigation goals and define the strategies and implementation steps to attain the identified goals. These goals and the corresponding objectives are listed below.

Mitigation measures will be implemented in order to improve the safety and security of local residents, businesses and visitors by reducing the impact of natural hazards on life, safety and property throughout the County, including economic and cascading impacts.

Goals: The goals and objectives of implementing mitigation measures in Columbia County are to:

Goal 1: Protect Life and Property

- *Objective 1-1:* Implement mitigation actions that will assist in protecting lives and property by making homes, businesses, infrastructure, and critical facilities more resistant to hazards.
- *Objective 1-2:* Encourage property owners to take preventive actions in areas that are especially vulnerable to hazards.

- *Objective 1-3:* Better characterize flood/stormwater hazard events by conducting additional hazard studies and identify inadequate stormwater facilities and poorly drained areas.
- *Objective 1-4:* Review existing local laws and ordinances, safety inspection procedures, and applicable rules to help ensure that they employ the most recent and generally accepted standards for the protection of buildings and environmental resources.
- *Objective 1-5:* Incorporate hazard considerations into land-use planning and natural resource management.
- *Objective 1-6:* Educate homeowners, renters, and businesses about insurance coverage available for natural hazards (i.e., flooding).
- *Objective 1-7:* Integrate the recommendations of this plan into existing local programs.
- *Objective 1-8:* Implement mitigation actions that encourage environmental stewardship and protection of the environment.

Goal 2: Increase Public Awareness

- *Objective 2-1:* Develop and implement additional education and outreach programs to increase public awareness of the risks associated with hazards and to educate the public on specific, individual preparedness activities.
- *Objective 2-2:* Provide information on tools, partnership opportunities, funding resources, and current government initiatives to assist in implementing mitigation activities.
- *Objective 2-3:* Implement mitigation actions that enhance the technological capabilities of the Village to better profile and assess exposure of hazards.
- *Objective 2-4:* Provide comprehensive information to local emergency service providers, municipalities, the media and the public during and following disaster and hazard events regarding emergency traffic routes, road closures, shelter locations, traffic restrictions, etc.

Goal 3: Encourage Partnerships

- *Objective 3-1:* Strengthen inter-jurisdiction and inter-agency communication, coordination, and partnerships to foster hazard mitigation actions and/or projects.
- *Objective 3-2:* Identify and implement ways to engage public agencies with individual citizens, non-profit organizations, business, and industry to implement mitigation actions more effectively.
- *Objective 3-3:* Encourage shared services in acquiring maintaining and providing emergency services and equipment.

- *Objective 3-4:* Encourage partnerships between neighborhood groups to work together and address hazards specific to their areas.

Goal 4: Provide for Emergency Services

- *Objective 4-1:* Encourage the establishment of policies to help ensure the prioritization and implementation of mitigation actions and/or projects designed to benefit essential facilities, services, and infrastructure.
- *Objective 4-2:* Where appropriate, coordinate and integrate hazard mitigation actions with existing local emergency operations plans.
- *Objective 4-3:* Identify the need for, and acquire, any special emergency services, training, and equipment to enhance response capabilities for specific hazards.
- *Objective 4-4:* Review and improve, if necessary, emergency traffic routes; communicate such routes to the public and communities.
- *Objective 4-5:* Ensure continuity of governmental operations, emergency services, and essential facilities at the local level during and immediately after disaster and hazard events.
- *Objective 4-6:* Identify and pursue funding opportunities to develop and implement local and county mitigation activities.
- *Objective 4-7:* Maintain communications with county/state regarding drainage and icy-road conditions.

5.2 Recent Mitigation Measures

Mitigation measures implemented recently in Columbia County are listed in table 5-1 below.

Table 5-1 Recent Mitigation Measures

Jurisdiction	Measure
Town of Ancram	FEMA funded culvert improvements
Town of Clermont	Code prohibits building within 500 feet of flood zones
Town of Livingston	FEMA funded culvert improvements

5.3 Identification and Analysis of Mitigation Actions

The Planning Team has listed potential mitigation measures to be taken (Table 5-2) and then, using STAPLEE criteria explained in further detail in Section 5.4, identified and prioritized a comprehensive range of specific mitigation actions to be implemented. These actions target the reduction of the effects of the hazards identified Countywide on the lives and safety of people and on existing and new buildings and infrastructure. The actions identified were chosen or designed to

relate to the mitigation goals and objectives listed above. The mitigation activities include a range of options including the following six types of categories:

- **Prevention:** apply administrative or regulatory actions or processes that influence the way land and buildings are developed and built. These actions also include public activities to reduce hazard losses such as zoning, capital improvements and the like.
- **Property Protection:** modify existing buildings or structures to protect them from a specific hazard or removing structures from the area of impact for a specific hazard.
- **Public Education and Awareness:** inform and educate citizens, elected officials, and property owners about hazards and potential mitigation strategies.
- **Natural Resource Protection:** minimize losses from hazard impacts and also preserve or restore the functions of natural systems.
- **Emergency Services:** protect people and property, during and immediately following a disaster or emergency event.
- **Structural Projects:** establish structural construction projects that reduce the impact of a specific hazard such as retaining walls or culverts.

Table 5-3 lists the mitigation actions identified by the Planning Team for implementation. To the extent that the information is available at the current time, details concerning estimated cost, implementation timeline, and the agencies or jurisdictions responsible for implementation have been included. The table also identifies which mitigation goals and hazards are addressed by each mitigation measure. Where “all-hazards” is indicated it means that the mitigation measure addresses all hazards profiled in this plan: Earthquake, Winter Storm (Severe), Flood, Landslide, Tornado, and Severe Storm. Mitigation activities and projects were submitted for inclusion in the plan by participating jurisdictions and some were identified for inclusion by the Planning Team as a whole. The Planning Team reviewed all activities and projects to ensure that they supported the mitigation goals and objectives adopted by the Planning Team. Mitigation activities were evaluated and discussed at various meetings of the Planning Team and during meetings with individual participating jurisdictions to determine which projects and activities should be included in the plan and what priority should be assigned to each.

The Planning Team determined that it is in the best interest of citizens, visitors and businesses Countywide to be as inclusive as possible with respect to a particular project if it would significantly reduce the County’s or a community’s vulnerability to a significant hazard. Only those projects that had legal or technical flaws or had prohibitive costs with no corresponding major benefit were eliminated from inclusion in the plan. Once the activities and projects were identified

they were assigned a priority level: high, moderate, or low. Priority levels and benefit/cost analyses are also indicated in Table 5-3. The methodology used to prioritize the projects is described further in Section 5.4 as are the planned methods for implementing the priority projects. Of note, the roads identified as needing paving are currently dirt and or gravel roads with poor drainage. Paving these roads will allow for better drainage and quicker recovery from flood events.

Table 5-2 Mitigation Measures Considered

Jurisdiction	Hazard(s) Addressed	Mitigation Measure
Stockport	Flood	■ Relocate homes in floodplains
	Severe Storm, Winter Storm (Severe), Tornado	■ Trim trees by power company house
	Flood	■ Relocate Begos Road out of the floodplain
Copake	All Hazards	■ Public preparedness information campaign
Germantown	All Hazards	■ Public preparedness information campaign
Chatham Town	Flood	■ Clear debris to drain swamp
	Flood	■ Clear debris in sluiceway
Austerlitz	Flood	■ Reinforce bridges over the Green River
	Flood	■ Replace the West Hill Rd culvert
	Flood	■ Clean and inspect culverts: – East Hill Road – Harvey Road
Stuyvesant	All Hazards	■ Public preparedness information campaign
Canaan	All Hazards	■ Public preparedness information campaign
Claverack	Flood	■ Improve drainage on all roads in floodplain
Hillsdale	Flood	■ Pave roads: – Wolf Hill Rd – Harlemville Road – Pumpkin Hill Rd – Rodman Road – Pheasant Lane – Phudd Hill – Herrington Rd – Lockwood Road – Hereford Hills – Texas Hill Rd
Kinderhook Village	All Hazards	■ Public preparedness information campaign

Table 5-2 Mitigation Measures Considered

Jurisdiction	Hazard(s) Addressed	Mitigation Measure
Philmont	All Hazards	<ul style="list-style-type: none"> ■ Public preparedness information campaign
Hudson	All Hazards	<ul style="list-style-type: none"> ■ Public preparedness information campaign
Taghkanic	Flood	<ul style="list-style-type: none"> ■ Improve drainage on all roads located in floodplains
	Flood	<ul style="list-style-type: none"> ■ New Culverts
New Lebanon	Flood	<ul style="list-style-type: none"> ■ Flood control (concrete beds) on: <ul style="list-style-type: none"> – Wyomanock Creek – Kinderhook Creek
Ancram	Winter Storm (Severe)	<ul style="list-style-type: none"> ■ Snow fencing on: <ul style="list-style-type: none"> – Carson Road – Sawchuck Road – SR 22
	Winter Storm (Severe)	<ul style="list-style-type: none"> ■ Purchase snowblower to mount on payload
Gallatin	All Hazards	<ul style="list-style-type: none"> ■ Public preparedness and flood zone danger information campaign
	Flood	<ul style="list-style-type: none"> ■ Relocate properties on the Roe-Jan creek
Ghent	Flood	<ul style="list-style-type: none"> ■ Reinforce the Arch Road historic bridge
	Flood	<ul style="list-style-type: none"> ■ Flood Control projects (concrete beds)
Chatham Village	Flood	<ul style="list-style-type: none"> ■ Increase sewage plant holding capacity
	Flood	<ul style="list-style-type: none"> ■ Improve drainage on Center Street
	Flood, Winter Storm (Severe), Severe Storm, Tornado	<ul style="list-style-type: none"> ■ Generators at: <ul style="list-style-type: none"> – Sewer plant – Water wells for pumps
Valatie	Flood	<ul style="list-style-type: none"> ■ Improve sewers to eliminate infiltration
	Flood	<ul style="list-style-type: none"> ■ Relocate well to reduce flooding and contamination
Greenport	Flood	<ul style="list-style-type: none"> ■ Build berm around sewer plant to eliminate flooding
Clermont	All Hazards	<ul style="list-style-type: none"> ■ Public preparedness information campaign
Kinderhook Town	Winter Storm (Severe), Severe Storm, Tornado	<ul style="list-style-type: none"> ■ Generator for highway garage



Table 5-2 Mitigation Measures Considered

Jurisdiction	Hazard(s) Addressed	Mitigation Measure
	Flood	■ New culverts: – Rod & Gun Club Road – McCagg Road – Maple Lane – Rabbit Rd – Robin Rd
Livingston	Flood	■ Flood control (concrete beds) on Roe-Jan Creek near Water Street and Old Rt 82
	Flood	■ Repair sluiceway/culvert on Roe-Jan Creek at Rt 9 and Buckwheat Road
Columbia County	All Hazards	■ Public preparedness information campaign

Table 5-3 Final Mitigation Measures

New or Existing	Jurisdiction	Mitigation Activity	Goals Supported/Hazard(s) Addressed	Priority	Estimated Budget (\$)	Benefit/Cost Analysis		Timeframe for Implementation	Responsible Agency or Jurisdiction	Funding Source
						Cost	Benefit			
Both	Countywide	Public preparedness information campaign	2 – All Hazards	High	TBD	L	H	ASAP	CCEMO	HMGP
New	Countywide	Implement building codes to encourage disaster resistant construction for new structures and renovations to existing structures	1 – All Hazards	High	TBD	L	H	ASAP	Building departments of all jurisdictions countywide	TBD
New	Countywide	Implement zoning to discourage building new structures in disaster prone areas	1 – All Hazards	High	TBD	L	H	ASAP	Legislatures of all jurisdictions countywide	TBD
Both	City of Hudson	Public preparedness information campaign	2 – All Hazards	High	TBD	L	H	ASAP	CCEMO	HMGP
Existing	Town of Ancram	Snow fencing on Carson Road to ease snow removal	1 – Winter Storm (Severe)	Moderate	TBD	L	H	Within 6 months of plan implementation	Ancram Highway Department	TBD
Existing	Town of Ancram	Snow fencing on Sawchuck Road to ease snow removal	1 – Winter Storm (Severe)	Moderate	TBD	L	H	Within 6 months of plan implementation	Ancram Highway Department	TBD
Existing	Town of Ancram	Snow fencing on SR 22 to ease snow removal	1 – Winter Storm (Severe)	Moderate	TBD	L	H	Within 6 months of plan implementation	Ancram Highway Department	TBD

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Table 5-3 Final Mitigation Measures

New or Existing	Jurisdiction	Mitigation Activity	Goals Supported/Hazard(s) Addressed	Priority	Estimated Budget (\$)	Benefit/Cost Analysis		Timeframe for Implementation	Responsible Agency or Jurisdiction	Funding Source
						Cost	Benefit			
Existing	Town of Austerlitz	Reinforce bridges over the Green River to prevent damage from flooding	1 – Flood	Low	TBD	M	H	Within 1 year of plan implementation	Austerlitz Highway Department	TBD
Both	Town of Canaan	Public preparedness information campaign	2 – All Hazards	High	TBD	L	H	ASAP	CCEMO	TBD
Existing	Town of Chatham	Clear debris in sluiceway to improve drainage and alleviate road flooding	1 – Flood	Moderate	TBD	M	M	Within 6 months of plan implementation	Chatham Highway Department	TBD
Existing	Town of Claverack	Improve drainage on all roads in floodplain	1 – Flood	Low	TBD	M	M	Within 1 year of plan implementation	Claverack Highway Department	TBD
Both	Town of Clermont	Public preparedness information campaign	2 – All Hazards	High	TBD	L	H	ASAP	CCEMO	HMGP
Both	Town of Copake	Public preparedness information campaign	2 – All Hazards	High	TBD	L	H	ASAP	CCEMO	HMGP
Both	Town of Gallatin	Public preparedness and flood zone danger information campaign	2 – All Hazards, Flood	High	TBD	L	H	ASAP	CCEMO	HMGP
Both	Town of Germantown	Public preparedness information campaign	2 – All Hazards	High	TBD	L	H	ASAP	CCEMO	HMGP

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Table 5-3 Final Mitigation Measures

New or Existing	Jurisdiction	Mitigation Activity	Goals Supported/Hazard(s) Addressed	Priority	Estimated Budget (\$)	Benefit/Cost Analysis		Timeframe for Implementation	Responsible Agency or Jurisdiction	Funding Source
						Cost	Benefit			
Existing	Town of Ghent	Flood Control projects (concrete stream beds)	1 – Flood	Low	TBD	H	M	Within 1 year of plan implementation	Ghent Highway Department	TBD
Existing	Town of Greenport	Build berm around sewer plant to eliminate flooding	1, 4 – Flood	Low	TBD	H	H	Within 1 year of plan implementation	Greenport Sewer Department	TBD
Existing	Town of Hillsdale	Pave Wolf Hill Rd to improve drainage and alleviate road flooding	1 – Flood, Winter Storm (Severe)	Low	TBD	H	M	Within 1 year of plan implementation	Hillsdale Highway Department	TBD
Existing	Town of Hillsdale	Pave Harlemville Road to improve drainage and alleviate road flooding	1 – Flood, Winter Storm (Severe)	Low	TBD	H	M	Within 1 year of plan implementation	Hillsdale Highway Department	TBD
Existing	Town of Hillsdale	Pave Pumpkin Hill Rd to improve drainage and alleviate road flooding	1 – Flood, Winter Storm (Severe)	Low	TBD	H	M	Within 1 year of plan implementation	Hillsdale Highway Department	TBD
Existing	Town of Hillsdale	Pave Rodman Road to improve drainage and alleviate road flooding	1 – Flood, Winter Storm (Severe)	Low	TBD	H	M	Within 1 year of plan implementation	Hillsdale Highway Department	TBD
Existing	Town of Hillsdale	Pave Pheasant Lane to improve drainage and alleviate road flooding	1 – Flood, Winter Storm (Severe)	Low	TBD	H	M	Within 1 year of plan implementation	Hillsdale Highway Department	TBD

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Table 5-3 Final Mitigation Measures

New or Existing	Jurisdiction	Mitigation Activity	Goals Supported/Hazard(s) Addressed	Priority	Estimated Budget (\$)	Benefit/Cost Analysis		Timeframe for Implementation	Responsible Agency or Jurisdiction	Funding Source
						Cost	Benefit			
Existing	Town of Hillsdale	Pave Phudd Hill to improve drainage and alleviate road flooding	1 – Flood, Winter Storm (Severe)	Low	TBD	H	M	Within 1 year of plan implementation	Hillsdale Highway Department	TBD
Existing	Town of Hillsdale	Pave Herrington Rd to improve drainage and alleviate road flooding	1 – Flood, Winter Storm (Severe)	Low	TBD	H	M	Within 1 year of plan implementation	Hillsdale Highway Department	TBD
Existing	Town of Hillsdale	Pave Lockwood Road to improve drainage and alleviate road flooding	1 – Flood, Winter Storm (Severe)	Low	TBD	H	M	Within 1 year of plan implementation	Hillsdale Highway Department	TBD
Existing	Town of Hillsdale	Pave Hereford Hills to improve drainage and alleviate road flooding	1 – Flood, Winter Storm (Severe)	Low	TBD	H	M	Within 1 year of plan implementation	Hillsdale Highway Department	TBD
Existing	Town of Hillsdale	Pave Texas Hill Rd to improve drainage and alleviate road flooding	1 – Flood, Winter Storm (Severe)	Low	TBD	H	M	Within 1 year of plan implementation	Hillsdale Highway Department	TBD
Existing	Town of Kinderhook	Generator for highway garage to ensure continued operations through a power outage	1, 4 - All Hazards	Moderate	TBD	L	H	Within 6 months of plan implementation	Kinderhook Highway Department	TBD

Table 5-3 Final Mitigation Measures

New or Existing	Jurisdiction	Mitigation Activity	Goals Supported/Hazard(s) Addressed	Priority	Estimated Budget (\$)	Benefit/Cost Analysis		Timeframe for Implementation	Responsible Agency or Jurisdiction	Funding Source
						Cost	Benefit			
Existing	Town of Livingston	Repair sluiceway/culvert on Roe-Jan Creek at Rt 9 and Buckwheat Road to eliminate and alleviate road flooding	1 – Flood	Low	TBD	M	H	Within 1 year of plan implementation	Livingston Highway Department	TBD
Existing	Town of New Lebanon	Flood control (concrete beds) on Wyomanock Creek	1 – Flood	Low	TBD	H	M	Within 1 year of plan implementation	New Lebanon Highway Department	TBD
Existing	Town of New Lebanon	Flood control (concrete beds) on Kinderhook Creek	1 – Flood	Low	TBD	H	M	Within 1 year of plan implementation	New Lebanon Highway Department	TBD
Existing	Town of Stockport	Trim trees by power company house	1,4 – Severe Storm, Winter Storm (Severe), Tornado	Moderate	TBD	M	H	Within 6 months of plan implementation	Stockport Highway Department	TBD
Both	Town of Stuyvesant	Public preparedness information campaign	2 – All Hazards	High	TBD	L	H	ASAP	CCEMO	HMGP
Existing	Town of Taghkanic	New Culverts to eliminate and alleviate road flooding	1 – Flood	Low	TBD	M	H	Within 1 year of plan implementation	Taghkanic Highway Department	TBD
Existing	Village of Chatham	Generator at Sewer plant to ensure continued treatment of sewage through a power outage	1, 4 – All Hazards	Moderate	TBD	L	H	Within 6 months of plan implementation	Chatham Sewer Department	TBD

Table 5-3 Final Mitigation Measures

New or Existing	Jurisdiction	Mitigation Activity	Goals Supported/Hazard(s) Addressed	Priority	Estimated Budget (\$)	Benefit/Cost Analysis		Timeframe for Implementation	Responsible Agency or Jurisdiction	Funding Source
						Cost	Benefit			
Both	Village of Kinderhook	Public preparedness information campaign	2 – All Hazards	High	TBD	L	H	ASAP	CCEMO	HMGP
Both	Village of Philmont	Public preparedness information campaign	2 – All Hazards	High	TBD	L	H	ASAP	CCEMO	HMGP
Existing	Village of Valatie	Improve sewers to eliminate infiltration from storm waters	1, 4 – Flood	Low	TBD	H	H	Within 1 year of plan implementation	Valatie Sewer Department	TBD
Both	Countywide	Collect additional information to fill any existing data gaps in this plan	1, 3 – All Hazards	High	TBD	L	H	During first plan revision cycle	CCEMO	TBD

5.4 Implementation of Mitigation Actions

The mitigation actions identified were prioritized using the STAPLEE methods which require evaluation based upon seven criteria which include social, technical, administrative, political, legal, economic and environmental criteria. Each of these criteria is defined below.

Social Criteria: This criterion requires consideration of whether there is likely to be public support or community acceptance for specific mitigation actions and overall implementation strategies.

Technical Criteria: This criterion focuses on whether a proposed action is technically feasible, will help to reduce losses in the long-term and has minimal secondary impacts. Consideration of technical criteria provides insight into whether the action is a whole or partial solution to the problem.

Administrative Criteria: Administrative criteria include the anticipated staffing, funding and maintenance requirements for a particular mitigation action or project.

Political Criteria: This criterion requires consideration of the likely support or opposition from current community and state political leadership for a specific mitigation action or project which may impact environmental, economic or public safety issues.

Legal Criteria: This criterion focuses on whether the County or participating jurisdictions have the legal authority to implement the proposed mitigation activities.

Economic Criteria: Here the Planning Team must consider budget constraints and the cost effectiveness of a proposed action or project.

Environmental Criteria: This criterion focuses on the impact that a particular action or project will have on environmental health and sustainability.

In addition to the STAPLEE criteria, projects were evaluated based on ease of implementation, costs and benefits, and timeframes for implementation in order to prioritize each activity. Activities were then assigned one of three priority levels: high, moderately high or low. This designation is indicated in Table 5-3. An informal Benefit-Cost Review process was emphasized during the prioritization phase. The methodology used for Benefit – Cost review were extrapolated from FEMA 386-5 (How To Guide: Using Benefit-Cost Review in Mitigation Planning) and are described in tables 5-4 and 5-5 below.

Table 5-4 Cost Benefit Review Methodology, Costs

Assigned Cost	Dollar Range
High	\$1,000,000+
Medium	\$500,000 - \$999,999
Low	\$0 - \$499,999

Table 5-5 Cost Benefit Review Methodology, Benefits

Assigned Benefit	Population Affected
High	40,001 - 63,000
Medium	20,001 - 40,000
Low	0 - 20,000

Columbia County recognizes that the FEMA regulation requires a formal benefit-cost analysis (BCA) of mitigation measures in order to be approved for HMGP funding. However a formal BCA is not required in the HMP and will be conducted as component of any future mitigation grant applications.

The County has chartered the formation of a team to lead the implementation of the Hazard Mitigation Plan and to support and track the accomplishment of the project identified within the plan. The Implementation Team is led by the Commissioner of the Columbia County Department of Public Works in close coordination with the Deputy Director of the Columbia County Emergency Management Office. The Implementation Team will establish a program to implement the performance based protective measures identified within the plan and lead the County in the implementation of protective measures for critical facilities. The team will support the implementation of projects and activities that will be spearheaded by individual jurisdictions as noted in Table 5-3.

Local building and fire codes need to be updated and stricter than New York State Building Codes. Codes should be strictly enforced in the Columbia County for both new and old buildings. New buildings must be built to the latest building codes. Any updates or improvements to existing buildings also need to follow the new codes. Safer buildings, in relation to building codes, mean a lower chance of collapse or other problems due to incidents. Building codes need to be maintained on a continuous basis.

6

Plan Maintenance and Adoption

6.1 Plan Maintenance

The Columbia County Emergency Management Office (CCEMO) is responsible for the overall maintenance of the Columbia County Multi-Jurisdictional Hazard Mitigation Plan. The Planning team will convene on an as-needed and/or scheduled basis to implement plan monitoring, evaluation, and updating, including solicitation of input from plan implementation partners, the public, and other stakeholders.

6.1.1 Monitoring

Plan monitoring refers to the ongoing oversight that CCEMO will undertake to maintain situational awareness over how, and how well, the plan and its recommended mitigation actions are being implemented. Responsibility for plan monitoring will be shared between the CCEMO Deputy Director (or his/her designee) and the Columbia County Public Works Commissioner-led Plan Implementation Team. In order to alleviate the workload of the part-time CCEMO, the County Board of Supervisors may elect to hire an outside consultant to carry out the maintenance, monitoring, evaluation, and update processes described in this section under the supervision of CCEMO and the Board of Supervisors.

The CCEMO Deputy Director or his/her designee will be responsible for working with each mitigation action's proponent organization (e.g., a municipal road department) on a day-to-day basis to maintain situational awareness over plan implementation. Based upon the nature of a given mitigation action, CCEMO will establish a project-specific oversight regime comprising scheduled (and, on an as-needed basis, ad hoc) site visits, conference calls, written reports, and/or status meetings. This information stream will be the subject of annual Plan Implementation Team meetings, during which the Columbia County Public Works Commissioner and CCEMO Deputy Director (or their designees) will jointly lead the Implementation Team in reviewing the period's progress and addressing any near-term implementation issues.

The annual implementation meetings will serve as a venue for reviewing, assessing, and supporting the execution of the Plan's portfolio of mitigation actions. The progress of each in-progress action will be measured against the action's established schedule and budget; additionally, in the event that an incident occurs, the team may evaluate the loss reduction performance of completed mitigation

projects and contribute recommendations to the plan update process. Additionally, the CCEMO Deputy Director or his designee will use these meetings as an opportunity to collect information in support of grants accountability, to monitor overall progress toward the plan's goals and objectives, and to stay abreast of changes in conditions that could feed into the plan update process.

The implementation meetings will also provide the public with an opportunity to observe their mitigation plan in action. CCEMO will publicize the meeting in advance on its Web site and any other appropriate public calendars and bulletins, and will also make any relevant materials available for download in order to facilitate public comment; welcome the public to attend the meetings and provide comments; and post meeting summaries on the Web.

6.1.2 Evaluation

In contrast to monitoring, the plan evaluation process measures at how well the plan itself is performing in service to the community's risk reduction goals. Under the direction of the CCEMO Deputy Director (or his/her designee), the Planning Team will convene on an annual basis – and on an ad hoc basis in the event of a major incident or a significant change in one or more aspects of the risk environment – to determine whether the plan is on course to deliver the desired outcome(s) with regard to risk and loss reduction.

In making this evaluation, the Planning Team will consider factors such as:

- whether the mitigation actions implemented have, or are still expected to, produced the intended results;
- whether the planning assumptions, goals and objectives remain valid;
- changes in the risk environment such as the introduction of a new hazard or the change in behavior of an existing hazard, or developments in the natural and/or built environments that exacerbate loss potential;
- changes in the State's mitigation goals, objectives, and priorities; and
- ability to continue plan implementation given current resource allocations.

In addition to directing the Planning Team's review, the CCEMO Deputy Director will request that all participating jurisdictions perform their own jurisdiction-specific evaluations in parallel to the Planning Team's review and using the same criteria. S/he will provide the results of these reviews to the Planning Team during the evaluation meeting and will also save them for consideration during the plan update process. The Planning Team will also look to the public for input, as well as to other stakeholders such as public- and private-sector organizations and even neighboring jurisdictions; as with the annual implementation meetings, CCEMO will publicize the plan evaluation meeting in advance on its Web site and any other appropriate public calendars and bulletins, and will also make any

relevant materials available for download in order to facilitate stakeholder engagement; welcome the public to attend the meetings and provide comments; and post a meeting summary on the Web.

6.1.3 Update

The CCEMO Deputy Director is responsible for directing and facilitating a full plan update every five years. Starting early in the third year after plan adoption or the last update, the Planning Team will conduct an in-depth review of the plan's performance over this five-year period, followed by revision of the plan's content on the basis of the following considerations:

- findings from annual and ad hoc plan evaluations;
- updates to the county's hazard identification and profile, asset inventory, and vulnerability assessment;
- availability of new mitigation techniques;
- anticipated availability of funding for mitigation actions; and
- changes in the State's mitigation priorities.

As in the process of developing the original plan, all participating jurisdictions will be expected to fully engage in the plan update process. This will also be the premier opportunity for the engagement of other stakeholders such as neighboring counties, the private sector, non-governmental organizations, and the general public. At the outset of this process, CCEMO will promote stakeholder involvement through Web site postings and other public calendars as well as news media outlets, making copies of all appropriate plan-related information available electronically via the Web and in hard copy at the public libraries of participating jurisdictions. CCEMO will also engage civic and other interest groups through direct outreach. All meetings will be publicized as described above and open to the public, and interested parties will be provided with an opportunity to submit comments and other input both in person at plan update-related meetings as well as in writing during a portion of the update period. At the end of this process, the County and participating jurisdictions will re-adopt the plan and start the cycle anew.

6.2 Plan Adoption

The Columbia County Multi-jurisdictional Hazard Mitigation Plan has been adopted by Columbia County via resolution by the County Legislature. A copy of this resolution is included in Appendix G. Additionally; each participating jurisdiction has adopted the plan via resolution of the appropriate local governing body. A copy of each of these resolutions is also included in Appendix G.

6.3 Plan Implementation and Integration

The County has chartered the formation of a team to lead the implementation of the Hazard Mitigation Plan and the incorporation of the plan into existing comprehensive plans, capital improvement plans, zoning and building codes, site reviews, permitting, job descriptions, staff training and other planning tools where appropriate. The Implementation Team is lead by the Commissioner of the Columbia County Department of Public Works in close coordination with the Deputy Director of the Columbia County Emergency Management Office. The Implementation Team will establish a program to implement performance based protective measures identified within the plan and lead the County in the implementation of protective measures for critical facilities. The Implementation Team is responsible for the development of a program to implement identified mitigation measures and monitor the impacts of the measures taken and for the implementation of the program and future monitoring to measure the impacts of the measures taken. In addition, the Implementation Team will conduct outreach to departments and agencies of all participating jurisdictions to encourage them to integrate the tenets contained within this plan into their day to day policies and procedures. For example the Implementation Team will work with jurisdictions to update building codes, job descriptions, work plans, policies, and procedures to address and consider hazard mitigation as it relates to governmental operations on a day to day basis. The Implementation Team will also work with jurisdictions to include mitigation projects in annual budgets rather than relying solely upon grant programs and integrate hazard mitigation in future land use, strategic, and land-use planning.

6.4 Continued Public Involvement

During the annual review of the Hazard Mitigation Plan, described in Section 6.1, the public, in addition to neighboring jurisdictions and public and private businesses and agencies throughout the County will be provided with an opportunity to review and comment on the progress made to date in the implementation of the plan and on the proposed revisions to the plan. The Implementation Team will provide the Planning Team with a report on the progress made to date annually. The Planning Team will combine the information in that progress report with information on the revisions proposed by all participating jurisdictions and the County.

This information will be released to the public, along with a comment form or other instructions for providing feed back, via the County website, local jurisdictions' websites, fliers and the media including local newspapers and newsletters. The comments received will be considered and incorporated where appropriate into the Planning Team's revisions to the plan.

A

Proclamations Declaring Support for the Planning Process

TOWN OF ANCRAM

Founded 1803

1416 County Route 7 Ancram NY 12502

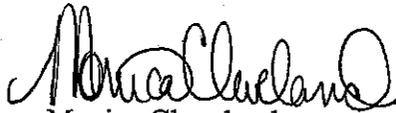
(518) 329-6512

fax: (518) 329-0962

The Town Board of the Town of Ancram passed the following Resolution #13 of 2006 on June 20, 2006.

RESOLVED; the Town Board of the Town of Ancram does hereby give Highway Superintendent James MacArthur permission to write up a Local Hazard Mitigation Plan for the Town of Ancram.

Motion made by Councilman Bryant and Seconded by Councilman Dietter. Motion carried.



Monica Cleveland

Town Clerk

**OFFICE OF THE SUPERVISOR
TOWN OF CANAAN
1547 County Route 5, South
Canaan, New York 12029**

October 13, 2006

The Canaan Town Board passed the following Resolution numbered 46 on June 3, 2006:

"WHEREAS, the Town Board of the Town Board of Canaan agrees to work with the Hazard Mitigation Grant Reimbursement Program, and

WHEREAS, THE Emergency Management appoints Highway Superintendent, Bernhard Meyer, Town Supervisor Gary Flaherty and Town Historian, Anna Mary Dunton; to act on the Town's behalf."

NOW, THEREFORE, BE IT RESOLVED that the Town Board of the Town of Canaan, hereby establishes that this resolution shall take effect immediately."

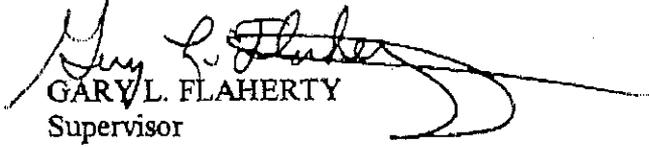
Upon the question of the foregoing Resolution, the following Town Board Members voted "Aye" in favor of the Resolution:

Supervisor Gary Flaherty
Councilman David Patwahl
Councilman Carrie Bither
Councilman Virginia Nightingale
Councilman Stephen August

There were no Nays.

The resolution having been approved by a majority of the Town Board, the same was declared duly adopted by the Supervisor of the Town of Canaan.

Certified by Town Clerk Charlotte L. Cowan. Seal of the Municipality.


GARY L. FLAHERTY
Supervisor

RES. #99-06 to participate in the Columbia County Hazard Mitigation Plan.

Supervisor DeGrootd offered Res. #99 and moved its adoption that
WHEREAS, the Columbia county Emergency Management Office is participating in a
FEMA plan to streamline emergency reimbursement aid and has requested the
participation of the Town of Chatham,

THEREFORE, BE IT RESOLVED THAT THE Chatham Town Board does hereby
authorize the participation of the Town of Chatham in the Columbia County Hazard
Mitigation Plan. Councilman Rippel seconded the motion.

Vote; ayes, all present

Nays, none and resolution was adopted.

7/20/06 Town Bd Mtg.

Village of Chatham
77 Main Street
Chatham, New York 12037

TEL (518) 392-5821
FAX (518) 392-3110



VILLAGE OF CHATHAM
COUNTY OF COLUMBIA
STATE OF NEW YORK

RESOLUTION

WHEREAS, the Village Board of the Village of Chatham supports the Columbia County Emergency Management's Hazard Mitigation Plan Program;

THEREFORE BE IT RESOLVED, The Village Board of the Village of Chatham hereby agrees to participate in the Columbia County Emergency Management's Hazard Mitigation Plan Program and to further participate with the State Emergency Management Office (SEMO) and the Federal Emergency Management Agency (FEMA).

RESOLUTION MADE BY: Trustee David Chapman

SECONDED BY: Trustee Lael Locke

The following Board Members voted "Aye" in favor of the Resolution:

Trustee David E. Chapman

Trustee W. George Grant

Trustee Lael Locke

The following Board Members voted "No" in opposition to said Resolution:

None

The Resolution having been approved by a majority of the Board, the same was declared duly adopted by the Mayor.

Carol M. Simmons
Village Clerk/Treasurer

Dated: October 12, 2006

TOWN of CLERMONT

RESOLUTION # 12-07

December 3
~~NOVEMBER 5, 2007~~

WHEREAS, The Town Board of the Town of Clermont supports the Columbia County Emergency Management's Hazard Mitigation Plan Program;

NOW THEREFORE BE IT RESOLVED THAT, the Town Board of the Town of Clermont hereby agrees to participate in the Columbia County Emergency Management's Hazard Mitigation Plan Program and to further participate with the State Emergency Management Office (SEMO) and the Federal Emergency Management Agency (FEMA).

MOTION MADE BY: Carol Lent

SECOND BY: Chris Nolan

DEPUTY SUPERVISOR

COUNCILWOMAN

COUNCILMAN

COUNCILMAN

December 3, 2007
DATED: ~~NOVEMBER 5, 2007~~

CERTIFIED:

Mary Helen Shanon
TOWN CLERK

Town of Gallatin
P.O. Box 67 ~ Ancram, New York 12502
Phone 518-398-7519 ~ Fax 518-398-1565

At the regular Gallatin Town Board meeting on October 12, 2006 the following resolution was passed:

Columbia County Hazard Mitigation Plan Program

The Town Board of Gallatin supports the Columbia County Emergency Management's Hazard Mitigation Plan Program;

Be it resolved that, the Town Board of the Town of Gallatin agrees to participate in the Columbia County Emergency Management's Hazard Mitigation Plan Program and to further participate with the State Emergency Management Office (SEMO) and the Federal Emergency Management Agency (FEMA).

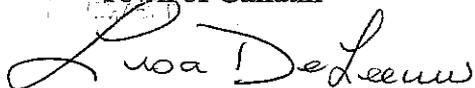
Roll call vote:

Supervisor Lynda Scheer	yes
Councilwoman Shannon Near	yes
Councilman Scott Gordon	yes
Councilman Steve Sorman	yes
Councilman Bob Near	absent

The resolution was approved by a majority vote of the Gallatin Town Board and was duly adopted by Supervisor Lynda Scheer.

October 12, 2006

Lisa DeLeeuw
Town Clerk
Town of Gallatin





TOWN OF HILLSDALE

PO Box 305
Hillsdale, New York 12529

Phone 518 325-5073

Fax 518 325-6917

Resolution #58 of 2006

Resolution Agreeing to Participate in the Columbia County Emergency Management's Hazard Mitigation Plan Program

At a special meeting of the Town Board of the Town of Hillsdale, Columbia County, New York, duly called and held on the 12th day of October, 2006, at the Town Hall, Route 23, Hillsdale, New York, the following resolution was made and seconded:

Resolution made by: Councilman August Sena
Seconded by: Councilman Carmen Barbato

WHEREAS, the Town Board of the Town of Hillsdale supports the Columbia County Emergency Management's Hazard Mitigation Plan Program;

THEREFORE, BE IT RESOLVED THAT, the Town Board of the Town of Hillsdale hereby agrees to participate in the Columbia County Emergency Management's Hazard Mitigation Plan Program and to further participate with the State Emergency Management Office (SEMO) and the Federal Emergency Management Agency (FEMA).

Vote:

Supervisor Arthur Baer	Yes
Councilwoman Ann Baldwin	Yes
Councilman Carmen Barbato	Yes
Councilman August Sena	Yes
Councilman Peter Cipkowski	Yes

This resolution having been passed unanimously by the Town Board, the same was duly declared adopted by the Supervisor.


Ruth Dodds, RMC, Town Clerk

Dated: October 12, 2006

Village of Kinderhook

Established in 1669

6 Chatham Street

P.O. Box 325

Kinderhook, N.Y. 12106

(518)758-9882

Fax(518)758-9869

The Village of Kinderhook passed the following Resolution #1 of 2007 on January 10, 2007.

RESOLVED; the Village Board of the Village of Kinderhook does hereby give Highway Superintendent Jack Taylor permission to write up a Local Hazard Mitigation Plan for the Village of Kinderhook.

Motion made by Trustee Phillips and Seconded by Trustee Masten. Motion carried.

Nicole H. Heeder
Village Clerk

**TOWN OF NEW LEBANON
RESOLUTION #20, 2006
COLUMBIA COUNTY HAZARD MITIGATION PLANNING PROGRAM
JULY 10, 2006**

At the regular meeting of the New Lebanon Town Board, held at the American Legion Hall, 7 Mill Road, New Lebanon, New York, duly called and held on the 10th day of July 2006, the following Resolution was proposed and seconded:

Resolution by Councilmember Margaret Robertson
Seconded by Councilmember John L. Yurish

COLUMBIA COUNTY HAZARD MITIGATION PLAN PROGRAM

WHEREAS, the Town Board of the Town of New Lebanon supports the Columbia County Emergency Management's Hazard Mitigation Plan Program;

THEREFORE BE IT RESOLVED THAT, the Town Board of the Town of New Lebanon hereby agrees to participate in the Columbia County Emergency Management's Hazard Mitigation Plan Program and to further participate with the State Emergency Management Office (SEMO) and the Federal Emergency Management Agency (FEMA).

Upon the question of the foregoing Resolution, the following Town Board Members voted "Aye" or "Nay" for said Resolution:

Roll Call Vote:

Supervisor David Katzenstein	Aye
Councilwoman Margaret Robertson	Aye
Councilman Monroe Wasch	Aye
Councilman Richard York	Aye
Councilman John L. Yurish	Aye

The Resolution, having been approved by a majority vote of the Town Board, was declared duly adopted by the Supervisor of the Town of New Lebanon.

Dated: July 10, 2006

Colleen Teal
Town Clerk
Town of New Lebanon

Village of Philmont
Resolution #1 – December 10, 2007
Columbia County Hazard Mitigation Planning Program

At the regular monthly meeting of the Village of Philmont Board of Trustees held on December 10, 2007 the following resolution was proposed by Trustee Cropper and seconded by Trustee Sagal.

Whereas, the Village board of the Village of Philmont supports the Columbia County Emergency Management's Hazard Mitigation Plan Program;

Therefore be it resolved that the Village of Philmont Board agrees to participate in the Columbia County Emergency Management's Hazard Mitigation Plan Program and to further participate with the State Emergency Management Office (SEMO) and the Federal Emergency Management Agency (FEMA).

Upon the question of the foregoing Motion, the following Village Board Members voted "Aye" or "Nay" for said Resolution:

Roll Call Vote

Mayor Clarence Speed	<u>YES</u>
Trustee Brian Johnson	<u>YES</u>
Trustee Barbara Sagal	<u>YES</u>
Trustee Douglas Cropper	<u>YES</u>
Trustee Robin Andrews	<u>YES</u>

This Resolution, having been approved by a majority vote of the Village Board was declared duly adopted by the Village of Philmont Board of Trustees

Dated: December 10, 2007

Eilene Morris
Clerk/Treasurer
Village of Philmont

Village Of Valatie
Columbia County Hazard Mitigation Planning Program
October 11, 2006

At, the regular meeting of the Village of Valatie, the Village Board, held at the Valatie Village Hall, 3053 Main Street, Valatie, New York 12184 duly called and held on the 10th day of October 2006, the following Resolution was proposed and seconded:

Resolution by Tr. Berry
Seconded by Tr. Raihofer

Columbia County Hazard Mitigation Plan Program

WHEREAS, the Village Board of the Village of Valatie supports the Columbia County Emergency Management's Hazard Mitigation Plan Program:

THEREFORE BE IT RESOLVED THAT, the Village Board of the Village of Valatie hereby agrees to participate in the Columbia County Emergency Management's Hazard Mitigation Plan Program and to further participate with the State Emergency Management Office (SEMO) and the Federal Emergency Management Agency (FEMA).

Upon the question of the foregoing Resolution, the following Village Board Members voted "Aye" or "Nay" for said Resolution:

Roll Call Vote:

Mayor Strevell	Aye
Tr. Berry	Aye
Tr. Bryant	Aye
Tr. Raihofer	Aye
Tr. Nastke	Aye

The Resolution, having been approved by a majority vote of the Village Board, was declared duly adopted by the Village Board of the Village of Valatie

Dated: October 11, 2006



Donna Schneider
Village Clerk
Village of Valatie

B

Kick-off Meeting Attendees

C

HIRA-NY Report

**HIRA-NY Hazard Analysis Results
for Columbia County
(September 20, 2006)**

Formatted for Public Comment

**Revised
May 9, 2007**

Prepared for:

COLUMBIA COUNTY EMERGENCY MANAGEMENT OFFICE (CEMO)



Prepared by:

ECOLOGY AND ENVIRONMENT, INC.
90 Broad Street, Suite 1906
New York, New York 10004

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List of Acronyms and Abbreviations



CCEMO	Columbia County Emergency Management Office
CFR	Code of Federal Regulations
FEMA	Federal Emergency Management Agency
HIRA-NY	Hazard Identification and Risk Assessment New York
NYSEMO	New York State Emergency Management Office

Executive Summary

On September 20, 2006 Columbia County conducted a hazard analysis using the automated program, *HIRA-NY* (Hazard Identification and Risk Assessment New York) developed by the American Red Cross and the New York State Emergency Management Office (NYSEMO). This Hazard Analysis document is a key component in the process of creating a multi-hazard plan and will constitute a major section of Columbia County's Multi-Hazard Mitigation Plan; it forms the basis for our risk and vulnerability assessment.

The purpose of developing a Hazard Mitigation Plan is to provide the Federal Emergency Management Agency enough information about the sensitive infrastructure, property and houses in Columbia County to enable them to facilitate appropriate emergency funding, response and recovery prior to, during and after a hazard event.

As a citizen of Columbia County, your feedback, comments, and questions are extremely valuable to the planning process. We appreciate your taking time to review this initial hazard analysis and look forward to your input. Please send your comments to the appropriate individual listed below:

Affiliation: Ecology and Environment, Inc. (Project Consultant)
Name: Adam Shatzkamer
Position: Project Manager
Address: 90 Broad Street, Suite 1906, New York, NY 10004
E-mail: ashatzkamer@ene.com
Phone: 212-742-1713

Affiliation: Columbia County Emergency Management Office (CCEMO)
Name: Gary L. Tuthill
Position: Deputy Manager Emergency Management
E-mail: gtuthill@nycap.rr.com

Affiliation: New York State Emergency Management Office (NYSEMO)
Name: Ed Lips
E-mail: Edward.Lips@semo.state.ny.us

Affiliation: New York State Emergency Management Office (NYSEMO)
Name: Nadine Macura
E-mail: Nadine.Macura@semo.state.ny.us

1

HIRA-NY Hazard Analysis Background

On September 20, 2006 Columbia County conducted a hazard analysis using the automated program, *HIRA-NY* (Hazard Identification and Risk Assessment New York) developed by the American Red Cross and the New York State Emergency Management Office (NYSEMO). This resulting Hazard Analysis, documented in this report, represents a key component supporting the process of creating a multi-hazard plan. A major section of Columbia County's Multi-Hazard Mitigation Plan, it forms the basis for our risk and vulnerability assessment.

HIRA-NY evaluates five factors that are the cornerstones of the hazard analysis process. In considering these factors, it is also expected that the risk assessment components of the all-hazard mitigation planning process as outlined in 44 Code of Federal Regulations (CFR) Part 201, under which the hazard mitigation plan is being developed, will also be considered. The risk assessment process is required to identify all hazards that can impact a community with a profiling of the most prevalent hazards. Profiling hazard involves consideration of a) location, or geographic areas affected; b) extent or magnitude/severity; c) previous occurrences; and, d) probability of future occurrences. These five factors are:

A. Scope

This factor looks at two aspects: (1) What area or areas in a jurisdiction could be impacted by the hazard location and (2) What are the chances of the hazard triggering another hazard causing a cascade effect?

B. Onset

How much time is there between the initial recognition of an approaching hazard and when the hazard begins to impact the community? This is a very important factor because for some hazards (e.g., drought) ample warning time is available so that if plans and procedures have not been developed, there is still time to develop them. On the other hand, an earthquake could occur at any time, without warning, and cause severe damage.

C. Impact

This factor involves the analysis of a hazard's impact extent to the community's infrastructure, private property, and people.

D. Duration (Also an Indicator of Extent)

This factor is concerned with three types of duration: (1) How long does the hazard remain active? (2) How long do emergency operations continue after the hazard event? (3) How long does the recovery process take?

E. Frequency (Past Occurrences)

This factor indicates how often a hazard has resulted in an emergency or disaster; historical frequency can also be a prediction of how often a hazard will occur in the future (probability of future occurrences). Frequency is established by recording historical events and determining time intervals between each occurrence.

2

Columbia County HIRA-NY Hazard Analysis Results

HIRA-NY is an automated interactive spreadsheet that asks specific questions on potential hazards in a community and records and evaluates the responses to these questions. The selections made in *HIRA-NY* are based on information entered into preformatted Microsoft Excel worksheets recommended by NYSEMO. *HIRA-NY* also includes historical and expert data on selected hazards. *HIRA-NY* is designed specifically for groups, rather than individual use. Columbia County assembled a group of local officials to consider and discuss the questions and issues raised by the *HIRA-NY* program. Representatives from the Columbia County Emergency Management Office (CEMO), Columbia County Highway Department and NYSEMO facilitated the meeting and recorded the results.

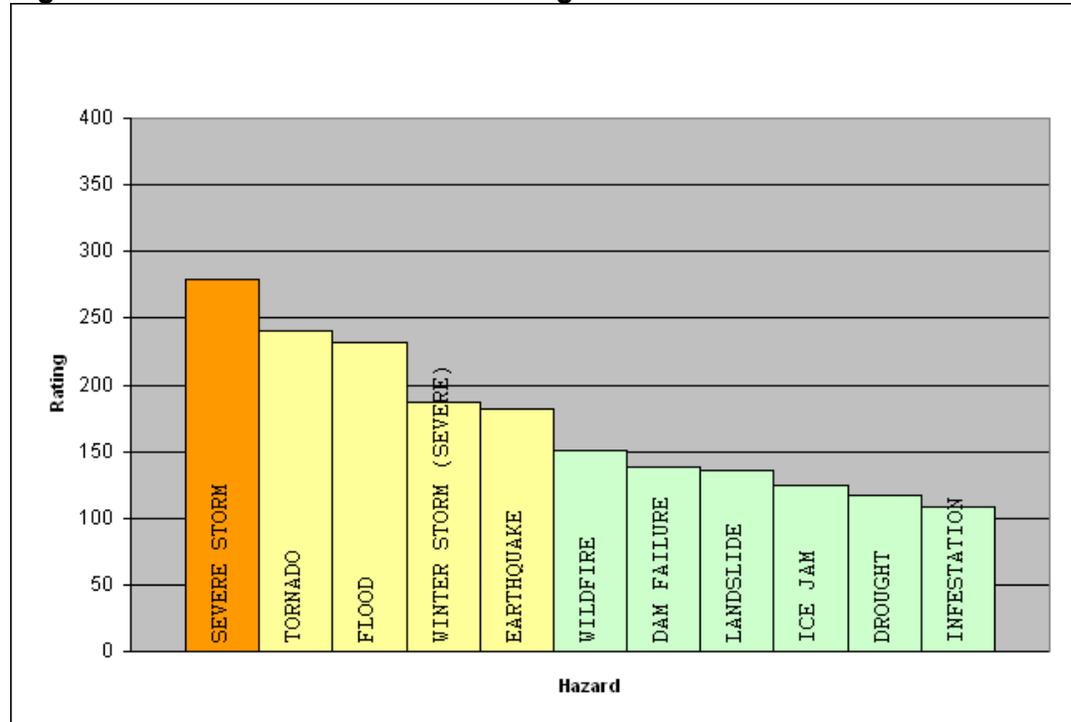
The Group analyzed all hazards potentially affecting Columbia County. *HIRA-NY* rated each hazard based on the Group's assessment and assigned a numerical value. These values are categorized as follows:

- **321 to 400 HIGH HAZARD**
- **241 to 320 MODERATELY HIGH HAZARD**
- **161 to 240 MODERATELY LOW HAZARD**
- **44 to 160 LOW HAZARD**

The Group rated the 11 hazards identified in Table 1, and depicted them in Figure 1 as follows:

Hazard	Rating
SEVERE STORM	279
TORNADO	240
FLOOD	232
WINTER STORM (SEVERE)	187
EARTHQUAKE	182
WILDFIRE	151
DAM FAILURE	138
LANDSLIDE	136
ICE JAM	124
DROUGHT	117

Figure 1 Chart of Hazards vs. Ratings



2.1 Hazard(s) Rated as Moderately High

2.1.1 SEVERE STORM: 279, Moderately High Hazard

- Potential Impact:** Throughout a large region
- Cascade Effects:** Highly likely (Cascading hazards identified)
 Dam Failure; Fire; Flood; Fuel Shortage; Hazmat (Fixed Site); Hazmat (In Transit); Landslide; Structural Collapse; Tornado; Utility Failure; Water Supply Contamination; Wildfire
- Frequency:** A Frequent event (Frequency identified)
- Onset:** No warning
- Hazard Duration:** One day
- Recovery Time:** One to two days
- Impact (Detailed information indicated below):**
- Serious injury or death unlikely
 - Moderate damage to private property
 - Little or no structural damage to public facilities

2.2 Hazard(s) Rated as Moderately Low

2.2.1 TORNADO: 240, Moderately Low Hazard

Potential Impact: Throughout a small region
Cascade Effects: Highly likely (Cascading hazards identified)
Fire; Fuel Shortage; Hazmat (Fixed Site); Hazmat (In Transit); Structural Collapse; Trans Accident; Utility Failure
Frequency: A regular event (Frequency identified)
Onset: No warning
Hazard Duration: Less than one day
Recovery Time: One to two days
Impact (Detailed information indicated below):

- Serious injury or death is likely, but not in large numbers
- Moderate damage to private property
- Moderate structural damage to public facilities

2.2.2 FLOOD: 232, Moderately Low Hazard

Potential Impact: Throughout a large region
Cascade Effects: Some potential (Cascading hazards identified)
Dam Failure; Flood; Hazmat (Fixed Site); Hazmat (In Transit); Ice Jam; Landslide; Structural Collapse; Water Supply Contamination
Frequency: A regular event (Frequency identified)
Onset: Several hours warning
Hazard Duration: Two to three days
Recovery Time: One to two days
Impact (Detailed information indicated below):

- Serious injury or death unlikely
- Moderate damage to private property
- Moderate structural damage to public facilities

2.2.3 WINTER STORM (SEVERE): 187, Moderately Low Hazard

Potential Impact: Throughout a large region
Cascade Effects: Some potential (Cascading hazards identified)
Dam Failure; Extreme Temps; Flood; Food Shortage; Fuel Shortage; Hazmat (Fixed Site); Hazmat (In Transit); Ice Jam; Ice Storm; Structural Collapse; Trans Accident; Utility Failure
Frequency: A regular event (Frequency identified)
Onset: Several days warning
Hazard Duration: One day

Recovery Time: One to two days

Impact (Detailed information indicated below):

- Serious injury or death is likely, but not in large numbers
- Little or no damage to private property
- Little or no structural damage to public facilities

2.2.4 EARTHQUAKE: 182, Moderately Low Hazard

Potential Impact: Throughout a large region

Cascade Effects: Highly Likely (Cascading hazards identified and mapped)
Dam Failure; Earthquake; Explosion; Fire; Flood; Food Shortage; Fuel Shortage; Hazmat (Fixed Site); Hazmat (In Transit); Landslide; Radiological (In Transit); Structural Collapse; Trans Accident; Utility Failure; Water Supply Contamination; Wildfire

Frequency: A rare event (Frequency identified)

Onset: No warning

Hazard Duration: Less than one day

Recovery Time: One to two days

Impact (Detailed information indicated below):

- Serious injury or death is likely, but not in large numbers
- Moderate damage to private property
- Moderate structural damage to public facilities

2.3 Hazard(s) Rated as Low

2.3.1 WILDFIRE: 151, Low Hazard

Potential Impact: Throughout a small region

Cascade Effects: Highly unlikely

Frequency: A rare event (Frequency identified)

Onset: No warning

Hazard Duration: Two to three days

Recovery Time: Three days to one week

Impact(Detailed information indicated below):

- Serious injury or death unlikely
- Little or no damage to private property
- Little or no structural damage to public facilities

2.3.2 DAM FAILURE: 138, Low Hazard

Potential Impact: Several locations

Cascade Effects: Some potential (Cascading hazards identified and mapped)
Flood; Structural Collapse; Utility Failure

5. General Recommendations

Frequency: A rare event (Frequency identified)

Onset: No warning

Hazard Duration: Less than one day

Recovery Time: One to two days

Impact (Detailed information indicated below):

- Serious injury or death unlikely
- Little or no damage to private property
- Moderate structural damage to public facilities

2.3.3 LANDSLIDE: 136, Low Hazard

Potential Impact: Several locations

Cascade Effects: Some potential (Cascading hazards identified)
Hazmat (Fixed Site); Infestation; Structural Collapse; Utility Failure

Frequency: A Rare event (Frequency identified)

Onset: No warning

Hazard Duration: Less than one day

Recovery Time: Three days to one week

Impact (Detailed information indicated below):

- Serious injury or death unlikely
- Little or no damage to private property
- Little or no structural damage to public facilities

2.3.4 ICE JAM: 124, Low Hazard

Potential Impact: Throughout a large region

Cascade Effects: Some potential (Cascading hazards identified)
Flood; Structural Collapse

Frequency: A rare event (Frequency identified)

Onset: One day warning

Hazard Duration: Two to three days

Recovery Time: Less than one day

Impact (Detailed information indicated below):

- Serious injury or death unlikely
- Little or no damage to private property
- Little or no structural damage to public facilities

2.3.5 DROUGHT: 117, Low Hazard

Potential Impact: Throughout a small region

Cascade Effects: Some potential (Cascading hazards identified)
Wildfire

Frequency: A rare event (Frequency identified)

Onset: Several days warning

5. General Recommendations

Hazard Duration: More than one week

Recovery Time: Less than one day

Impact (Detailed information indicated below):

- Serious injury or death unlikely
- Moderate damage to private property
- Little or no structural damage to public facilities

2.3.6 INFESTATION: 108, Low Hazard

Potential Impact: Throughout a small region

Cascade Effects: Highly unlikely

Frequency: A rare event (Frequency identified)

Onset: More than one week warning

Hazard Duration: More than one week

Recovery Time: Three days to one week

Impact (Detailed information indicated below):

- Serious injury or death unlikely
- Moderate damage to private property
- Little or no structural damage to public facilities

3

Contact Information for Comment Submission

We have dedicated ourselves to an open hazard analysis planning process. Your comments on this initial hazard analysis are critical to its overall success of the hazard planning and mitigation process. Please forward all of your comments, questions and/or concerns to the following individuals as appropriate:

Affiliation: Columbia County Emergency Management Office (CCEMO)
Name: Gary L. Tuthill
Position: Deputy Manager Emergency Management
E-mail: gtuthill@nycap.rr.com

Affiliation: New York State Emergency Management Office (NYSEMO)
Name: Ed Lips
E-mail: Edward.Lips@semo.state.ny.us

Affiliation: New York State Emergency Management Office (NYSEMO)
Name: Nadine Macura
E-mail: Nadine.Macura@semo.state.ny.us

Affiliation: Ecology and Environment, Inc. (Project Consultant)
Name: Adam Shatzkamer
Position: Project Manager
Address: 90 Broad Street, Suite 1906
New York, NY 10004
E-mail: ashatzkamer@ene.com
Phone: 212-742-1713

D

Resolutions of Plan Adoption

Once FEMA has indicated that the approval of the Columbia County Multi-Jurisdictional Hazard Mitigation Plan is probable, each participating jurisdiction will execute a resolution adopting the plan. The resolutions will follow the form provided below.

ADOPTION RESOLUTION SAMPLE

(Name of Jurisdiction) Town A

(Governing Body) Town Council

(Address) 100 Main Street, Town A

RESOLUTION

WHEREAS, Town A, with the assistance from Ecology & Environment, Inc., has gathered information and prepared the Columbia County Multi-Jurisdictional Hazard Mitigation Plan; and

WHEREAS, the Columbia County Multi-Jurisdictional Hazard Mitigation Plan; has been prepared in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS, Town A is a local unit of government that has afforded the citizens an opportunity to comment and provide input in the Plan and the actions in the Plan; and

WHEREAS, Town A have reviewed the Plan and affirms that the Plan will be updated no less than every five years;

NOW THEREFORE, BE IT RESOLVED by Town Council that Town A adopts the Columbia County Multi-Jurisdictional Hazard Mitigation Plan; as this jurisdiction's Natural Hazard Mitigation Plan, and resolves to execute the actions in the Plan.

ADOPTED this 20th day of September, 2005 at the meeting of the Town Council.

(Mayor)

(Clerk)

E

List of Critical Infrastructure and Bridges Located within Columbia County

MERLE OIL CO INC	UNION TPKE	HUDSON	UNION TPKE	MERLE AVE
TOWN OF ANCRAM	1416 COUNTY ROUTE 7	ANCRAM	1416 COUNTY ROUTE 7	COUNTY RTE 7
TOWN OF GALLATIN	2242 STATE ROUTE 82	ANCRAM	2242 STATE ROUTE 82	OFF COUNTY RTE 7
TOWN OF GALLATIN	COUNTY RTE 7	ANCRAM	COUNTY RTE 7	C R 8
TOWN OF TAGHKANIC GARAGE	972 RT 27	ANCRAM	972 RT 27	C R 27
TOWN OF TAGHKANIC	972 RT 27	ANCRAM	972 RT 27	PUMPKIN HOLLOW RD
ANCRAM FIRE HOUSE	PO BOX 8	ANCRAM	PO BOX 8	COUNTY RTE 7
TOWN HALL GALLATIN	2242 STATE ROUTE 82	ANCRAM	2242 STATE ROUTE 82	COUNTY RTE 7
TAGHKANIC FIRE CO	646 NEW FORGE RD	ANCRAM	646 NEW FORGE RD	OLD RT 82 AND CR 10
TAGHKANIC FIRE CO NO 1	646 NEW FORGE RD II	ANCRAM	646 NEW FORGE RD II	OLD RT. 82
TOWN OF ANCRAM		ANCRAM		ANCRAMDALE STORAGE
CENTRAL HUDSON GAS & ELEC	284 SOUTH AVE	ANCRAM	284 SOUTH AVE	ROE JAN NO 10 ANCRAM
SPENCER TOWN FIRE COMPANY	MEMORIAL DRIVE AND RT 203	AUSTERLITZ		
HIGHWAY GARAGE	714 RT 203	AUSTERLITZ		
AUSTERLITZ FIRE CO.		AUSTERLITZ		AUSTERLITZ
TOWN OF AUSTERLITZ		AUSTERLITZ		WEST HILL RD
CANAAN PROTECTIVE FIRE		CANAAN		SR 295
CANAAN FIRE CO.		CANAAN		SR 295
CANAAN PROTECTIVE FIRE		CANAAN		SR 295
TOWN HALL		CANAAN		
RED ROCK FIRE COMPANY		CANAAN		
EAST CHATHAM FIRE COMPANY		CANAAN		
TOWN GARAGE		CANAAN		
UNITED STATES OF AMERICA	35 RAILROAD AVE	CHATHAM	35 RAILROAD AVE	RAILROAD AVE
UNITED STATES OF AMERICA	35 RAILROAD AVE	CHATHAM	35 RAILROAD AVE	33 RAILROAD AVE
VILLAGE FIRE HOUSE	MAIN ST	CHATHAM	MAIN ST	MAIN ST
VILLAGE OF CHATHAM		CHATHAM		ROUTE 21; OFF
VILLAGE OF CHATHAM		CHATHAM		ROUTE 21; OFF
VILLAGE OF CHATHAM		CHATHAM		SR 66
VILLAGE OF CHATHAM	77 MAIN ST	CHATHAM	47 MAIN ST	MAIN ST
VILLAGE OF CHATHAM	TRACY MEMORIAL	CHATHAM	TRACY MEMORIAL	ROUTE 66
TOWN OF CHATHAM	488 STATE ROUTE 295	CHATHAM	488 STATE ROUTE 295	S.R. 295
TOWN OF CHATHAM	488 STATE RTE 295	CHATHAM	488 STATE RTE 295	STATE RTE 295
SCHOOL DIST #1		CHATHAM		WOODBRIIDGE AVE.- MIDDLE S
VILLAGE OF CHATHAM		CHATHAM		CHATHAM
TOWN OF CHATHAM	488 STATE ROUTE 295	CHATHAM	488 STATE ROUTE 295	DORLAND RD
TOWN OF CHATHAM	488 STATE ROUTE 295	CHATHAM	488 STATE ROUTE 295	COUNTY RTE 13
TOWN OF CHATHAM	488 STATE ROUTE 295	CHATHAM	488 STATE ROUTE 295	S.R. 66
SCHOOL DIST. #1		CHATHAM		HIGH SCHOOL
VILLAGE OF CHATHAM	17 BROOKSIDE AVE	CHATHAM	17 BROOKSIDE AVE	BROOKSIDE AVE
VILLAGE OF CHATHAM		CHATHAM		JONES AVE
TACONIC TELEPHONE CO	1 TACONIC PL	CHATHAM	1 TACONIC PL	RAILROAD AVE
CHATHAM RESCUE SQUAD INC.	15 MOORE AVE	CHATHAM	15 MOORE AVE	MOORE AVE
VILLAGE OF CHATHAM		CHATHAM		JONES AVE

FIRE CO OF VILLAGE		CHATHAM	HOFFMAN STREET	CHATHAM
EAST CHATHAM FIRE CO INC	14 FRISBEE ST	CHATHAM	14 FRISBEE ST	FRISBEE ST., E. CHAT.
EAST CHATHAM FIRE HOUSE	14 FRISBEE ST	CHATHAM	14 FRISBEE ST	FRISBEE ST
EAST CHATHAM FIRE CO	14 FRISBEE ST	CHATHAM	14 FRISBEE ST	FRISBEE ST
NORTH CHATHAM LIBRARY		CHATHAM		N. CHAT., S.R. 203
NYS CORRECTIONAL FACILITY		CLAVERACK		C R 29
TOWN OF CLAVERACK	PO BOX 427	CLAVERACK	PO BOX 427	SNYDERTOWN RD.
VALLEY OIL CO. INC.	P.O.BOX 430	CLAVERACK	P.O.BOX 430	ST. RT. 9-H & 23
MELLENVILLE FIRE CO	12544-0000	CLAVERACK	NY001349	NY
CLAVERACK FIRE DEPT	12534-3825	CLAVERACK	NY000944	NY
TOWN OF CLAVERACK	PO BOX 427	CLAVERACK	PO BOX 427	CHURCH ST.
TOWN OF CLAVERACK	PO BOX 427	CLAVERACK	PO BOX 427	ROXBURY RD.
TOWN OF CLAVERACK	PO BOX 427	CLAVERACK	PO BOX 427	SCHOOLHOUSE RD
CLAVERACK		CLAVERACK		
CLAVERACK		CLAVERACK		
TOWN OF CLERMONT	1795 US RT 9	CLERMONT	1795 US RT 9	CR 6
TOWN OF CLERMONT	1795 US RTE 9	CLERMONT	1795 US RTE 9	SR 9
COMMUNITY RESCUE SQUAD	MOUNTAINVIEW RD	COPAKE	MOUNTAINVIEW RD	MOUNTAINVIEW RD
TOWN OF COPAKE	230 MOUNTAINVIEW RD	COPAKE	230 MOUNTAINVIEW RD	MOUNTAINVIEW RD
TOWN OF COPAKE		COPAKE		MT. VIEW RD
TOWN OF COPAKE		COPAKE		SCHOOL RD
COPAKE FIRE DISTRICT	CENTER HILL RD	COPAKE	CENTER HILL RD	CENTER HILL RD
RHODA LAKE COMMUNITY INC	PO BOX 682	COPAKE	PO BOX 682	JACKSON RD
RHODA LAKE COMMUNITY INC	PO BOX 682	COPAKE	PO BOX 682	SHORE DR
TOWN OF GALLATIN		GALLATIN	TACONIC PARKWAY	JACKSON CORNERS ROAD
GERMANTOWN TELEPHONE CO	PO BOX 188	GERMANTOWN	PO BOX 188	S R 9 BLUE STORES
TOWN OF GERMANTOWN	50 PALATINE PARK RD	GERMANTOWN	50 PALATINE PARK RD	PALATINE PARK RD
TOWN OF GERMANTOWN	50 PALATINE PARK RD	GERMANTOWN	50 PALATINE PARK RD	PALENTINE PARK RD
TOWN HIGHWAY DEPT	50 PALATINE PARK RD	GERMANTOWN	50 PALATINE PARK RD	MAIN ST
TOWN OF GERMANTOWN	50 PALATINE PARK RD	GERMANTOWN	50 PALATINE PARK RD	MAPLE AVE.
TOWN OF GERMANTOWN	50 PALATINE PARK RD	GERMANTOWN	50 PALATINE PARK RD	OFF MAPLE AVE.
TOWN OF GERMANTOWN	50 PALATINE PARK RD	GERMANTOWN	50 PALATINE PARK RD	SHARPS LANDING RD.
TOWN RESERVOIR	50 PALATINE PARK RD	GERMANTOWN	50 PALATINE PARK RD	MAIN ST.
TOWN DOCK	50 PALATINE PARK RD	GERMANTOWN	50 PALATINE PARK RD	CHEVIOT RD.
GERMANTOWN TELEPHONE CO	PO BOX 188	GERMANTOWN	PO BOX 188	MAIN ST
GERMANTOWN LIBRARY	50 PALATINE PARK	GERMANTOWN	50 PALATINE PARK	46 PALATINE PARK
GERMANTOWN TELEPHONE CO	PO BOX 188	GERMANTOWN	PO BOX 188	US ROUTE 9G LEASED LAND
GERMANTOWN TELEPHONE CO.	PO BOX 188	GERMANTOWN	PO BOX 188	ROUTE 6
GERMANTOWN TELEPHONE CO.	PO BOX 188	GERMANTOWN	PO BOX 188	PUBLIC ROW
TOWN OF GERMANTOWN	50 PALATINE PARK RD	GERMANTOWN	50 PALATINE PARK RD	MAPLE AVE.
TOWN OF GERMANTOWN	50 PALATINE PARK RD	GERMANTOWN	50 PALATINE PARK RD	
TOWN OF GERMANTOWN	50 PALATINE PARK RD	GERMANTOWN	50 PALATINE PARK RD	MAIN ST.
GERMANTOWN FIRE DISTRICT	PO BOX 331	GERMANTOWN	PO BOX 331	MAIN ST.
TOWN OF GERMANTOWN FIRE	PO BOX 331	GERMANTOWN	PO BOX 331	MAIN ST.

CLERMONT FIRE CO INC NO 2	RTE 9G	GERMANTOWN	RTE 9G	FIREHOUSE RD
TOWN OF CLERMONT		GERMANTOWN		SR 9
GERMANTOWN TELEPHONE CO	PO BOX 188	GERMANTOWN	PO BOX 188	COUNTY RTE 8
HILLTOP COMMUNICATIONS	PO BOX 352	GERMANTOWN	PO BOX 352	SATELLITE DISHES
TOWN OF GERMANTOWN	50 PALATINE PARK RD	GERMANTOWN	50 PALATINE PARK RD	RIVER RD.
CLERMONT FIRE CO INC NO 2		GERMANTOWN		FIREHOUSE RD
CARMELITE SOCIETY OF AGED	600 WOODS ROAD	GERMANTOWN	600 WOODS ROAD	WOODS RD
TOWN OF GHENT	PO BOX 98	GHENT	PO BOX 98	ROUTE 66
GHENT TOWN OF	PO BOX 98	GHENT	PO BOX 98	GARAGE PLACE RD
GHENT VOLUNTEER FIRE CO		GHENT		ROUTE 66
GHENT VOLUNTEER FIRE CO		GHENT		ROUTE 66
HUDSON VALLEY CARE CENTER	1 GREEN MANOR AVE	GHENT	1 GREEN MANOR AVE	GREEN MANOR AVE
WEST GHENT VOL FIRE CO	425 ROUTE 20	GHENT	425 ROUTE 20	BENDER LN
GHENT TOWN OF	TOWN HALL	GHENT	TOWN HALL	ROUTE 22
COUNTY OF COLUMBIA	PO BOX 574	GHENT	PO BOX 574	GHENT
COUNTY OF COLUMBIA	PO BOX 574	GHENT	PO BOX 574	GHENT
SCHOOL DIST NO 1		GREENPORT		STATE RT. 66
TOWN OF GREENPORT		GREENPORT		OFF HEALY BLVD.
TOWN OF GREENPORT		GREENPORT	JOSLEN BLVD	
TOWN OF GREENPORT		GREENPORT		RT 9H
GREENPORT WATER WORKS	HEALY BLVD	GREENPORT	HEALY BLVD	RT 9H
TOWN OF GREENPORT	600 TOWNHALL DR	GREENPORT	600 TOWNHALL DR	RTE 9 BUBBLE TANK
TOWN OF GREENPORT	600 TOWN HALL DR	GREENPORT	600 TOWN HALL DR	RTE 23B
BOARD OF FIRE		GREENPORT		GREENPORT
GREENPORT FIRE DIST	TOWN HALL DR	GREENPORT	TOWN HALL DR	WASHINGTON BLVD LOT 18
COUNTIES OF COL & GREENE	401 STATE ST	GREENPORT	401 STATE ST	GREENPORT
GREENPORT RESCUE SQUAD	PO BOX 275	GREENPORT	PO BOX 275	NEWMAN RD
GREENPORT FIRE DISTRICT		GREENPORT		CR 14
TOWN OF GREENPORT	ROUTE 9	GREENPORT	ROUTE 9	FAIRVIEW AVE EXT.
TOWN OF GREENPORT		GREENPORT		RTE 9
CITY OF HUDSON		GREENPORT		GREENPORT
TOWN OF GREENPORT		GREENPORT		OFF FAIRVIEW AVE. EXT.
TOWN OF GREENPORT		GREENPORT		FAIRVIEW AVE.
TOWN OF GREENPORT		GREENPORT		U.S. RT. 9
TOWN OF GREENPORT		GREENPORT		U.S. #9
GREENPORT FIRE DIST		GREENPORT		GREENPORT LOT 21
NEW YORK CENTRAL LINES	500 WATER STREET	GREENPORT	500 WATER STREET	GREENPORT
TOWN OF HILLSDALE	PO BOX 305	HILLSDALE	PO BOX 305	ROUTE 23
TACONIC HILLS CENTRAL	PO BOX 146	HILLSDALE	PO BOX 146	COUNTY RTE IIA
TACONIC HILLS CENTRAL		HILLSDALE		C.R. IIA
TOWN OF HILLSDALE	PO BOX 305	HILLSDALE	PO BOX 305	ROUTE 23
TOWN OF HILLSDALE	PO BOX 305	HILLSDALE	PO BOX 305	OLD TOWN RD
TOWN OF HILLSDALE	PO BOX 305	HILLSDALE	PO BOX 305	OLD TOWN RD
TOWN OF HILLSDALE	PO BOX 305	HILLSDALE	PO BOX 305	OLD TOWN RD.

COLUMBIA MEMORIAL HOSPITA	71 PROSPECT AVE.	HUDSON	71 PROSPECT AVE.	PROSPECT AVE.
COLUMBIA MEMORIAL HOSPITA	71 PROSPECT AVE	HUDSON	71 PROSPECT AVE	PROSPECT AVE
COLUMBIA MEMORIAL HOSPITA	71 PROSPECT AVE	HUDSON	71 PROSPECT AVE	ROSSMAN AVE
COLUMBIA MEMORIAL HOSPITA	71 PROSPECT AVE	HUDSON	71 PROSPECT AVE	ROSSMAN AVE
HOUSING RESOURCES OF	48 NORTH 6TH ST	HUDSON	48 NORTH 6TH ST	ROCK ST
COL CNTY HUMANE SOCIETY	RDI SR 66	HUDSON	RDI SR 66	HUMANE SOCIETY RD.
CITY OF HUDSON	CITY CLERK'S OFFICE	HUDSON	CITY CLERK'S OFFICE	
NYS OFFICE OF MENTAL	243 FISH & GAME RD	HUDSON	243 FISH & GAME RD	FISH & GAME RD
CITY OF HUDSON	520 WARREN ST	HUDSON	520 WARREN ST	
CITY OF HUDSON	CITY HALL	HUDSON	CITY HALL	ACADEMY HILL & CEMETERY
CITY OF HUDSON CEMETERIES	520 WARREN ST	HUDSON	520 WARREN ST	CED.PK.-PAUL AV-UN.TPK-NE
COUNTY OF COLUMBIA	PO BOX 574	HUDSON	PO BOX 574	STATE & N 4TH STS
COUNTY OF COLUMBIA	PO BOX 574	HUDSON	PO BOX 574	NORTH SIXTH ST
CITY OF HUDSON	520 WARREN ST.	HUDSON	520 WARREN ST.	WARREN ST. POL. STA.
CITY OF HUDSON	DOCK ST	HUDSON	DOCK ST	SEWAGE TREATMENT PLANT
CITY OF HUDSON	DOCK & MILL STS	HUDSON	DOCK & MILL STS	PUBLIC WORKS GARAGE
N.Y.S. CORRECTIONAL	SCHOOL	HUDSON	SCHOOL	WORTH AVE.
U.S. POST OFFICE	402 UNION ST.	HUDSON	402 UNION ST.	UNION ST.
U.S. POST OFFICE LOT	402 UNION ST.	HUDSON	402 UNION ST.	UNION
J.W. HOYSRADT HOSE CO.,		HUDSON		WARREN ST
J.W.HOYSRADT HOSE CO. #8		HUDSON		WARREN ST.
HOME FOR THE AGED	620 UNION ST.	HUDSON	620 UNION ST.	UNION ST.
COUNTY OF COLUMBIA	INDUSTRIAL TRACT	HUDSON	INDUSTRIAL TRACT	INDUSTRIAL TRACT
CITY OF HUDSON	YOUTH CENTER	HUDSON	YOUTH CENTER	WARREN ST.
CITY OF HUDSON	520 WARREN ST.	HUDSON	520 WARREN ST.	S FRONT ST
CITY OF HUDSON	520 WARREN ST.	HUDSON	520 WARREN ST.	BROAD ST
COUNTIES OF COL & GREENE		HUDSON		GREENPORT
COLUMBIA MEMORIAL HOSP	71 PROSOECT AVE.	HUDSON	71 PROSOECT AVE.	WARREN ST
COLUMBIA MEMORIAL	71 PROSPECT AVE.	HUDSON	71 PROSPECT AVE.	PROSPECT AVE
VERIZON NEW YORK INC	P.O. BOX 152206	HUDSON	P.O. BOX 152206	UNION ST
COLUMBIA MEDICAL COMPLEX,	839 N. JEFFERSON ST.	HUDSON	839 N. JEFFERSON ST.	PROSPECT AVE.
TOWN OF KINDERHOOK	P	KINDERHOOK	P	CHURCH ST
TOWN OF KINDERHOOK	PO BOX P	KINDERHOOK	PO BOX P	US RTE 9 REAR
NIVERVILLE FIRE DEPT	PO BOX 422	KINDERHOOK	PO BOX 422	US RTE 9
NIVERVILLE FIRE DEPT INC	888 CR. 28	KINDERHOOK	888 CR. 28	MAIN ST
TOWN OF KINDERHOOK	P	KINDERHOOK	P	STATE FARM RD
HISTORICAL CEMETERY	RR 2 BOX 190	KINDERHOOK	RR 2 BOX 190	CEMETERY
ICHABOD CRANE CENTRAL		KINDERHOOK VILLAGE		BROAD ST
ADVENTIST HOME	PO BOX 95	LIVINGSTON	PO BOX 95	COUNTY RTE 10
TOWN OF LIVINGSTON	PO BOX 65	LIVINGSTON	PO BOX 65	RD
LIVINGSTON PUMPER NO 1		LIVINGSTON		STATE RTE 9
TOWN OF LIVINGSTON		LIVINGSTON		COLD SPRING ROAD
EAGER COMMUNICATIONS TOWER	BLUE HILL RD CR 31	LIVINGSTON		
LIVINGSTON FAMILY PRACTICE		LIVINGSTON		2400 RT 9

NORTHERN DUTCHESS PARAMEDICS		LIVINGSTON		
NYS POLICE BARRACKS	RT 9	LIVINGSTON		
ELIZAVILLE FIRE COMPANY		LIVINGSTON		CR 19 AND COUNTY 2
LIVINGSTON PUMER CO. INC.		LIVINGSTON		LIVINGSTON
LIVINGSTON PUMPER CO INC		LIVINGSTON		LIVINGSTON-VL-9 SIGN
LEBANON VALLEY PROTECTIVE		NEW LEBANON		U.S. 20
NEW LEBANON CENTRAL		NEW LEBANON		SR 22
NEW LEBANON CENTRAL		NEW LEBANON		OFF SR 22
TOWN OF NEW LEBANON	P.O. BOX 328	NEW LEBANON	P.O. BOX 328	TEMPLE RD.
TOWN OF NEW LEBANON		NEW LEBANON		W. HILL RD.
TOWN OF NEW LEBANON		NEW LEBANON		SR 22
TOWN OF NEW LEBANON	-	NEW LEBANON	-	SR 22
TOWN OF NEW LEBANON		NEW LEBANON		SR 22
EMERGENCY COMMUNICATION TOWER		NEW LEBANON	RT 5	
OLD CHATHAM FIRE HOUSE		PHILMONT		ALBANY TPKE
VILLAGE OF PHILMONT	PO BOX 00	PHILMONT	PO BOX 00	RTE.217 DISPOSAL PLANT
VILLAGE OF PHILMONT		PHILMONT		MAIN ST.
AM LEGION MS POST 252		PHILMONT		MAIN ST.
AM LEGION MS POST 252		PHILMONT		RAILROAD AVE
VILLAGE OF PHILMONT		PHILMONT		CANAL ST
VILLAGE OF PHILMONT	PO BOX 00	PHILMONT	PO BOX 00	CLAVERACK RESERVOIR
VILLAGE OF PHILMONT	PO BOX 00	PHILMONT	PO BOX 00	CLAVERACK RESERVOIR
VILLAGE OF PHILMONT	MAIN ST	PHILMONT	MAIN ST	VILLAGE WATER SUPPLY
PINE HAVEN HOME		PHILMONT		S.R. 217
STOCKPORT FIRE VOL #1		STOCKPORT		RT 25
TOWN OF STOCKPORT	2787 ATLANTIC AVE	STOCKPORT	2787 ATLANTIC AVE	ROUTE 9
TOWN OF STOCKPORT	2787 ATLANTIC AVE	STOCKPORT	2787 ATLANTIC AVE	ATLANTIC AVE
TOWN OF STOCKPORT	2787 ATLANITC AVE	STOCKPORT	2787 ATLANITC AVE	KING'S ACRES SEWER
TOWN OF STOCKPORT	2787 ATLANTIC AVE	STOCKPORT	2787 ATLANTIC AVE	WATER SUPPLY
STOTTVILLE FIRE CO	PO BOX 264	STOCKPORT	PO BOX 264	ATLANTIC AVE
U S POST OFFICE	2857 ATLANTIC AVE	STOCKPORT	2857 ATLANTIC AVE	ATLANTIC AVE
VALATIE FALLS HYDRO INC	BOX 158	STOCKPORT	BOX 158	PART OF ISLAND & TIP
CHITTENDEN FALLS STEAM	BOX 158	STOCKPORT	BOX 158	ROSSMAN RD
CHITTENDEN FALLS HYDRO	BOX 158	STOCKPORT	BOX 158	ROSSMAN RD
CHITTENDEN FALLS HYDRO	BOX 158	STOCKPORT	BOX 158	ROSSMAN RD
STUYVESANT FALLS		STOCKPORT		LINDENWALD AVE.
TOWN OF STUYVESANT		STUYVESANT		C R 26A
TOWN OF STUYVESANT		STUYVESANT		C R 26A
TOWN OF STUYVESANT	RTE 26A	STUYVESANT	RTE 26A	RIVERVIEW ST
TOWN OF STUYVESANT	RTE 26A	STUYVESANT	RTE 26A	CHURCH ST LOT 1
TOWN OF STUYVESANT	RTE 26A	STUYVESANT	RTE 26A	SR 9J
TOWN OF STUYVESANT		STUYVESANT		STATE RTE 398
STUYVESANT		STUYVESANT		SR 398
STUYVESANT FIRE CO #1 INC	194 CTY RTE 26A	STUYVESANT	194 CTY RTE 26A	COUNTY RTE 26A

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National Climate Data Center Query Results

Mag = Storm Magnitude

Dth = Recorded Deaths

Inj = Recorded Injuries

PrD = Property Damage

CrD = Crop Damage

**Data before 1993 was not recorded at the jurisdiction level and may be listed under COLUMBIA

The hyperlinks in the left column link to more information on the NOAA website

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
Ancram	7/13/94	1915	Flash Flood	N/A	0	0	50,000	0
Ancram	6/30/94	1636	Thunderstorm Winds	N/A	0	0	5,000	0
Ancram	7/6/94	1830	Thunderstorm Winds	N/A	0	0	5,000	0
Ancram	7/9/97	1:30 PM	Tstm Wind	0 kts.	0	0	4,000	0
Ancram	7/13/94	1915	Lightning	N/A	0	1	0	0
Ancram	8/22/97	3:45 PM	Hail	0.75 in.	0	0	0	0
Ancram	5/13/04	3:02 PM	Tstm Wind	60 kts.	0	0	0	0
Ancramdale	7/5/04	7:00 PM	Lightning	N/A	0	1	0	0
Austerlitz	5/18/00	4:40 PM	Tstm Wind	0 kts.	0	0	25,000	0
Austerlitz	6/20/01	3:26 PM	Hail	1.50 in.	0	0	9,000	0
Austerlitz	6/16/02	1:25 PM	Hail	0.75 in.	0	0	0	0
Austerlitz	6/9/04	6:55 PM	Tstm Wind	60 kts.	0	0	0	0
Austerlitz	7/22/05	6:06 PM	Tstm Wind	60 kts.	0	0	0	0
Canaan	8/30/04	6:00 PM	Flash Flood	N/A	0	0	280,000	0
Canaan	7/3/97	6:17 PM	Tornado	F1	0	0	150,000	0
Canaan	8/14/02	5:06 PM	Tstm Wind	0 kts.	0	0	7,000	0
Canaan	6/16/02	1:23 PM	Hail	0.75 in.	0	0	0	0
Canaan	7/3/97	6:20 PM	Tornado	F2	0	0	550,000	20,000
Chatham	5/31/98	4:20 PM	Tstm Wind	0 kts.	0	0	15,000	0
Chatham	7/21/03	7:40 PM	Tstm Wind	60 kts.	0	0	10,000	0
Chatham	7/20/94	1530	Thunderstorm Winds	N/A	0	0	5,000	0
Chatham	7/26/94	1530	Lightning	N/A	0	0	5,000	0
Chatham	7/28/95	1845	Thunderstorm Winds	N/A	0	0	5,000	0
Chatham	6/8/96	4:30 PM	Tstm Wind	0 kts.	0	0	5,000	0
Chatham	8/4/95	1400	Thunderstorm Winds	N/A	0	0	4,000	0
Chatham	6/16/02	1:00 PM	Hail	1.50 in.	0	0	0	0
Chatham	6/9/04	6:40 PM	Lightning	N/A	0	0	0	0
Chatham Center	7/6/99	4:35 PM	Tstm Wind	0 kts.	0	0	4,000	0
Claverack	6/30/01	5:43 PM	Tstm Wind	0 kts.	0	0	55,000	0
Claverack	3/30/01	4:30 PM	Flood	N/A	0	0	15,000	0
Claverack	5/31/02	3:12 PM	Tstm Wind	0 kts.	0	0	12,000	0
Claverack	5/25/99	11:50 AM	Tstm Wind	0 kts.	0	0	10,000	0
Claverack	6/20/01	3:17 PM	Hail	1.00 in.	0	0	0	0
Claverack	8/21/04	12:45 PM	Lightning	N/A	0	0	0	0
Claverack	9/18/04	7:00 AM	Flash Flood	N/A	0	0	0	0
Claverack	7/27/05	3:25 PM	Tstm Wind	60 kts.	0	0	0	0
Clermont	6/3/01	8:30 AM	Tstm Wind	0 kts.	0	0	100,000	0
Clermont	7/26/94	1542	Thunderstorm Winds	N/A	0	0	5,000	0
Clermont	8/16/03	2:21 PM	Tstm Wind	60 kts.	0	0	0	0
Clermont	8/13/05	4:15 PM	Tstm Wind	60 kts.	0	0	0	0
COLUMBIA	3/29/93	850	Flood	N/A	0	0	500,000	0

COLUMBIA	8/28/73	1134	Tornado	F4	0	0	25,000	0
COLUMBIA	9/20/75	1745	Tornado	F1	0	2	25,000	0
COLUMBIA	7/10/78	1445	Tornado	F1	0	0	25,000	0
COLUMBIA	8/29/59	1430	Hail	2.00 in.	0	0	0	0
COLUMBIA	8/29/59	1430	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	6/18/62	1430	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	6/24/64	1300	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	7/10/66	1600	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	9/13/74	1600	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	8/10/79	1430	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	4/3/83	900	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	6/16/83	1600	Hail	1.00 in.	0	0	0	0
COLUMBIA	6/16/83	1700	Hail	1.75 in.	0	0	0	0
COLUMBIA	6/16/83	1700	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	7/4/83	1300	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	5/31/86	2037	Hail	1.00 in.	0	0	0	0
COLUMBIA	6/16/86	2105	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	7/29/86	1527	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	6/13/87	1100	Hail	0.75 in.	0	0	0	0
COLUMBIA	6/13/87	1125	Hail	0.75 in.	0	0	0	0
COLUMBIA	7/25/87	1510	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	7/25/87	1715	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	7/11/88	1655	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	7/12/88	1520	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	7/12/88	1535	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	7/12/88	1542	Tstm Wind	0 kts.	0	1	0	0
COLUMBIA	7/17/88	1537	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	7/17/88	1537	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	8/12/88	1240	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	8/12/88	1245	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	8/12/88	1300	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	6/23/89	1820	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	7/7/89	1540	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	7/10/89	1345	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	7/10/89	1345	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	7/10/89	1415	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	7/10/89	1420	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	7/10/89	1600	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	6/19/90	1450	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	6/29/90	1653	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	8/28/90	2052	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	10/18/90	1810	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	10/18/90	1834	Tstm Wind	0 kts.	0	2	0	0
COLUMBIA	10/18/90	1835	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	10/18/90	1835	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	10/18/90	1835	Tstm Wind	0 kts.	0	1	0	0
COLUMBIA	10/18/90	1915	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	5/17/91	1520	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	5/30/91	1447	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	6/12/91	1230	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	7/7/91	830	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	8/4/91	1400	Tstm Wind	0 kts.	0	0	0	0

COLUMBIA	8/4/91	1400	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	5/2/92	1545	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	5/2/92	1553	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	5/2/92	1610	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	6/14/92	1635	Hail	0.75 in.	0	0	0	0
COLUMBIA	6/14/92	1635	Hail	0.75 in.	0	0	0	0
COLUMBIA	6/24/92	1610	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	7/14/92	1415	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	7/14/92	1450	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	8/4/92	1515	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	8/8/92	1725	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	9/10/92	1740	Tstm Wind	0 kts.	0	0	0	0
COLUMBIA	9/10/92	1817	Tstm Wind	0 kts.	0	0	0	0
Copake	7/3/96	7:11 PM	Lightning	N/A	0	0	8,000	0
Copake	6/2/00	3:50 PM	Hail	1.00 in.	0	0	8,000	0
Copake	5/31/98	8:00 PM	Tstm Wind	0 kts.	0	0	6,000	0
Copake	7/26/94	1525	Thunderstorm Winds	N/A	0	0	5,000	0
Copake	8/22/97	3:55 PM	Hail	1.75 in.	0	0	5,000	0
Copake	8/22/03	3:30 PM	Tstm Wind	60 kts.	0	0	1,000	0
Copake Falls	7/3/97	4:23 PM	Tornado	F1	0	0	60,000	0
Copake Falls	6/2/00	3:53 PM	Hail	0.75 in.	0	0	0	0
Countywide	7/15/00	9:05 PM	Flood	N/A	0	0	1,500,000	0
Countywide	9/16/99	5:00 PM	Flood	N/A	0	0	600,000	0
Countywide	12/17/00	10:40 AM	Flood	N/A	0	0	100,000	0
Countywide	6/6/00	11:00 PM	Flood	N/A	0	0	75,000	0
Countywide	7/15/95	605	Thunderstorm Winds	N/A	0	0	50,000	0
Countywide	7/15/96	1:00 PM	Strong Wind	N/A	0	0	15,000	0
Countywide	8/4/95	1445	Thunderstorm Winds	N/A	0	0	10,000	0
East Taghkanic	5/18/00	4:30 PM	Tstm Wind	0 kts.	0	0	15,000	0
Gallatin	5/18/00	4:40 PM	Tstm Wind	0 kts.	0	0	95,000	0
Gallatin	8/9/00	11:02 PM	Tstm Wind	0 kts.	0	0	22,000	0
Germantown	4/4/95	1235	Tstm Wind	0 kts.	0	0	300,000	0
Germantown	7/7/94	1745	Thunderstorm Winds	N/A	0	0	5,000	0
Germantown	5/10/00	11:00 AM	Lightning	N/A	0	0	5,000	0
Germantown	8/22/03	3:30 PM	Tstm Wind	60 kts.	0	0	2,000	0
Germantown	8/16/03	3:00 PM	Tstm Wind	60 kts.	0	0	0	0
Ghent	8/11/03	3:25 PM	Flash Flood	N/A	0	0	20,000	0
Ghent	6/9/04	6:50 PM	Tstm Wind	80 kts.	0	0	10,000	0
Ghent	8/2/02	12:55 PM	Tstm Wind	0 kts.	0	0	8,000	0
Ghent	7/6/94	1625	Thunderstorm Winds	N/A	0	0	5,000	0
Ghent	8/4/95	1405	Thunderstorm Winds	N/A	0	0	4,000	0
Ghent	5/1/97	5:57 PM	Hail	0.75 in.	0	0	0	0
Ghent	5/6/97	1:00 PM	Hail	0.75 in.	0	0	0	0
Ghent	7/22/05	5:56 PM	Tstm Wind	60 kts.	0	0	0	0
Greendale	5/24/04	6:25 PM	Hail	0.88 in.	0	0	0	0
Greenport	4/27/94	1520	Thunderstorm Winds	N/A	0	0	5,000	0
Hillsdale	6/7/99	5:15 PM	Tstm Wind	90 kts.	0	0	100,000	0
Hillsdale	7/23/02	1:00 PM	Tstm Wind	0 kts.	0	0	15,000	0
Hillsdale	8/3/01	3:30 PM	Tstm Wind	0 kts.	0	0	8,000	0
Hillsdale	5/31/98	7:30 PM	Tstm Wind	0 kts.	0	0	4,000	0
Hillsdale	7/3/97	4:46 PM	Hail	1.75 in.	0	0	2,000	0
Hillsdale	8/14/05	3:45 PM	Tstm Wind	60 kts.	0	0	0	0

Hudson	8/22/03	3:30 PM	Lightning	N/A	0	0	10,000	0
Hudson	6/25/02	11:00 PM	Lightning	N/A	0	0	5,000	0
Hudson	8/4/95	1410	Thunderstorm Winds	N/A	0	0	4,000	0
Hudson	5/11/96	4:59 PM	Tstm Wind	0 kts.	0	0	2,000	0
Hudson	8/1/02	4:40 PM	Lightning	N/A	0	0	1,000	0
Hudson	7/21/03	7:25 PM	Tstm Wind	60 kts.	0	0	1,000	0
Hudson	8/11/03	1:00 PM	Flash Flood	N/A	0	0	0	0
Hudson	8/12/04	2:25 PM	Hail	0.75 in.	0	0	0	0
Hudson	8/30/04	6:22 PM	Flash Flood	N/A	0	0	0	0
Hudson	7/12/05	4:10 PM	Tstm Wind	60 kts.	0	0	0	0
Hudson	8/14/05	3:22 PM	Tstm Wind	60 kts.	0	0	0	0
Hudson	8/14/05	3:26 PM	Tstm Wind	60 kts.	0	0	0	0
Kinderhook	7/21/03	7:43 PM	Tornado	F2	0	1	200,000	0
Kinderhook	7/15/95	605	Thunderstorm Winds	N/A	0	0	20,000	0
Kinderhook	7/21/03	7:40 PM	Tornado	F0	0	0	20,000	0
Kinderhook	6/5/02	9:00 PM	Tstm Wind	0 kts.	0	0	11,000	0
Kinderhook	5/31/98	4:10 PM	Tstm Wind	0 kts.	0	0	10,000	0
Kinderhook	7/23/02	12:26 PM	Tstm Wind	0 kts.	0	0	10,000	0
Kinderhook	8/4/95	1400	Thunderstorm Winds	N/A	0	0	4,000	0
Kinderhook	5/29/98	3:41 PM	Tstm Wind	0 kts.	0	0	2,000	0
Kinderhook	5/18/00	4:26 PM	Tstm Wind	60 kts.	0	0	0	0
Kinderhook	6/1/04	5:22 PM	Hail	0.75 in.	0	0	0	0
Kinderhook	6/1/04	5:22 PM	Tstm Wind	60 kts.	0	0	0	0
Kinderhook	6/2/04	1:18 PM	Hail	0.75 in.	0	0	0	0
Lake Taghkanic	6/8/96	7:20 PM	Flash Flood	N/A	0	0	200,000	0
Lake Taghkanic	5/15/93	2230	Lightning	N/A	0	2	1,000	0
Lebanon Spgs	6/2/00	3:30 PM	Tstm Wind	0 kts.	0	0	24,000	0
Lebanon Spgs	2/17/06	11:03 AM	Tstm Wind	60 kts.	0	0	0	0
Livingston	4/4/95	1240	Tstm Wind	0 kts.	0	0	300,000	0
Livingston	6/2/00	3:25 PM	Tstm Wind	0 kts.	0	0	175,000	0
Livingston	6/25/00	7:20 PM	Tstm Wind	0 kts.	0	0	24,000	0
Livingston	5/18/00	4:21 PM	Tstm Wind	0 kts.	0	0	20,000	0
Livingston	6/2/00	4:10 PM	Hail	0.75 in.	0	0	0	0
Livingston	5/23/04	11:14 PM	Tstm Wind	60 kts.	0	0	0	0
Livingston	5/24/04	11:14 AM	Lightning	N/A	0	0	0	0
Livingston	5/24/04	11:14 AM	Tstm Wind	60 kts.	0	0	0	0
Livingston	8/13/05	4:12 PM	Tstm Wind	60 kts.	0	0	0	0
Livingston	6/2/00	4:30 PM	Hail	1.25 in.	0	0	10,000	1,000,000
Mellenville	8/23/96	3:30 PM	Lightning	N/A	0	0	15,000	0
New Lebanon	5/15/04	3:41 PM	Tstm Wind	60 kts.	0	0	0	0
Newton Hook	7/21/03	7:35 PM	Tornado	F0	0	0	5,000	0
Niverville	7/21/03	7:32 PM	Tornado	F1	0	0	150,000	0
Niverville	8/3/00	1:14 PM	Lightning	N/A	0	0	40,000	0
Niverville	5/31/98	4:26 PM	Tstm Wind	0 kts.	0	0	20,000	0
Niverville	6/13/94	1950	Thunderstorm Winds	N/A	0	0	5,000	0
Niverville	9/26/98	11:05 PM	Tstm Wind	0 kts.	0	0	3,000	0
Niverville	5/24/04	4:23 PM	Hail	0.75 in.	0	0	0	0
North Chatham	8/23/96	2:47 PM	Tstm Wind	0 kts.	0	0	2,000	0
North Chatham	7/6/99	4:33 PM	Tstm Wind	0 kts.	0	0	2,000	0
North Hillsdale	6/9/04	7:02 PM	Tstm Wind	60 kts.	0	0	0	0
Northwest Portion	5/6/98	8:35 PM	Flash Flood	N/A	0	0	50,000	0
Omi	6/9/04	6:40 PM	Tstm Wind	60 kts.	0	0	0	0

Philmont	6/7/99	5:08 PM	Hail	0.75 in.	0	0	0,000	0
Philmont	5/18/00	4:55 PM	Tstm Wind	0 kts.	0	0	21,000	0
Philmont	7/5/04	4:00 PM	Tstm Wind	60 kts.	0	0	0	0
Red Rock	8/28/93	1319	Thunderstorm Winds	N/A	0	0	5,000	0
Red Rock	7/20/94	1530	Thunderstorm Winds	N/A	0	0	5,000	0
Stockport	6/20/01	2:35 PM	Hail	2.00 in.	0	0	20,000	0
Stockport	5/28/01	12:07 PM	Hail	1.75 in.	0	0	11,000	0
Stockport	6/11/00	3:00 PM	Hail	2.00 in.	0	0	10,000	0
Stockport	6/5/02	8:40 PM	Hail	2.00 in.	0	0	9,000	0
Stockport	6/13/94	1950	Thunderstorm Winds	N/A	0	0	5,000	0
Stockport	7/6/94	1625	Thunderstorm Winds	N/A	0	0	5,000	0
Stockport	7/9/94	1453	Thunderstorm Winds	N/A	0	0	5,000	0
Stockport	6/29/94	1153	Thunderstorm Winds	N/A	0	0	1,000	0
Stockport	8/13/99	10:20 PM	Hail	1.00 in.	0	0	1,000	0
Stockport	7/21/03	7:30 PM	Hail	1.75 in.	0	0	1,000	0
Stockport	6/9/04	6:40 PM	Tstm Wind	60 kts.	0	0	0	0
Stockport	7/12/05	4:10 PM	Tstm Wind	60 kts.	0	0	0	0
Stottville	7/12/05	4:10 PM	Tstm Wind	60 kts.	0	0	0	0
Stuyvesant	7/21/03	7:38 PM	Tornado	F0	0	0	10,000	0
Stuyvesant	5/31/98	4:10 PM	Tstm Wind	0 kts.	0	0	6,000	0
Stuyvesant	7/9/94	1453	Thunderstorm Winds	N/A	0	0	5,000	0
Stuyvesant	7/21/03	7:40 PM	Tornado	F0	0	0	5,000	0
Stuyvesant	9/26/98	11:00 PM	Tstm Wind	0 kts.	0	0	1,000	0
Stuyvesant	5/28/01	12:12 PM	Hail	0.75 in.	0	0	0	0
Stuyvesant	2/17/06	10:40 AM	Tstm Wind	65 kts.	0	0	0	0
Stuyvesant	5/31/98	4:31 PM	Hail	1.00 in.	0	0	4,000	200,000
Stuyvesant Falls	6/9/04	6:35 PM	Tstm Wind	60 kts.	0	0	0	0
Stuyvesant Falls	7/22/05	5:46 PM	Tstm Wind	60 kts.	0	0	0	0
Taghkanic	11/25/04	10:40 AM	Tstm Wind	60 kts.	0	0	0	0
Town Of Claverack	7/13/96	1:00 PM	Flash Flood	N/A	0	0	20,000	0
Valatie	5/29/98	3:38 PM	Tstm Wind	0 kts.	0	0	15,000	0
Valatie	7/21/03	7:40 PM	Tstm Wind	60 kts.	0	0	10,000	0
Valatie	8/4/95	1400	Thunderstorm Winds	N/A	0	0	4,000	0
West Copake	6/9/04	6:30 PM	Lightning	N/A	0	0	0	0
West Lebanon	6/2/00	3:15 PM	Flash Flood	N/A	0	0	18,000	0
West Lebanon	6/9/04	6:30 PM	Lightning	N/A	0	0	0	0
Hudson	5/29/95	1740	Tornado	F2	0	5	10,000,000	0



Glossary

Mitigation	Any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event ²²
Stafford Act	This Act constitutes the statutory authority for most Federal disaster response activities ²³
Flood Insurance Rate Map	It is the official map of a community on which FEMA has delineated both the special hazard areas and the risk premium zones applicable to the community ²⁴
Emergency Management	The organization and management of resources and responsibilities for dealing with all aspects of emergencies, in particularly preparedness, response and rehabilitation ²⁵
Hazard	A source of danger
Risk	The potential for suffering harm, loss, or danger
Vulnerability	The level of exposure of human life, property, and resources to damage from natural hazards ²⁶
Flood Plain	See Flood Zone
Flood Zone	Land area at risk from flooding.
Peak Ground Acceleration	A measure of ground movement
Epicenter	The point on the Earth's surface directly above the focus of an earthquake
Richter Scale	Scale for measuring earthquake intensity
Inundation	The act of covering with water
Fujita Scale	Scale for measuring tornado intensity

²² FEMA

²³ Ibid.

²⁴ Ibid.

²⁵ United Nations International Strategy for Disaster Reduction

²⁶ NOAA