# Northern and Eastern Dutchess County Communities
# Regional Hazard Mitigation Planning Project
# HAZARD IDENTIFICATION QUESTIONNAIRE

## IDENTIFICATION OF POTENTIAL HAZARDS

The first step in completing a multi-jurisdictional risk assessment for the Northern and Eastern Dutchess County communities is to answer the question: *what kinds of natural hazards can affect the planning area?* In completing this step we must simply identify all the natural hazards that might affect your communities, and then narrow the list down to those hazards that are most likely to have significant impacts. Further research and analysis will then be focused on those hazards identified as significant, while the other hazards will be eliminated from further consideration in the risk assessment and mitigation planning process.

FEMA's current regulations and interim guidance under the Disaster Mitigation Act of 2000 (DMA 2000) require, at a minimum, an evaluation of a full range of natural hazards. To receive a 'satisfactory' score for this element, the plan must indicate:

- which hazards were initially considered
- which hazards *were* identified as significant hazards to be addressed in the plan (and why)
- which hazards *were not* identified as significant hazards to be addressed in the plan (and why not)

**FEMA Planning Requirement**

***44 CFR Part 201.6(c)(2)(i):*** *[The risk assessment shall include] a description of the type… of all natural hazards that can affect the jurisdiction.*

Our consultants at URS have considered a full range of natural hazards, and have identified several as significant hazards that are recommended to be addressed in the Multi-Jurisdictional Hazard Mitigation Plan. These hazards were identified through an extensive process that involved research of past disaster declarations in the County; review of the New York State Hazard Mitigation Plan; and an evaluation of readily available online information from reputable sources (such as Federal and state agencies) to supplement information from these key sources. The following table documents this evaluation process for the full range of hazards considered. For each hazard considered, the table indicates whether or not the hazard was identified as a significant hazard to be addressed in the plan, how this determination was made (i.e. the sources of information that were consulted while researching each hazard), and why this determination was made. *(Please note that some hazards not currently identified as significant may be reconsidered during future plan updates and possibly included in subsequent versions of the plan.)* For your convenience, brief definitions of each hazard are listed on pages 14 through 16.

**The hazard identification process is not complete without your feedback.** Please take a moment to review this table and fill in the "Core Planning Group Member Feedback" column. Do you concur with the determination? We are also interested in anything that may come to mind regarding: (a) historic events, including the date, number of injuries, and types (and/or dollar amounts) of damages to buildings, utilities, infrastructure and, especially, critical facilities; and (b) any areas of town and/or specific facilities that you feel are particularly at risk, even if there are no historic occurrences. *(Note: There is no need to re-submit this information if you have already provided it to the URS team).*

Please provide feedback using the following table and return to URS by email, US mail, or fax, no later than **November 17, 2008**. Please make sure to provide your contact information on page 2, and feel free to attach additional pages if needed. *Thank you in advance for your participation!*

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## CONTACT INFORMATION

**Name:** _____

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**Jurisdiction You Are Representing:** _____

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| Natural Hazards Considered | Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No) | Which sources of information were used to make this determination? | Why was this determination made? | Core Planning Group Member Feedback<br>• *Do you concur? If no, please explain.*<br>• *Any historic events? If so, when? What were the damages?*<br>• *Any localized areas and/or specific facilities particularly at-risk?* |
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| **ATMOSPHERIC HAZARDS** | | | | |
| Avalanche | NO | • Review of US Forest Service National Avalanche Center web site<br>• Review of NY State Hazard Mitigation Plan<br>• Review of FEMA's Multi-Hazard Identification and Risk Assessment | • Avalanches are not included in the NY State Hazard Mitigation Plan, and are not discussed for NY on the US Forest Service Avalanche Center web site.<br>• While avalanches are not unknown in northern New York State, the topography and climate in Dutchess County do not support conditions required for the occurrence of significant avalanches. | |
| **Extreme Temperatures** | **YES** | • Review of NY State Hazard Mitigation Plan<br>• Review of NOAA National Climatic Data Center (NCDC) Database<br>• Review of FEMA's Multi-Hazard Identification and Risk Assessment | • Extreme heat events are mentioned in the NY State plan as a discrete hazard. Extreme cold is mentioned in the context of winter storms.<br>• The state plan records one significant extreme heat event affecting Dutchess County since 1994 and shows that the percentage of the population most susceptible to extreme heat (under 5yrs and over 65yrs) is 17.6%, which is lower than in most other counties in the state.<br>• NCDC reports 17 significant extreme temperature events for areas including Dutchess County between February 1993 and June 2008 (including three extreme summer heat events, four extreme winter cold events, seven | |

| Natural Hazards Considered | Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No) | Which sources of information were used to make this determination? | Why was this determination made? | Core Planning Group Member Feedback<br>• *Do you concur? If no, please explain.*<br>• *Any historic events? If so, when? What were the damages?*<br>• *Any localized areas and/or specific facilities particularly at-risk?* |
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| | | | unseasonably warm events and three unseasonably cold events). For these events there are $50,000 recorded property damages but no attributed deaths, injuries or crop damages across the affected areas. | |
| **Extreme Wind** | **YES** | • Review of NY State Hazard Mitigation Plan<br>• Review of FEMA's Multi-Hazard Identification and Risk Assessment<br>• Review of NOAA NCDC Storm Events Database<br>• Review of American Society of Civil Engineers (ASCE) Standard 7-02 (Minimum Design Loads for Buildings and Other Structures)<br>• Review of Wind Zones in the United States as per FEMA Publication 320 – Taking Shelter From the Storm | • Extreme wind events are included in the NY State plan in the context of hurricane and tornado events.<br>• The state plan ranks Dutchess County as fourth out of 62 counties in the state for the threat of extreme wind and vulnerability to extreme wind losses.<br>• Dutchess County is located in a climate region that is highly susceptible to numerous types of extreme wind events including straight line winds, severe thunderstorms, hurricanes, tropical storms, and nor'easters.<br>• According to FEMA-320, Dutchess County is located in a wind zone where extreme wind speeds of 160mph are possible.<br>• NCDC reports 73 high wind events (wind speed > 50 knots/58 mph) for Dutchess County since 1998. These events have most often been associated with thunderstorms, and have caused more than $1.5 million in property damage and one injury but no recorded deaths or crop damages.<br>• The 3 second wind gust for Dutchess County for building design purposes as per ASCE 7-02 is between 90 and 95 mph. The standard also shows Dutchess County is located in a Special Wind Region, i.e. an area where wind anomalies are known to occur and in which wind speeds may be substantially higher than specified. | |
| Hailstorm | NO | • Review of NY State Hazard Mitigation Plan | • The state plan includes hailstorms as a discrete hazard. | |

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| | | • Review of FEMA's Multi-Hazard Identification and Risk Assessment<br>• Review of NOAA NCDC Storm Events Database and NOAA NSSL website | • NCDC reports 78 severe hailstorm events (3/4 inch diameter hail or greater) for Dutchess County between June 1957 and June 2008. For these events there are $48,000 recorded property damages and $1.09 million crop damages, but no recorded deaths or injuries.<br>• NCDC reports only one event in which "damaging" hail (at least 2 inches in diameter) fell in Dutchess County (Pine Plains – September 26, 1998).<br>• According to NSSL data Dutchess County is located in a part of the country with the lowest annual number of days with hailstorms (less than 2), and where the annual average number of damaging hail events is less than 0.25.<br>• There are minimal hazard mitigation techniques available to reduce hailstorm impacts to property, outside of the emergency preparedness procedures and severe weather warning systems already in place (i.e. mass public notifications that recommend immediate protective actions). There are no known hail mitigation measures for crops, which have incurred by far the greatest hail damages. | |
| **Hurricane and Tropical Storm** | **YES** | • Review of NY State Hazard Mitigation Plan<br>• Analysis of NOAA historical tropical cyclone tracks<br>• Review of NOAA National Hurricane Center website<br>• Review of NOAA NCDC Storm Events Database and National Hurricane Center web site<br>• Review of FEMA's | • Hurricane and tropical storm events are discussed in the state plan, which includes FEMA mapping showing Dutchess County located in a hurricane-prone area where extreme wind speeds of 160 mph are possible.<br>• Dutchess County has been included in the area covered by major disaster declarations due to hurricanes or tropical storms on two occasions in the last ten years.<br>• NOAA historical records indicate four hurricane tracks and 11 tropical storm tracks passing within 65 nautical miles of Dutchess County between 1900 and 2007. | |

| Natural Hazards Considered | Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No) | Which sources of information were used to make this determination? | Why was this determination made? | Core Planning Group Member Feedback<br>• *Do you concur? If no, please explain.*<br>• *Any historic events? If so, when? What were the damages?*<br>• *Any localized areas and/or specific facilities particularly at-risk?* |
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| | | Multi-Hazard Identification and Risk Assessment | • The most recent of these events was Tropical Storm Floyd, which passed over Long Island in September 1999. The most proximate event to Dutchess County Communities Regional Plan area was Tropical Storm Able in September 1952 (the path of which crossed directly over Dutchess County).<br>• According to the NHC the estimated return period for a Category 1 hurricane in the New York City area is 17 years, rising to 370 years for a Category 5 event. | |
| **Lightning** | **YES** | • Review of NY State Hazard Mitigation Plan<br>• Review of NOAA NCDC Storm Events Database, NOAA lightning statistics, and National Severe Storms Laboratory (NSSL) web site<br>• Review of FEMA's Multi-Hazard Identification and Risk Assessment | • Lightning is not considered as a discrete hazard in the NY State Hazard Mitigation Plan.<br>• According to NOAA and FEMA data, eastern and northern Dutchess County is located in an area of the country that experiences an average of less than 40 thunder events and one lightning flash per square kilometer per year. For comparison, large areas of the country experience more than 120 events per year and more than 10 flashes per square kilometer.<br>• NOAA records that New York State has experienced the fourth most deaths and third most damages from lightning in the United States from 1959 to 1994.<br>• NCDC reports 8 significant lightning events for Dutchess County between August 1996 and May 2008. These events have resulted in one recorded injury and more than $230,000 in property damage. | |
| **Nor'easter** | **YES** | • Review of NY State Hazard Mitigation Plan<br>• Review of NOAA NCDC Storm Events Database<br>• Review of FEMA's Multi-Hazard Identification and Risk | • Nor'easters are discussed in the state plan as a common cause of flooding and snowstorms, particularly in the south eastern part of the state where Dutchess County is located.<br>• NYSEMO has classified nor'easters as a moderate hazard (second only to flooding) in the planning area covering Dutchess County. | |

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| | | Assessment | • Dutchess County has a history of experiencing the impacts of nor'easters, including high wind, heavy rain or snow, and flooding. | |
| **Tornado** | **YES** | • Review of NY State Hazard Mitigation Plan<br>• Review of NOAA NCDC Storm Events Database and National Severe Storms Laboratory (NSSL) web site<br>• Review of FEMA's Multi-Hazard Identification and Risk Assessment | • The state plan acknowledges that New York State has a definite vulnerability to tornadoes, with an average annual occurrence of 6 tornadoes per year since 1950.<br>• Tornadoes are ranked as a moderate hazard in the planning area covering Dutchess County.<br>• NCDC reports 11 tornado events in Dutchess County between August 1978 and June 2008. These events have resulted in no recorded deaths or injuries but have caused $3.2 million in property damage. Of the 11 recorded events, six were of magnitude F1 (moderate damage) on the Fujita scale and the remainder were F0 (light damage).<br>• NSSL tornado probability data indicate that while Dutchess County is in an area that experiences 0.2 to 0.4 tornado events per year, life-threatening and damaging tornado events remain a possibility. | |
| **Winter Storm** | **YES** | • Review of NY State Hazard Mitigation Plan<br>• Review of FEMA's Multi-Hazard Identification and Risk Assessment<br>• Review of NOAA NCDC Storm Events Database<br>• New York State Climate Office web site | • Winter storms including heavy snow and ice storms are discussed in the state plan, which notes that Dutchess County averages approximately 42 inches of snowfall per year. The statewide average is 65 inches, with 60% of the state experiencing at least 70 inches annually.<br>• The state plan ranks winter/ice storms as a moderate risk in the planning area covering Dutchess County.<br>• The NY State plan ranks Dutchess County 10$^{th}$ out of 62 counties in the state for most threatened by snow and vulnerable to snow losses. The plan also ranks Dutchess County 34$^{th}$ out of 62 for most vulnerable to ice storms | |

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| | | | and ice storm losses.<br>• NCDC reports that Dutchess County has been affected by 84 significant snow and ice events between January 1993 and February 2008. More than $20 million in property damages are attributed to these events, including damages occurring outside Dutchess County.<br>• NCDC mapping shows Dutchess County to be located in an area with an average of 12-19 hours of freezing rain per year.<br>• According to FEMA, Dutchess County is located in an area where snow depths of 50-75" have a 5% chance of being equaled or exceeded in any given year.<br>• The website of the New York State Climate Office indicates that the eastern side of Dutchess County experiences higher annual snowfalls than the western side.<br>• FEMA records show that Dutchess County has been specifically included in two snow-related declared disasters in the last 30 years and one snow-related emergency declaration. | |
| **HYDROLOGIC HAZARDS** | | | | |
| Coastal Erosion | NO | • Review of NY State Hazard Mitigation Plan<br>• Review of FEMA's Multi-Hazard Identification and Risk Assessment | • While coastal erosion is identified as a hazard and discussed in the NY State plan, it does not apply to Dutchess County since the county has no coastline. | |
| **Dam Failure** | **YES** | • Review of NY State Hazard Mitigation Plan<br>• Review of New York State Department of Environmental Conservation (NYSDEC) Bureau of Flood | • Dam Failure is briefly discussed in the state plan as a potential cause of flooding.<br>• A study of the USACE NID and Stanford NPDP databases, in conjunction with NYSDEC data indicates that there are 56 dams located within the nine jurisdictions participating in the Dutchess County Communities Regional Plan. | |

| Natural Hazards Considered | Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No) | Which sources of information were used to make this determination? | Why was this determination made? | Core Planning Group Member Feedback<br>• *Do you concur? If no, please explain.*<br>• *Any historic events? If so, when? What were the damages?*<br>• *Any localized areas and/or specific facilities particularly at-risk?* |
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| | | Protection and Dam Safety web site<br>• Review of U.S. Army Corps of Engineers National Inventory of Dams database (NID)<br>• Review of Stanford University's National Performance of Dams Program (NPDP) web site<br>• Review of FEMA's Multi-Hazard Identification and Risk Assessment | Of these, 6 are designated "High" hazard potential, 13 are designated "Significant" hazard, and the remainder are "Low" hazard.<br>• According to USGS criteria, of the six "High" hazard potential dams, only one dam in the project area qualifies as a "Major" dam by virtue of having a dam height of more than 50 feet. None of the dams in the project area qualify as "Major" dams by the USGS storage criteria, since none have a normal storage volume of more than 5,000 acre-feet. The largest dam in the project area has a height of 19 feet and a normal storage volume of 4,854 acre-feet.<br>• All except one of the "High" hazard potential dams in the project area have Emergency Action Plans which include inundation mapping.<br>• The NPDP database does not record any dam failure incidents in the project area since detailed records began in 1868. | |
| **Drought** | **YES** | • Review of NY State Hazard Mitigation Plan<br>• Review of FEMA's Multi-Hazard Identification and Risk Assessment<br>• Review of NOAA NCDC Database<br>• Review of National Drought Mitigation Center /NOAA web sites | • Drought is discussed in the state plan, which describes two significant local droughts and one statewide drought event to have affected Dutchess County since 1993.<br>• For the purposes of this plan the primary impacts of drought are assumed to fall on agriculture, which is assumed to be economically significant throughout the northern and eastern portions of Dutchess County.<br>• NCDC reports that Dutchess County has been affected by nine drought events of since 1993. One of these events, in August 1993, is recorded as having caused $50 million in crop damage across the entire southeastern area of New York State. | |

| Natural Hazards Considered | Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No) | Which sources of information were used to make this determination? | Why was this determination made? | Core Planning Group Member Feedback<br>• *Do you concur? If no, please explain.*<br>• *Any historic events? If so, when? What were the damages?*<br>• *Any localized areas and/or specific facilities particularly at-risk?* |
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| | | | • According to the Palmer Drought Severity Index (PDSI) Map for the USA, Dutchess County is located in an area that experienced drought conditions for 5-10% of the period 1895 to 1995. | |
| **Flood** | **YES** | • Review of NY State Hazard Mitigation Plan<br>• Review of NOAA NCDC Storm Events Database<br>• Review of FEMA's Multi-Hazard Identification and Risk Assessment<br>• Review of FEMA's NFIP Community Status Book and Community Rating System (CRS)<br>• Review of FEMA Q3 flood data for the participating Dutchess County communities | • Flooding is described in the state plan as the primary natural hazard in the State of New York and is discussed in comprehensive detail.<br>• One third of all Federal disaster declarations since 1998 covering Dutchess County have involved flooding.<br>• Dutchess County has been affected by five flood-related Presidential disaster declarations since 1953, with one major flood disaster declaration covering areas including Dutchess County since 2004.<br>• NCDC records 73 flood events affecting Dutchess County since June 1994. One fatality and almost $14.5 million in property damage was attributed to these events.<br>• According to data tabulated in the State Plan, based on FEMA's Q3 flood mapping, 8% of Dutchess County and 2% of all residential properties lie within the identified 100-year floodplain. Dutchess County ranks as the 14$^{th}$ most threatened and vulnerable to flood loss out of the 62 counties in the state on this basis.<br>• All nine jurisdictions covered by this plan participate in the NFIP but none participate in the CRS. According to data tabulated in the New York State Hazard Mitigation Plan Dutchess County ranks 15$^{th}$ out of 62 for the total number of NFIP policies and 11$^{th}$ for the total dollar amount of NFIP coverage. Dutchess County ranks 20$^{th}$ in the state for the total number of NFIP claims since 1978, and 23$^{rd}$ for the total dollar amount of claims paid. | |

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| **Ice Jams** | **YES** | • Review of NY State Hazard Mitigation Plan<br>• Review of FEMA's Multi-Hazard Identification and Risk Assessment<br>• USACE Cold Regions Research & Engineering Laboratory Ice Jams Database | • Ice jams are mentioned as a significant cause of flooding in the state plan – New York State has experienced more ice jam events than any other U.S. state except Montana in the period 1867 through 2007.<br>• The USACE CRREL Ice Jams database records one ice jam incident in total (in the Town of Amenia in January 1999) on all watercourses in the nine participating Dutchess County communities from 1875 to 2007. | |
| Storm Surge | NO | • Review of NY State Hazard Mitigation Plan<br>• Review of U.S. Army Corps of Engineers SLOSH model data<br>• Review of FEMA's Multi-Hazard Identification and Risk Assessment | • While storm surge is discussed in the state plan under flood hazard and hurricane/tropical storm hazard, storm surges are considered a coastal phenomenon and since Dutchess County is located more than 30 miles from the nearest coastline, they are not regarded as a hazard for the purposes of this plan. | |
| Wave Action | NO | • Review of NY State Hazard Mitigation Plan<br>• Review of FEMA's Multi-Hazard Identification and Risk Assessment | • While waves are discussed in the state plan under flood hazard, damage-causing waves are considered a coastal phenomenon, and since Dutchess County is located more than 30 miles from the nearest coastline, they are not regarded as a hazard for the purposes of this plan. | |
| **GEOLOGIC HAZARDS** | | | | |
| **Earthquake** | **YES** | • Review of NY State Hazard Mitigation Plan<br>• Review of USGS Earthquake Hazards Program web site<br>• Review of New York City Area Consortium For Earthquake Loss Mitigation website<br>• Review of FEMA's | • Earthquakes are discussed in the state plan, since earthquakes have occurred in and around the State of New York in the past.<br>• The state plan ranks Dutchess County 15$^{th}$ out of 62 counties for potential annualized earthquake losses and 23$^{rd}$ out of 62 for potential annualized earthquake loss per capita.<br>• According to USGS seismic hazard maps, the peak ground acceleration (PGA) with a 10% probability of exceedance in 50 years for the | |

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| | | Multi-Hazard Identification and Risk Assessment | participating communities in Dutchess County is 3% of gravity. FEMA requires that earthquakes be further evaluated for mitigation purposes in areas with a PGA of 3%g or more.<br>• USGS records show two significant earthquakes affecting Dutchess County, where significant is defined as those that caused deaths and/or property damage, or that were experienced by populations in the epicentral area. One event occurred on 06/07/74 and a second event on 02/26/83 (both with Modified Mercalli Intensities of VI). | |
| Expansive Soils | NO | • Review of NY State Hazard Mitigation Plan<br>• Review of FEMA's Multi-Hazard Identification and Risk Assessment<br>• US Department of Transport Federal Highway Administration (USDOT FHA) Geological Data<br>• Review of USDA Natural Resources Conservation Service (NRCS) Soil Websites | • Expansive soils are not identified as a hazard in the NY State plan.<br>• According to FEMA and USGS sources, Dutchess County is located in an area that mostly contains "little or no" clay swelling potential.<br>• According to USDOT FHA Report No. FHWA-RD-76-82, Dutchess County lies in an area mapped as non-expansive – the occurrence of expansive materials is extremely limited.<br>• New York State building codes are based on the International Building Code (2000, with 2001 supplement), in which Chapter 18 includes provisions for building on expansive soils (through design, removal or stabilization) so that new construction will be protected. | |
| Landslide | NO | • Review of NY State Hazard Mitigation Plan<br>• Review of USGS Landslide Incidence and Susceptibility Hazard Map<br>• Review of New York State Geological Survey (NYSGS) GIS database | • Landslides are discussed in the NY state plan, which gives Dutchess County as a whole a weighted rank of 12$^{th}$ out of 62 counties in the state for susceptibility to landslides, and 23$^{rd}$ out of 62 for vulnerability to losses from landslides. However, this is predominantly due to mapped high risk areas along the Hudson River, outside of our planning area.<br>• USGS landslide hazard maps indicate that the | |

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| | | of historic landslides in New York<br>• Review of FEMA's Multi-Hazard Identification and Risk Assessment | Northern and Eastern Dutchess County Communities project area is identified as being of "Low landslide incidence" (less than 1.5% of the area is at risk).<br>• Using NYSGS data and mapping records, the State Plan reports no noteworthy landslide events in the Dutchess County Communities Regional Plan project area for a period of record beginning in 1963. | |
| Land Subsidence | NO | • Review of NY State Hazard Mitigation Plan<br>• Review of FEMA's Multi-Hazard Identification and Risk Assessment<br>• Review of USGS Fact Sheet 165-00 Land Subsidence in the U.S. | • The state plan delineates certain areas that are susceptible to land subsidence hazards in New York. While mapping in the state plan indicates that much of the project area is underlain by carbonate karst rock such as limestone (in which there can be the potential for subsidence caused by sinkholes) no collapses that have resulted in structural damage have been recorded in the project area.<br>• USGS-165-500 indicates that Dutchess County is located in an area where subsidence caused by compaction of aquifers or drainage of organic soils is not likely.<br>• While there is some history of mining in Dutchess County, relatively little has been carried out underground and it is assumed that there is no significant risk of land subsidence due to mine collapse. | |
| Tsunami | NO | • Review of NY State Hazard Mitigation Plan<br>• Review of FEMA's Multi-Hazard Identification and Risk Assessment | • Tsunamis are not discussed in the state plan. Since the southernmost border of Dutchess County is located more than 30 miles from the ocean, and no record exists of a catastrophic Atlantic basin tsunami impacting the mid-Atlantic coast of the United States, FEMA mitigation planning guidance suggests that locations in the eastern U.S. north of Virginia have a relatively low tsunami risk and need not conduct a tsunami risk assessment at this time. | |

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| Volcano | NO | • Review of NY State Hazard Mitigation Plan<br>• Review of USGS Volcano Hazards Program web site | • No volcanoes are located within approximately 2,000 miles of Dutchess County. | |
| **OTHER HAZARDS** | | | | |
| **Wildfire** | **YES** | • Review of NY State Hazard Mitigation Plan<br>• Review of NOAA NCDC Storm Events Database<br>• Review of NYSEMO and NYSDEC web sites<br>• Review of FEMA's Multi-Hazard Identification and Risk Assessment | • While NYSEMO and NCDC records do not record any significant wildfire events in Dutchess County since January 1950, wildfires are discussed in the state plan as a hazard of concern, and wildfires are ranked as a moderate risk in the planning area covering Dutchess County.<br>• According to available GIS data, almost two thirds of the project area is forested, and wildfire hazard risks are expected to increase as development along the urban/wildland interface increases. | |

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

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

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