5.4.8 SEVERE WINTER STORM

This section provides a profile and vulnerability assessment for the severe winter storm hazard.

HAZARD PROFILE

This section provides profile information including description, extent, location, previous occurrences and losses and the probability of future occurrences.

Description

For the purpose of this HMP, as deemed appropriate by Burlington County, and per the State of New Jersey Hazard Mitigation Plan (NJ HMP), winter weather events include snow storms, ice storms, cold waves and wind chill with snow storms being "the most obvious manifestation of winter weather." Since most extra-tropical cyclones (mid-Atlantic cyclones locally known as Northeasters or Nor'Easters), generally take place during the winter weather months (with some events being an exception), these hazards have also been grouped as a type of severe winter weather storm. These types of winter events or conditions are further defined below.

Heavy Snow: According to the National Weather Service (NWS), heavy snow is generally snowfall accumulating to 4 inches or more in depth in 12 hours or less; or snowfall accumulating to six inches or more in depth in 24 hours or less. A snow squall is an intense, but limited duration, period of moderate to heavy snowfall, also known as a snowstorm, accompanied by strong, gusty surface winds and possibly lightning (generally moderate to heavy snow showers) (NWS, 2005). Snowstorms are complex phenomena involving heavy snow and winds, whose impact can be affected by a great many factors, including a region's climatologically susceptibility to snowstorms, snowfall amounts, snowfall rates, wind speeds, temperatures, visibility, storm duration, topography, and occurrence during the course of the day, weekday versus weekend, and time of season (Kocin and Uccellini, 2011).

Blizzard: Blizzards are characterized by low temperatures, wind gusts of 35 miles per hour (mph) or more and falling and/or blowing snow that reduces visibility to ¼-mile or less for an extended period of time (three or more hours) (NWS, 2005).

Sleet or Freezing Rain Storm: Sleet is defined as pellets of ice composed of frozen or mostly frozen raindrops or refrozen partially melted snowflakes. These pellets of ice usually bounce after hitting the ground or other hard surfaces. Freezing rain is rain that falls as a liquid but freezes into glaze upon contact with the ground. Both types of precipitation, even in small accumulations, can cause significant hazards to a community (NWS, 2005).

Ice storm: An ice storm is used to describe occasions when damaging accumulations of ice are expected during freezing rain situations. Significant accumulations of ice pull down trees and utility lines resulting in loss of power and communication. These accumulations of ice make walking and driving extremely dangerous, and can create extreme hazards to motorists and pedestrians (NWS, 2005).

Extra-Tropical Cyclone: Extra-tropical cyclones, sometimes called mid-latitude cyclones, are a group of cyclones defined as synoptic scale, low pressure, weather systems that occur in the middle latitudes of the Earth. These storms have neither tropical nor polar characteristics and are connected with fronts and horizontal gradients in temperature and dew point otherwise known as "baroclinic zones".

Extra-tropical cyclones are everyday weather phenomena which, along with anticyclones, drive the weather over much of the Earth. These cyclones produce impacts ranging from cloudiness and mild showers to heavy gales and thunderstorms. Tropical cyclones often transform into extra-tropical cyclones at the end of their tropical existence, usually between 30 degrees (°) and 40° latitude, where there is sufficient force from upper-level shortwave troughs riding the westerlies (weather systems moving west to east) for the process of extra-tropical transition to begin. A shortwave trough is a disturbance in the mid or upper part of the atmosphere which induces upward motion ahead of it. During an extra-tropical transition, a cyclone begins to tilt back into the colder air mass with height, and the cyclone's primary energy source converts from the release of latent heat from condensation (from thunderstorms near the center) to baroclinic processes (Canadian Hurricane Centre [CHC], 2003).

Nor'Easter (abbreviation for North Easter): Nor'Easters are named for the strong northeasterly winds that blow in from the ocean ahead of the storm and over coastal areas. They are also referred to as a type of extra-tropical cyclones (mid-latitude storms, or Great Lake storms). A Nor'Easter is a macro-scale extra-tropical storm whose winds come from the northeast, especially in the coastal areas of the northeastern U.S. and Atlantic Canada. Wind gusts associated with Nor'Easters can exceed hurricane forces in intensity. Unlike tropical cyclones that form in the tropics and have warm cores (including tropical depressions, tropical storms and hurricanes); Nor'Easters contain a cold core of low barometric pressure that forms in the mid-latitudes. Their strongest winds are close to the earth's surface and often measure several hundred miles across. Nor'Easters may occur at any time of the year but are more common during fall and winter months (September through April) (NYCOEM, 2008).

Nor'Easters can cause heavy snow, rain, gale force winds and oversized waves (storm surge) that can cause beach erosion, coastal flooding, structural damage, power outages and unsafe human conditions. If a Nor'Easter cyclone stays just offshore, the results are much more devastating than if the cyclone travels up the coast on an inland track. Nor'Easters that stay inland are generally weaker and usually cause strong winds and rain. The ones that stay offshore can bring heavy snow, blizzards, ice, strong winds, high waves, and severe beach erosion. In these storms, the warmer air is aloft. Precipitation falling from this warm air moves into the colder air at the surface, causing crippling sleet or freezing rain (McNoldy [Multi-Community Environmental Storm Observatory (MESO)], 1998-2007). While some of the most devastating effects of Nor'Easters are experienced in coastal areas (e.g. beach erosion, coastal flooding), the effects on inland areas, like Burlington County, may include heavy snow, strong winds and blizzards.

Winter storms can also generate coastal flooding, ice jams and snow melt, resulting in significant damage and loss of life. Coastal floods are caused when the winds generated from intense winter storms cause widespread tidal flooding and severe beach erosion along coastal areas. Ice jams are caused when long cold spells freeze up rivers and lakes. A rise in the water level or a thaw breaks the ice into large chunks. These chunks become jammed at man-made and natural obstructions. The ice jams act as a dam and result in flooding (NSSL, 2006).

Extent

The magnitude or severity of a severe winter storm depends on several factors including a region's climatologically susceptibility to snowstorms, snowfall amounts, snowfall rates, wind speeds, temperatures, visibility, storm duration, topography, and time of occurrence during the day (e.g., weekday versus weekend), and time of season.

The extent of a severe winter storm can be classified by meteorological measurements, such as those above, and by evaluating its societal impacts. The Northeast Snowfall Impact Scale (NESIS) categorizes snowstorms, including Nor'Easter events, in this manner. Unlike the Fujita Scale (tornado) and Saffir-Simpson Scale (hurricanes), there is no widely used scale to classify snowstorms. NESIS was developed by Paul Kocin of The Weather Channel and Louis Uccellini of the NWS to characterize and rank high-impact, northeast snowstorms. These storms have large areas of 10 inch snowfall accumulations and greater. NESIS has five ranking categories: Notable (1), Significant (2), Major (3), Crippling (4), and Extreme (5) (Table 5.4.8-1). The index differs from other meteorological indices in that it uses population information in addition to meteorological measurements. Thus, NESIS gives an indication of a storm's societal impacts. This scale was developed because of the impact northeast snowstorms can have on the rest of the country in terms of transportation and economic impact (Kocin and Uccellini, 2011).

Table 5.4.8-1. NESIS Ranking Categories 1 - 5

Category	Description	NESIS Range	Definition
1	Notable	1.0 – 2.49	These storms are notable for their large areas of 4-inch accumulations and small areas of 10-inch snowfall.
2	Significant	2.5 – 3.99	Includes storms that produce significant areas of greater than 10-inch snows while some include small areas of 20-inch snowfalls. A few cases may even include relatively small areas of very heavy snowfall accumulations (greater than 30 inches).
3	Major	4.0 – 5.99	This category encompasses the typical major Northeast snowstorm, with large areas of 10-inch snows (generally between 50 and 150 × 103 mi^2—roughly one to three times the size of New York State with significant areas of 20-inch accumulations.
4	Crippling	6.0 – 9.99	These storms consist of some of the most widespread, heavy snows of the sample and can be best described as crippling to the northeast U.S, with the impact to transportation and the economy felt throughout the United States. These storms encompass huge areas of 10-inch snowfalls, and each case is marked by large areas of 20-inch and greater snowfall accumulations.
5	Extreme	10 +	The storms represent those with the most extreme snowfall distributions, blanketing large areas and populations with snowfalls greater than 10, 20, and 30 inches. These are the only storms in which the 10-inch accumulations exceed 200 × 103 mi^2 and affect more than 60 million people.

Source: Kocin and Uccellini, 2004

NESIS scores are a function of the area affected by the snowstorm, the amount of snow, and the number of people living in the path of the storm. These numbers are calculated into a raw data number ranking from "1" for an insignificant fall to over "10" for a massive snowstorm. Based on these raw numbers, the storm is placed into its decided category. The largest NESIS values result from storms producing heavy snowfall over large areas that include major metropolitan centers (Enloe, 2011).

NOAA's National Climatic Data Center (NCDC) is currently producing the Regional Snowfall Index (RSI) for significant snowstorms that impact the eastern two-thirds of the U.S. The RSI ranks snowstorm impacts on a scale from one to five, which is similar to the Fujita scale for tornadoes or the Saffir-Simpson scale for hurricanes. The RSI differs from the NESIS because it includes population. RSI is based on the spatial extent of the storm, the amount of snowfall, and the combination of the extent and snowfall totals with population (based on the 2000 Census) (NOAA-NCDC, 2011). Table 5.4.8-2 explains the five categories:

Table 5.4.8-2. RSI Ranking Categories

Category	Description	RSI Value
1	Notable	1-3
2	Significant	3-6
3	Major	6-10
4	Crippling	10-18
5	Extreme	18.0+

Source: NOAA-NCDC, 2011

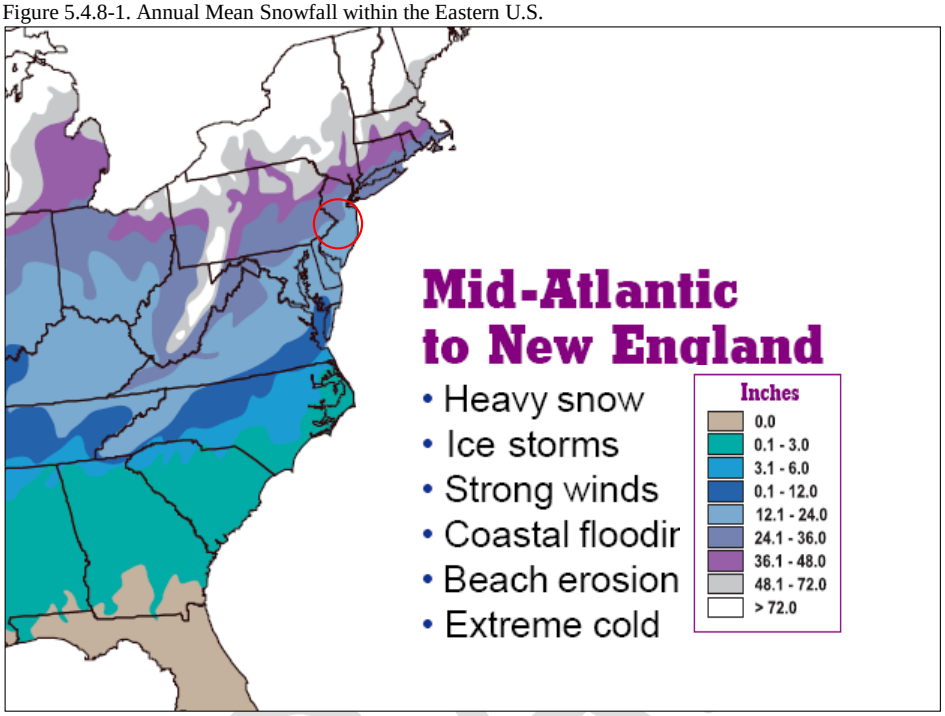
The indices for RSI are calculated similar to those for NESIS; however, the new indices require region-specific parameters and thresholds for the calculations. The NCDC has analyzed and assigned RSI values to over 500 storms since 1900 (NOAA-NCDC, 2011).

Location

Winter weather, particularly snowstorm events, has historically affected many U.S. states, mainly in the states located in the Northeast and Midwest, including all of New Jersey. Winter weather can reach the state as early as October and is usually in full force by late November with average winter temperatures average between 20 and 40° F.

As indicated in the NJ HMP, winter storm hazards in New Jersey are guaranteed annually from late November to March, including ice storms. The zone of heaviest snowfall across New Jersey usually occurs in the southwest-to-northeast strip about 150 miles wide, approximately parallel to the path of the storm center, and about 125 and 175 miles northwest of it. If the center passes well offshore, only south Jersey receives substantial snowfall. When the track passes close to shore, warm air from the ocean is drawn into the surface circulation, resulting in rain falling over south Jersey and snow over the rest of the State. Often, a passing storm center brings rain to the south, mixed precipitation to central sections and snow to the north. On average, the State receives a seasonal amount of 12.8 inches of snow or more (NWS, 2001). The average annual snowfall is greater than 24 inches over much of New Jersey's central and northern area (Figure 5.4.8-1).

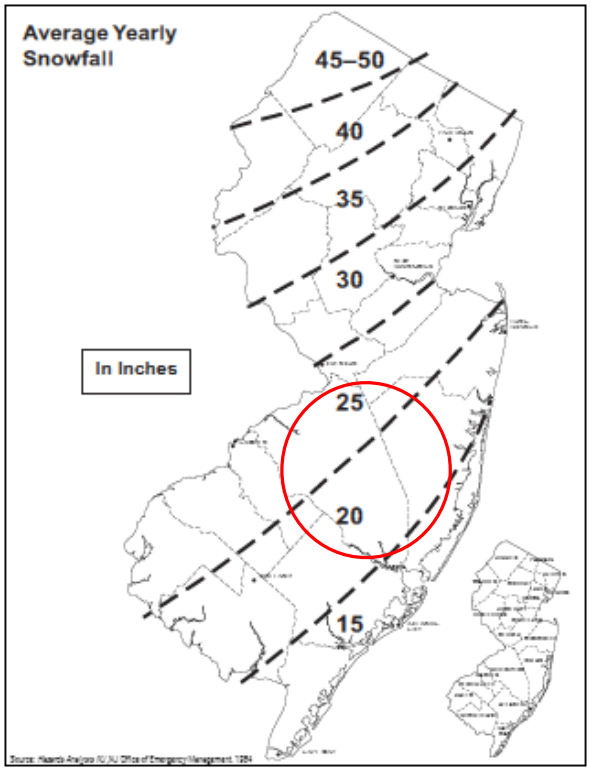
Figure 5.4.8-1. Annual Mean Snowfall within the Eastern U.S.



Source: NWS, 2001
Note: Burlington County is indicated by a red circle with an average annual snow accumulation of 12.1 to 24-inches.

Statewide, average annual snowfall ranges from a low of approximately 15 inches in southeastern New Jersey to a high of approximately 50 inches in northwestern New Jersey. For Burlington County, average annual snowfall ranges from a low of approximately 15 inches in the extreme southern portion of the county, to a high of roughly 25 inches in northwestern areas nearest the Delaware River (see Figure 5.4.8-2). This can vary greatly from one year to the next, particularly if several major extended-period storms impact the area (during which snowfall totals can approach or exceed annual averages) (Burlington County HMP, 2008).

Figure 5.4.8-2. Average Yearly Snowfall for New Jersey



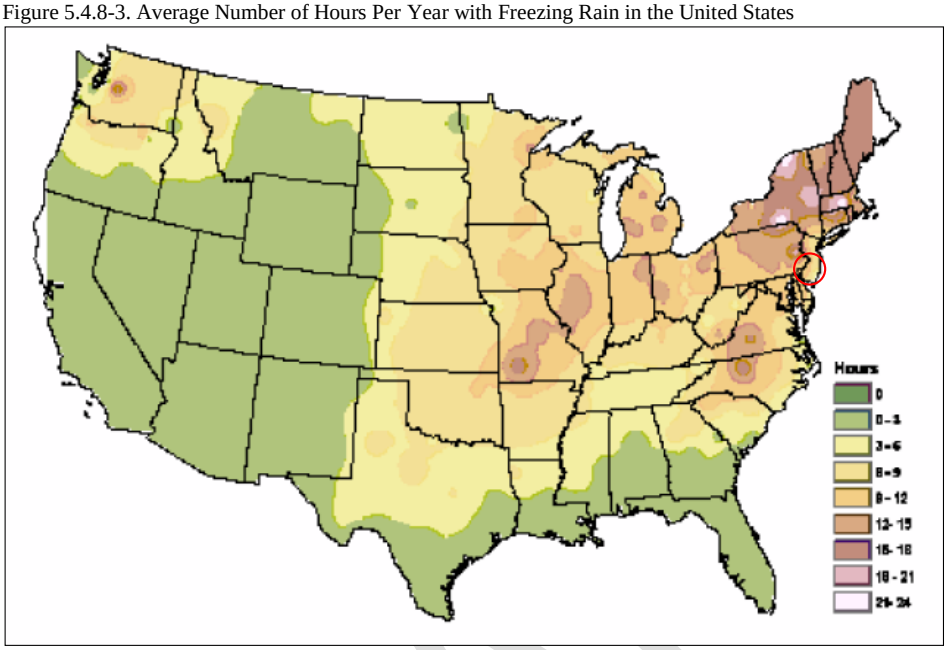
Source: NJOEM, 2012
Note: Red circle indicates approximate location of Burlington County

Most extreme snowfall events occur as the result of extremely strong low pressure systems moving to the north, northeast off of the coast of New Jersey from early winter through mid-spring. If the conditions are ideal, these coastal lows transport Atlantic moisture over a cold layer of air over New Jersey resulting in extremely high snowfall rates and occasionally blizzard conditions (NJOEM, 2011).

In many parts of New Jersey, the distribution of ice storms coincides with the general distribution of snow, and their occurrence similarly depends on regional pressure distribution and local weather conditions. Therefore, the entire state of New Jersey is susceptible to ice storms (NJOEM, 2012). However, areas experiencing lower temperatures are more susceptible to all winter storms. Interestingly, this can mean that areas at higher elevations with colder air may experience more ice and freezing rain than their neighbors in a lower valley; but in other cases it is the lowlands that experience ice storms when cold air gets trapped in the valleys of regions with more significant topographical change (NJOEM, 2012).

Figure 5.4.8-3 illustrates the average number of hours per year with freezing rain in the U.S. According to the figure, Burlington County experiences between three and 12 hours per year (NYS HMP, 2011).

Figure 5.4.8-3. Average Number of Hours Per Year with Freezing Rain in the United States



Source: NYS HMP, 2011
Note: Burlington County is indicated by a red circle with an average number of 3 to 12 hours of freezing rain each year.

According to a November 14, 2005 press release from the NJOEM, Nor'Easters have the potential to cause as much damage as hurricanes and other tropical cyclone storms in New Jersey's latitudes, with powerful winds, rain or snow and large waves. They can pound and erode beaches with heavy surf, affect inland areas with flooding, or coat the land with thick layers of ice and snow. Nor'Easters result from the counterclockwise rotation of a low-pressure system and the clockwise rotation of a high-pressure system, combining to send wind and moisture to New Jersey from the Northeast. The Nor'Easters ferocity will depend on the strength of the two systems. One reason Nor'Easters are so dangerous is that they tend to move much more slowly than hurricanes at our latitudes. That slow movement allows the storm's effects to accumulate in a given area. The worst disasters in New Jersey history, in terms of cost and widespread damage, have been from Nor'Easters that moved slowly and remained for several days. Nor'Easters can occur all year long, but in New Jersey they are primarily a risk between September and April (Buccino, 2005).

Input from Planning Committee

- Medford Township noted that they regularly receive snowfall amounts in excess of four inches each winter and that generally, snowfall amounts are sufficient enough to close schools one or twice per year. They also noted that during the President's Day 2003 storm, they received approximately 17 inches of snowfall, resulting in a declared state of emergency and, in January 1987, Medford was hit by a freezing rainstorm that resulted in over a half inch of ice on streets, wires, and trees resulting in numerous motor vehicle accidents, power outages, and downed trees (Burlington County HMP, 2008).

- Florence Township reported that their most recent event was the Presidents Day snow storm in February 2003. This storm impacted Florence by stopping travel, commerce, and putting a strain on the local public works system. The public works department was overwhelmed with the amount of snow that came down compared to the available workers and plows available to clear it. Snow and ice storms are always a challenge for Florence due to parking and the lack of areas to push and store snow (Burlington County HMP, 2008).

- Pemberton Township reported the following five recent and significant events in their community over the last eleven years: 1996 Blizzard (over 3 feet of snow); 2000 major snow event (4 to 9 inches of snow); 2001 major snow event (up to 5 inches); 2002 significant snow event (amount unknown); 2003 significant snow event (amount unknown) (Burlington County HMP, 2008).

- Mount Laurel reports that winter storms and ice storms can cripple their Township. From past events, major concerns are traffic movement and clearing roadways for emergency vehicles. Other problems include power outages, downed trees, and safety of employees (Burlington County HMP, 2008).

- Cinnaminson reported that, most recently, they were affected by the Blizzard of February 2003, which impacted travel, commerce, and caused power outages. The Departments of Public Works, Police and Fire were all overwhelmed. They noted that major winter storms are always a challenge for their jurisdiction (Burlington County HMP, 2008).

- Mansfield reported that roads were closed after the 1994 and 1995 ice storms and the 1996 blizzard. They also noted an increased potential for snow drift formation in areas near large farm fields (Burlington County HMP, 2008).

Comment [ES1]: Will update if new information is provided.

Previous Occurrences and Losses

Many sources provided historical information regarding previous occurrences and losses associated with severe winter storms and extreme cold events throughout the State of New Jersey and Burlington County. With so many sources reviewed for the purpose of this HMP, loss and impact information for many events could vary depending on the source. Therefore, the accuracy of monetary figures discussed is based only on the available information identified during research for this HMP.

According to NOAA's NCDC storm events database, Burlington County experienced 32 severe winter weather events between January 1, 1996 and April 30, 2013 (the database does not list any severe winter events prior to 1996). Total property damages and/or crop damages were not specified in the database. According to the Hazard Research Lab at the University of South Carolina's Spatial Hazard Events and Losses Database for the U.S. (SHELDUS), between 1960 and 2012, 63 winter storm events occurred within the County. The database indicated that severe winter storm events and losses specifically associated with Burlington County and its municipalities totaled over $5.7 million in property damage, though no crop damage was reported. However, these numbers may vary due to the database identifying the location of the hazard event in various forms or throughout multiple counties or regions.

Between 1954 and 2012, FEMA declared that the state of New Jersey experienced seven winter storm-related disasters (DR) or emergencies (EM) classified as one or a combination of the following disaster types: severe winter storm, snowstorm, blizzard, and ice conditions. Generally, these disasters cover a wide region of the State; therefore, they may have impacted many counties. However, not all counties were included in the disaster declarations. Of those events, Burlington County has been declared as a disaster area as a result of six winter storm-related events (FEMA, 2012). In some cases, what FEMA

may classify as a severe storm or coastal storm event, various other sources including the NJ HMP and NJOEM indicate that they were identified as Nor'Easter events, which are further identified in Table 5.4.8-3.

It is possible that Burlington County was declared as a disaster area for more events; however, not enough information was found to make that determination. Also, although Burlington County may have not been listed as an official FEMA disaster area for all of the events identified in New Jersey, Burlington County may have still experienced indirect or cascading losses or impacts associated with the events. Because flooding was the primary result of some of these hazard events, the severe flooding impact of major events are also mentioned in Section 5.4.4 (Flood).

Based on all sources researched, known severe winter storm events that have affected Burlington County and its municipalities are identified in Table 5.4.8-3. With flood documentation for the State of New Jersey being so extensive, not all sources have been identified or researched. Therefore, Table 5.4.8-3 may not include all events that have occurred throughout the County and region. Events previously reported in the 2008 County HMP are sourced as "Burlington County HMP".

Table 5.4.8-3. Winter Storm Events Between 1995 and 2012.

Date of Event	Event Type	FEMA Declaration #	County Designated?	Location and Description	Source(s)
March 13-17, 1993	Severe Blizzard	EM-3106	Yes	No reference and/or no damage reported.	FEMA
February 3, 1995	Snow	N/A	N/A	Snowfall varied, from 8 to 12 inches in communities nearest to the Delaware River with lesser amounts in areas nearer to the coast.	Burlington County HMP
February 15, 1995	Ice	N/A	N/A	Freezing rain, particularly in northern parts of the county, in the evening hours, with black ice on the morning of 02/16/95.	Burlington County HMP
February 26, 1995	Snow/Ice	N/A	N/A	Snow followed by sleet and freezing rain. Precipitation amounts were less than one tenth of an inch, but the mixture of freezing rain and sleet made for a slippery morning commute.	Burlington County HMP
December 9, 1995	Snow	N/A	N/A	No reference and/or no damage reported.	Burlington County HMP
December 14, 1995	Snow/Ice	N/A	N/A	Snow followed by sleet and then freezing rain. Accumulations were low (averaging one to three inches across the southern half of the state) but freezing rain hampered travel.	Burlington County HMP
January 7, 1996	Blizzard	DR-1088	Yes	No reference and/or no damage reported.	Burlington County HMP
February 2, 1996	Snow	N/A	N/A	Snow accumulations averaged around six inches in Burlington County.	Burlington County HMP
February 16, 1996	Snow	N/A	N/A	Snow accumulations averaged 6 to 8 inches in most areas. Individual accumulations included 13 inches in Bordentown and Mount Laurel, and 10 inches in Mount Holly. This storms occurrence on the Friday of an upcoming three day weekend hampered travel. In the Philadelphia area travel was described as the worst of the year.	Burlington County HMP
March 2, 1996	Snow	N/A	N/A	Snow accumulations of 6 to 8 inches were fairly common throughout the southern half of the state. Some representative accumulations included 9 inches at McGuire AFB and Tabernacle, and 8 inches in Mount Holly. Because this snow fell on a Saturday morning, the number of accidents was held down.	Burlington County HMP
March 8, 1996	Snow	N/A	N/A	Snow accumulations averaged 3 to 5 inches throughout Central and Southern New Jersey, including 5 inches in Willingboro and 4 inches in Mount Holly.	Burlington County HMP
January 9, 1997	Snow/Ice	N/A	N/A	Mixture of snow, sleet and freezing rain across Central and Southern New Jersey. Accumulations were light, mainly an inch or less and Although the wintry mix of precipitation did cause slippery roads, no serious accidents or traffic tie-ups were reported.	Burlington County HMP
January 11, 1997	Snow	N/A	N/A	Light snow with accumulations averaging between 2 and 4 inches, with the highest accumulations (all near 4 inches) falling in a band across Eastern Burlington, Northwest Ocean and Southern Monmouth Counties.	Burlington County HMP
January 16, 1997	Snow/Ice	N/A	N/A	Snow followed by a prolonged period of sleet and freezing rain that lasted through the morning commute. Snow accumulations averaged an inch or less. Ice accretions averaged between one-quarter to one-half of an inch across most of the area and made traveling extremely hazardous on untreated roadways and	Burlington County HMP

Date of Event	Event Type	FEMA Declaration #	County Designated?	Location and Description	Source(s)
				surfaces.	
January 22, 1997	Ice	N/A	N/A	Black ice formed on roadways, bridges and overpasses the morning of the 22nd. For the affected areas there were three traffic fatalities and over 100 injuries in the Greater Philadelphia Metropolitan Area (including in New Jersey Burlington, Camden, Gloucester, Ocean and Salem Counties).	Burlington County HMP
February 14, 1997	Snow/Ice	N/A	N/A	Wintry mix of snow and freezing rain across Central and Southwest New Jersey. Precipitation started as snow throughout the area the night of the 13th/morning of the 14th, and changed the snow to freezing rain between 4 and 7 a.m., changing to just plain rain during the morning commute. Accumulations prior to the change over averaged approximately 1.0 to 1.5 inches. Driving on untreated roadways prior to the change to rain was very hazardous.	Burlington County HMP
March 31, 1997	Snow	N/A	N/A	Rain changed to heavy wet snow around midday in the Greater Philadelphia Metropolitan Area. Sussex and Warren Counties along with the northwest part of Morris County were hit the hardest but several bands of heavier snow brought season high accumulations to sections of Hunterdon, Somerset, Mercer and Burlington Counties. Coastal communities suffered high winds. Accumulations included 10 inches in Willingboro and 6 inches in Mount Holly.	Burlington County HMP
December 27, 1997	Snow	N/A	N/A	A low pressure system spread a swath of light snow across much of New Jersey. Snow began falling during the morning on the 27th and ended by midnight in all areas. The snow was mixed with rain at times across southern New Jersey, especially near Delaware Bay and the coast. Accumulations averaged 1 to 3 inches. The heaviest snow occurred in two bands: from Hunterdon to Morris Counties and from western Atlantic County through southeastern Burlington County and Southern Ocean County. Accumulations included 1.8 inches in Atsion (Burlington County).	Burlington County HMP
March 22, 1998	Snow	N/A	N/A	Narrow burst of heavier snow in a southwest to northeast corridor from Mount Laurel in Burlington County to Sandy Hook in Monmouth County. Accumulations within this band averaged 3 to 5 inches. Elsewhere across central and southern New Jersey, accumulations were lighter and generally two inches or less. Accumulations included 4.5 inches in Mount Laurel.	Burlington County HMP
December 23, 1998	Snow	N/A	N/A	Precipitation fell mainly as snow, primarily from around 6 p.m. on the 23rd through the early morning of the 24th. Heaviest accumulations occurred just to the north of the transition zone to sleet across Salem, southern Gloucester, southern Camden, western Atlantic, southern Burlington and central Ocean Counties. Accumulations in this band averaged around 4 inches. Elsewhere accumulations were mainly 2 to 3 inches. Accumulations included 4.5 inches in Tabernacle and 2.0 inches in Mount Holly.	Burlington County HMP
January 2, 1999	Snow/Ice	N/A	N/A	Wintry precipitation affected New Jersey the late evening of the 2nd and morning of the 3rd. Precipitation started as light freezing rain and sleet in central and southern New Jersey. Precipitation intensity was light for the first several hours of this event. Water equivalents of ice and sleet in central and southern New Jersey were only a	Burlington County HMP

Date of Event	Event Type	FEMA Declaration #	County Designated?	Location and Description	Source(s)
				few hundredths of an inch. Because this occurred late on a weekend night, the number of reported vehicular accidents was not very high.	
January 8, 1999	Snow/Ice	N/A	N/A	Snow, sleet, and freezing rain. Accumulations averaged between 2 and 5 inches. Ice accretions were generally one-tenth of an inch or less in most areas. In Burlington County, a speeding Greyhound bus slid off the New Jersey Turnpike in Springfield Township. Six persons were injured. Accumulations included 4.5 inches in Tabernacle, 4 inches in Moorestown, and 3.5 inches in Mount Laurel.	Burlington County HMP
January 13, 1999	Snow/Ice	N/A	N/A	Snow, sleet and freezing rain. Freezing rain of 1.0 to 1.5 inches in many parts of the state, particularly northern areas. Event total water equivalents included 2.09 inches in Atsion and 1.67 inches at the McGuire AFB.	Burlington County HMP
March 14, 1999	Snow	N/A	N/A	Heavy wet snow to most of New Jersey from northern Burlington and Ocean Counties northward. Accumulations in southwest New Jersey were mainly between 2 and 4 inches with higher amounts in the northern portion of the state. Heavy snow downed trees and power lines resulting in many power outages. Accumulations included 3.5 inches in Mount Holly and Moorestown.	Burlington County HMP
January 20, 2000	Snow	N/A	N/A	Accumulations were 3 to 6 inches to the southeast of the New Jersey Turnpike and generally 1 to 3 inches across the rest of the state. Accumulations included in Burlington County 5 inches in Tabernacle and the McGuire AFB, 4.7 inches in Mount Laurel and 3.6 inches in Maple Shade.	Burlington County HMP
January 25, 2000	Snow	N/A	N/A	The most intense winter storm since the Blizzard of 1996 buried New Jersey on the 25th with 6 to 15 inches of snow, sleet and freezing rain, wind gusts as strong as 60 mph along the shore, moderate coastal flooding and drifts as high as four feet. For the first time since 1996 county and government offices were closed. Many businesses and all schools were closed. Many malls never opened and all the others closed early. Dozens of public events were postponed. Many schools were also closed the next day (the 26th). Scores of vehicles slid off roadways. Downed power lines caused about 3,100 homes and businesses to lose power. Total accumulations included in Burlington County were 13 inches in Moorestown, 10 inches in Lumberton and Marlton, 9 inches in Mount Laurel and 7 inches in Bordentown.	Burlington County HMP
January 30, 2000	Snow	N/A	N/A	A mix of snow, sleet and freezing rain across New Jersey with primarily rain in the southeast part of the state and heavy snow in the northwest part of the state.	Burlington County HMP
February 3, 2000	Snow	N/A	N/A	Accumulations were quite uniform and ranged between 1 and 2 inches. While accumulations were considerably lighter than what fell during the two largest snow storms during the second half of January, this storm coincided with the evening commute home and many untreated roads were slippery. Accumulations in Burlington County included 1.7 inches in Mount Holly.	Burlington County HMP
February 18, 2000	Snow/Ice	N/A	N/A	A mix of snow, sleet and freezing rain. Snowfall accumulations prior to the changeover averaged between 4 and 6 inches in Morris, Sussex and Warren Counties and 2 to 4 inches throughout the rest of the state, except along the coast. In Cape May County and along coastal areas, accumulations were around an inch.	Burlington County HMP

Date of Event	Event Type	FEMA Declaration #	County Designated?	Location and Description	Source(s)
				In Burlington County, there were 15 accidents in Medford Township alone. Accumulations included 3 inches in Bordentown.	
April 9, 2000	Snow	N/A	N/A	Accumulations ranged from about an inch in coastal areas of Cumberland and Atlantic Counties to 8 inches in Sussex County. The combination of the heavy wet snow and strong gusty winds downed trees, tree limbs and power lines, particularly in the northwest part of the state. Slushy roadways also led to several fender bender type accidents. Accumulations included 3.5 inches in Mount Holly and 2 inches in Wrightstown.	Burlington County HMP
December 13, 2000	Snow/Ice	N/A	N/A	Snow, sleet and freezing rain with ice accumulations particularly in northwestern portions of the state.	Burlington County HMP
December 19, 2000	Snow	N/A	N/A	This storm brought most of the state of New Jersey its first widespread snow of the winter season. Accumulations were not heavy and ranged between 1 and 3 inches. However, driving conditions on untreated roadways were reported treacherous. Accumulations included 1.5 inches in New Lisbon (Burlington County).	Burlington County HMP
December 22, 2000	Snow	N/A	N/A	The heaviest snow fell across southern parts of Salem, Gloucester, Camden, Burlington and Monmouth Counties as well as the rest of southeast New Jersey. Even within this band, there was an axis of maximum snowfall (around 4 inches) across eastern Cumberland County, Atlantic County between New Jersey State Route 50 and the Garden State Parkway and extreme southeast Burlington County. Accumulations in Burlington County included 2.8 inches in Tabernacle, 2.5 inches in Shamong, and 2 inches in New Lisbon.	Burlington County HMP
December 30, 2000	Snow	N/A	N/A	This storm impacted northern parts of the state most severely, where accumulations were mainly between 4 and 12 inches. Amtrak canceled its Metroliner Service between Washington D.C. and New York City. New Jersey Transit canceled bus service in the northern half of the state. New Jersey Transit had about 20 minute rail delays on their line. Businesses and malls either closed early, or never opened, especially in the northern half of the state. The number of accidents were relatively low given this snow occurred on a Saturday morning. The snow was powdery and nature thus few tree limbs and wires were downed. Accumulations in Burlington County included 11 inches in Bordentown, 10 inches in Browns Mills, and 9.5 inches in Tabernacle.	Burlington County HMP
January 5, 2001	Snow	N/A	N/A	Light snow, with accumulations mainly between one and three inches, causing slippery travel conditions on untreated roadways. Specific accumulations in Burlington County included 1.5 inches in Willingboro.	Burlington County HMP
January 20, 2001	Snow/Ice	N/A	N/A	Mix of sleet and snow across the state. The largest accumulation of sleet and snow occurred across the northwest half of the state. Accumulations ranged from less than one inch in Cape May County to 10 inches in Morris County. Because this event occurred on a weekend, the number of traffic accidents was relatively lower. Specific accumulations in Burlington County included 4 inches in Moorestown and Tabernacle.	Burlington County HMP
February	Snow/Ice	N/A	N/A	Many schools and businesses across the state closed early, an early rush hour	Burlington

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5, 2001				produced numerous accidents congested nearly every major roadway to the point that emergency personnel and snow plows could not get through. Specific accumulations included in Burlington County: 3.5 inches in Bordentown and 3 inches in Moorestown.	County HMP
February 22, 2001	Snow	N/A	N/A	Accumulations averaged between 4 and 8 inches with much uniformity throughout the state. Average commutes took as much as eight times longer than normal. The southern half of the state had the most serious accidents of the day. In Mount Laurel a multi-vehicle accident caused two dozen injuries (one serious) and caused two hour delays on Interstate 295. Specific accumulations in Burlington County included in Burlington County: 6.8 inches in Wrightstown, 6.7 inches in Marlton, 6 inches in Tabernacle and 5.5 inches in Maple Shade.	Burlington County HMP
March 4, 2001	Snow/Ice	N/A	N/A	Wintry mix of precipitation. Snowfall totals were highest in northern parts of the state, including 15 inches in Sussex County. Specific accumulations in Burlington County included 2.1 inches in Mount Holly.	Burlington County HMP
March 26, 2001	Snow	N/A	N/A	Snow showers across southeast New Jersey. Accumulations averaged between 1 and 2 inches. Secondary and tertiary roadways were slippery, mainly before sunrise. Specific accumulations in Burlington County included 1.6 inches in Mount Laurel, 1.5 inches in Mount Holly, and 1 inch in New Lisbon.	Burlington County HMP
January 19, 2002	Snow/Ice	N/A	N/A	Wintry mix of snow, sleet and freezing rain. Most accumulations were between 3 and 5 inches. Lighter amounts accumulated in the southeast part of the state. Bridges, overpasses and untreated roadways became very treacherous and numerous accidents were reported. Specific accumulations in Burlington County included 4.5 inches in Marlton, and 4.3 inches in Moorestown.	Burlington County HMP
March 17, 2002	Snow/Ice	N/A	N/A	Mix of snow, sleet and freezing rain. Snowfall and sleet accumulations averaged 1 to 2 inches as the heaviest precipitation remained south of the region. Ice accretions from the freezing rain were less than one-quarter of an inch. High temperatures in the 60s and 70s the previous two days helped keep road surfaces relatively warm and ice free, with most accumulations reported on grassy surfaces. Specific accumulations in Burlington County included 0.5 inches in Mount Laurel and 0.3 inches in Maple Shade.	Burlington County HMP
December 5, 2002	Snow	N/A	N/A	The first winter storm of the season dropped four to ten inches of snow across most of New Jersey with slightly lower amounts across the immediate Cape May County coast. In many places in the southern half of the state, this was more snow than fell all of last winter. Two hundred forty of the state's five hundred ninety-seven school districts never opened. The rest (mainly in the northern half of the state) dismissed their children early. There were many midday closures of courthouses, county and municipal offices and also colleges and universities. The state started dismissing non-essential workers at 1 p.m. in Trenton. The New Jersey State Senate and Assembly meeting was canceled. Horse racing and simulcasting was cancelled at Freehold and Monmouth Park. The snowy conditions delayed New Jersey Transit trains 15 to 30 minutes and New Jersey Transit buses by up to one hour. Many	Burlington County HMP

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				evening Freeholder meetings, schools and social functions were cancelled. Clinic, dentist and doctor offices closed early. Specific accumulations in Burlington County included 8.5 inches in Moorestown, 8.2 inches in Mount Holly, and 6.2 inches in Tabernacle.	
January 5, 2003	Snow/Ice	N/A	N/A	Heavy snow across extreme southwestern New Jersey and an accumulating snow of two to four inches across much of the rest of the southern half of southern New Jersey. Accumulations farther north were less than two inches. The largest accumulations were in Salem and Gloucester Counties. Many roads in the southwestern part of the state became slippery and snow covered. Accumulations in Burlington County included 3.7 inches in Tabernacle, 3.1 inches in Mount Holly, 3.0 inches in Mount Laurel and 2.5 inches in Delran.	Burlington County HMP
January 29, 2003	Snow/Ice	N/A	N/A	Precipitation mixed with sleet and freezing rain at times. Accumulations averaged between one and three inches. Untreated roads were hazardous with many fender benders on major highways and side streets. In Burlington County, a 74-year-old woman passenger died in Westampton Township on the New Jersey Turnpike after her husband lost control of the car, spun off the road and struck a tree. In Edgewater Park, southbound lanes of U.S. Route 130 were closed through the evening because of a three vehicle crash. Specific accumulations in Burlington County included 2.5 inches in New Lisbon, 2.3 inches in Mount Laurel, and 2.0 inches in Maple Shade.	Burlington County HMP
February 6, 2003	Snow	N/A	N/A	This storm dropped about 5 to 8 inches of snow across most of New Jersey. Many main roads were snowpacked for the morning commute when most of these minor accidents occurred. Specific accumulations included 8.5 inches in Mount Holly, 8.0 inches in Bordentown (Burlington County), 7.8 inches in Maple Shade.	Burlington County HMP
February 10, 2003	Snow/Ice	N/A	N/A	Across New Jersey accumulations were mainly between one and two inches with the highest amounts across the eastern parts of the state. In the southern half of the state, since temperatures were either at or slightly above the freezing mark, the snow did not typically stick to most roadways.	Burlington County HMP
February 16-17, 2003	Snow	EM-3181	Yes	The most powerful storm to affect New Jersey since the Blizzard of 1996 struck during the President's Day Weekend. Governor James McGreevey declared a state of emergency on the 16th. It cost state and local officials 14 million dollars to clear roadways statewide. Most businesses reopened on the 18th, but schools and state courthouses remained closed. The worst damage from the storm inland was caused by the weight of the snow and sleet which caused numerous roof collapses and collapses of "Florida rooms". Moderate tidal flooding and moderate to locally severe beach erosion affected coastal communities. In Burlington County, hundreds of residents were forced to leave their Tricia Meadows homes in Mount Laurel on the 17th after drifting snow blocked the roof top furnace flue and vent pipes. Carbon monoxide was building within their homes. A shelter was opened at a nearby school. Volunteers helped clear the roofs and residents returned that evening. The roof of an apparel printing business in Lumberton collapsed. Planes	Burlington County HMP

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				were grounded at McGuire Air Force Base through the 18th. Specific snow accumulations in Burlington County included 21.0 inches in Mount Laurel, 20.0 inches in Bordentown, and 19.0 inches in Tabernacle. Statewide, this event caused nearly $20 million in damages.	
February 23, 2003	Snow/Ice	N/A	N/A	Runoff from the heavy rain and snow melt began to freeze over on area roadways as temperatures plunged below freezing during the evening of the 23rd. This led to the formation of black ice and caused numerous multi-vehicle accidents and road closures. The road salt that was on roadways was washed away by the heavy rain and snow melt on both the 22nd and earlier on the 23rd.	Burlington County HMP
February 26, 2003	Snow/Ice	N/A	N/A	A steady light snow from the morning of the 26th until just past midnight on the 27th. Untreated roads became slippery, especially during the evening commute on the 26th. Burlington County was not particularly impacted, except in the more southern portions of the county.	Burlington County HMP
February 27, 2003	Snow/Ice	N/A	N/A	Southern half of New Jersey was primary area affected. Accumulations ranged from 1.5 to 5.0 inches with the highest amounts in Atlantic County. Specific accumulations in Burlington County included 3.0 inches in Tabernacle, and 2.2 inches in Mount Holly. The storm track was too far southeast to bring heavy snow into most of New Jersey.	Burlington County HMP
March 6, 2003	Snow/Ice	N/A	N/A	Wintry transition from rain to sleet, freezing rain and then snow across most of the rest of northern and southwestern New Jersey. Accumulations averaged around an inch or less across central and southwest New Jersey. Warmer ground temperatures kept most road surfaces clear. Ice accretions on exposed surfaces, mainly those with northern exposures, neared one-quarter of an inch. Specific snow and sleet accumulations in Burlington County included 0.4 inches in Mount Holly. In Burlington County, primarily northwestern areas were impacted.	Burlington County HMP
April 7, 2003	Snow/Ice	N/A	N/A	In Burlington County, primarily northwestern areas were impacted. Accumulations ranged from 1 to 8 inches with the highest amounts in the Passaic and Raritan River Basins. Nearly every major thoroughfare in the state reported accidents with numerous accidents reported on the New Jersey Turnpike, Interstates 80, 78, 287 and 295. The only reported fatal accident occurred in the northbound lanes of Interstate 295 in Mount Laurel Township (Burlington County) when a 55-year-old man died while trying to pass a pickup truck and tractor trailer. The collision between the vehicles sent the driver into a median and caused the truck and trailer to jackknife across the highway. Specific accumulations in Burlington County included 2.0 inches in Willingboro.	Burlington County HMP
December 5, 2003	Snow	N/A	N/A	Northeaster. Accumulations averaged between 7 and 14 inches, with lighter accumulations in the southeast part of the state. In Burlington County, areas affected were primarily to the northwest. Statewide, the heavy snow wreaked havoc with holiday parades, festivals and tree lightning ceremonies. Many schools dismissed early. Forty-seven accidents occurred on Interstate 295 in Mercer and Burlington County. On the 5th, bus routes ran up to 90 minutes late while rail lines	Burlington County HMP

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				reported delays of up to 30 minutes. Delays on the 6th were less. The college entrance SAT exams on the 6th were postponed. The winter storm put a big dent in the holiday shopping on Saturday the 6th. Some stores never opened. Hospitals had a difficult time getting their employees to and from work. Libraries were closed. Many municipalities declared snow emergencies to help clear the roads for plowing. The plows had a hard time keeping back roads with northwestern exposure clear on the weekend (6th and 7th) as strong winds blew the snow back on the road. In Burlington County, a tractor trailer overturned on U.S. Route 130 in Willingboro and slid into a home. Another multi-vehicle accident closed the roadway in the same township. Specific accumulations in Burlington County included 10.0 inches in Wrightstown, 8.5 inches in Mount Laurel, and 5.0 inches in Tabernacle.	
January 14, 2004	Snow/Ice	N/A	N/A	Snow across all of New Jersey with the heaviest amounts in the northern half of the state. Accumulations ranged from one to three inches across much of the southern half of the state and from three to eight inches across Ocean County and much of the northern half of the state. The snow led to hazardous traveling conditions with many fender-benders and slip-sliding accidents. Specific accumulations in Burlington County included 4.0 inches at the McGuire Air Force Base (Burlington County) and 2.0 inches in Maple Shade.	Burlington County HMP
January 17, 2004	Snow/Ice	N/A	N/A	Wintry mix of precipitation across central and southern New Jersey. Snowfall accumulations were around one inch in central New Jersey and less than one inch in southern New Jersey. Ice accretions were generally less than one-tenth of an inch. Untreated roads became very hazardous and slippery, especially since the recent weather was unseasonably cold.	Burlington County HMP
January 25, 2004	Snow	N/A	N/A	Snow fell across the southern half of New Jersey. Accumulations averaged between 2 and 6 inches with the highest accumulations in the southern tier counties. Nearly all schools in the southern half of the state either closed for the day or had delayed openings. Untreated roads were slippery. Specific accumulations in Burlington County included 4.0 inches at the McGuire Air Force Base and Willingboro. Accumulations farther north in New Jersey were generally two inches or less.	Burlington County HMP
January 27, 2004	Snow/Ice	N/A	N/A	A wintry mix of freezing rain, sleet and snow. Heavy snow fell across the northern half of New Jersey. Some spotty light freezing drizzle or freezing rain fell throughout most of the day on the 27th. Accumulations averaged between 5 and 10 inches in the northern half of the state and 2 to 5 inches in the southern half of the state. Untreated roads were slippery and numerous accidents occurred. During the freezing drizzle on the morning of the 27th in Burlington County, five cars skidded into each other in the southbound lanes of the New Jersey Turnpike. A couple skidded off the road and one overturned. A female passenger in the car died. The following day, a 48-year-old Mount Laurel man died of a heart attack while shoveling the snow. Many schools dismissed early on the 27th and many schools	Burlington County HMP

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				were closed in the northern half of the state on the 28th. Specific accumulations included 4.5 inches in Mount Holly.	
February 5, 2004	Snow/Ice	N/A	N/A	Winter storm of snow, sleet and freezing rain to northwest New Jersey and a lighter mix of wintry precipitation throughout most of the rest of New Jersey. With the exception of northwestern New Jersey, snowfall accumulations were generally less than one inch and ice accretions were less than one quarter of an inch. Untreated roadways and walkways were very treacherous.	Burlington County HMP
February 17, 2004	Snow	N/A	N/A	Accumulations in Cape May and Ocean Counties, the primarily affected areas, averaged 4 to 6 inches. Farther to the north or west, there was a sharp drop in snowfall intensity and accumulations were generally 2 inches or less. Because of warm ground temperatures, the first reports of accumulating snow were received several hours after the onset of the storm. Specific accumulations in Burlington County included 2.5 inches in Browns Mills. Burlington County was most affected in southeastern areas.	Burlington County HMP
March 16, 2004	Snow/Ice	N/A	N/A	One overturned on Interstate 295 in Burlington County as a result of the storm. Most of the accidents were minor and involved vehicles slipping off of roads and into signs and ditches. Snow spread from south to north during the morning of the 16th. As warmer air moved in from the Atlantic Ocean, precipitation changed to rain in the greater Philadelphia Metropolitan Area during the early afternoon of the 16th. Accumulations ranged from two to eight inches, with the highest amounts in Sussex and Morris Counties. Specific accumulations in Burlington County included 3.8 inches in Willingboro and 3.1 inches in Mount Holly. In Burlington County, primarily northwestern areas were impacted.	Burlington County HMP
March 19, 2004	Snow/Ice	N/A	N/A	For the second time in the same work week snow, some of it heavy, fell across central and northern New Jersey. Accumulations ranged between two and seven inches in most locations. The number of accidents overall were less than what occurred with the snow on the 16th as most of it fell overnight. Specific accumulations in Burlington County included 3.0 inches in Browns Mills and 2.4 inches in Mount Holly. In Burlington County, primarily northwestern areas were impacted.	Burlington County HMP
December 19, 2004	Snow/Ice	N/A	N/A	This storm was accompanied by dense fog across central and southern New Jersey after midnight on the 19th. Air temperatures were at or below freezing in the area and this permitted black ice to form on area roadways and walkways. Untreated roadways and walkways were slippery. In Burlington County, a multi-vehicular pile-up on the Garden State Parkway in Bass River Township resulted in the death of a 40-year-old woman; lesser black ice and fog related accidents occurred along New Jersey State Route 38 in Mount Laurel Township. In Burlington County, primarily northwestern areas were impacted.	Burlington County HMP
December 26, 2004	Snow	N/A	N/A	Light snow fell across New Jersey from the evening of the 26th into the pre-dawn hours of the 27th. For many, this was the first accumulating snow of the season. Accumulations averaged between one to two inches across much of the area, with	Burlington County HMP

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				slightly lower accumulations far south and slightly higher accumulations in Monmouth County. The snow, even though it was light, led to many accidents. Accumulations in Burlington County included 2.1 inches in Mount Laurel. In Burlington County, primarily northwestern areas were impacted.	
January 19, 2005	Snow/Ice	N/A	N/A	Light snow fell during the afternoon and evening on the 19th. Since the recent weather was very cold, it stuck instantly to all surfaces. Traveling on untreated roadways became very slippery. Accumulations averaged only an inch or two, but many accidents occurred. Sixty accidents occurred on Interstate 295 between New Jersey State Route 73 in Burlington County and East Greenwich Township in Gloucester County. Some schools dismissed early and there were many cancellations of evening school classes and organizational events. Specific accumulations in Burlington County included 1.5 inches in Maple Shade.	Burlington County HMP
January 22, 2005	Snow	N/A	N/A	Heavy snow fell across northern and southwestern New Jersey with a wintry mix across southeastern New Jersey. Only Cape May County and coastal Atlantic County were spared heavy accumulations. In northern and southwestern New Jersey accumulations ranged from 8 to 17 inches with the highest amounts in Ocean, Burlington, Monmouth and Middlesex Counties. Across southeastern New Jersey accumulations ranged from around 10 inches in interior Atlantic and Cumberland Counties to less than an inch along coastal Cape May County. Seventeen of the twenty-one New Jersey counties reported at least one measurement of a foot or greater of snow. Governor Richard Codey declared a state of emergency from 8 p.m. EST on the 22nd through 8 a.m. EST on the 23rd. Vehicles were required to stay off of public roads and thoroughfares. Gusty northwest winds which followed in the wake of the storm caused considerable drifting snow and hampered road crews efforts as drifts continued to form on roads through the night of the 23rd. The unseasonably cold weather also rendered the salt less effective. Many of the reported accidents were minor. Some municipalities were reporting more sledding than vehicular accidents. Many sporting, community events and church services were cancelled. Museums and malls closed early on the 22nd and many opened late on the 23rd. Snow emergencies were declared by many municipalities. Regional rail lines reported delays from the 22nd through the 24th. For the first time in 9 years, nearby Philadelphia International Airport was closed for about 5 hours on the 22nd. Eight hundred passengers were stranded. Only half of the normal flights left the airport on the 23rd. Specific snowfall accumulations in Burlington County included 16.5 inches in Wrightstown, 15.0 inches in Tabernacle, and 12.2 inches in Mount Holly. This storm caused approximately $16.2 million statewide.	Burlington County HMP
February 3, 2005	Snow	N/A	N/A	Highest snow accumulations (1 to 3 inches) across east central New Jersey. Snow fell elsewhere in the state, but accumulations were generally less than one inch. Untreated roadways were slippery, especially in Monmouth County. Precipitation ended as light rain in southeastern New Jersey. Specific accumulations in	Burlington County HMP

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				Burlington County included 2.0 inches in New Lisbon and 1.1 inches in Wrightstown.	
February 20, 2005	Snow/Ice	N/A	N/A	Heavy snow fell across northwestern New Jersey and a wintry mix of snow and freezing rain affected central and southwestern New Jersey from the evening of the 20th into the morning of the 21st. Snowfall accumulations averaged 5 to 8 inches in northwestern New Jersey and 2 to 5 inches across central and southwestern New Jersey. Accumulations in southeastern New Jersey were less than 2 inches. Ice accretions in central and southwestern New Jersey averaged less than one tenth of an inch. Conditions were generally reported as quiet although many rural and northern area roads were slick and slippery in spots. Specific accumulations in Burlington County included 3.2 inches in Burlington and Edgewater Park, 3.1 inches in Maple Shade, 3.0 inches in Mount Holly, and 2.5 inches in Tabernacle.	Burlington County HMP
February 24, 2005	Snow	N/A	N/A	Heavy snow fell across most of New Jersey on the 24th into the 25th. Accumulations averaged between 3 and 7 inches in most areas. The lightest accumulations were in Warren and Sussex Counties and along the immediate southern New Jersey coast. The snow arrived too late to cancel schools and accumulated enough by the evening rush hour to cause traveling headaches. On the morning of the 25th many schools had delayed openings. There were hundreds of weather related accidents, many were minor. A multi-vehicle accident on Interstate 295 near Burlington Township blocked the southbound lanes for hours and caused a five mile traffic snarl. Specific accumulations in Burlington County included 6.0 inches in Edgewater Park, 5.8 inches in Mount Laurel and Shamong.	Burlington County HMP
February 28, 2005	Snow	N/A	N/A	This wintry weather was caused by a true northeaster. Heavy snow fell across northern and southwestern New Jersey from the morning of the 28th into the morning of March 1st. Accumulations averaged 4 to 8 inches, with some higher amounts in Sussex and Warren Counties and lower amounts in the southeastern part of the state. Many schools dismissed early on the 28th. Many after school activities and classes as well as municipal and school board meetings were cancelled. Many minor accidents occurred. In Burlington County, a 17-year-old boy, a 17-year-old girl and their 41-year-old bus driver were injured when two school buses collided in Medford Township. Specific accumulations in Burlington County included 8.0 inches in Southampton and Wrightstown, and 6.8 inches in Medford.	Burlington County HMP
March 8, 2005	Snow/Ice	N/A	N/A	Accumulations averaged an inch or two in the southern part of New Jersey and 2 to 4 inches in the northern part of the state. Poor driving conditions, particularly on untreated roadways in the northern part of the state. Specific snow accumulations in Burlington County included 2.5 inches in Florence and 1.5 inches in Tabernacle.	Burlington County HMP
December 4, 2005	Snow/Ice	N/A	N/A	Mix of snow and freezing rain across most of New Jersey. Accumulations averaged 1 to 3 inches with some higher amounts in Mercer County. Except for parts of Sussex County, the snow changed to freezing rain before ending during the morning with ice accretions of one to two tenths in most areas. Numerous accidents, some with serious injuries and fatalities occurred. In Bordentown	Burlington County HMP

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				(Burlington County), a 43-year-old man was struck and killed on the New Jersey Turnpike. He lost control of his vehicle and became disabled on the left shoulder. He was killed after he vacated his vehicle and was struck by another passing vehicle. Snowfall accumulations in Burlington County included 2.0 inches in Mount Holly.	
December 6, 2005	Snow	N/A	N/A	Heavy snow across much of the southern half of New Jersey, with lighter snow across Mercer and Middlesex Counties. Little if any snow fell across the rest of the Raritan Basin and northwestern New Jersey. Accumulations averaged three to seven inches with the highest amounts in Monmouth and Ocean Counties. Many schools in the coastal counties were closed. Schools farther inland had two hour delayed openings. Mainly minor accidents (vehicles striking poles) were reported. Burlington County reported about 25 weather related accidents. Specific accumulations in Burlington County included 4.3 inches in Maple Shade, 4.0 inches in Willingboro, and 3.5 inches in Mount Holly.	Burlington County HMP
December 9, 2005	Snow/Ice	N/A	N/A	Snow, sleet, and freezing rain affected most of the state. Precipitation along the coast fell mainly as rain. Snow accumulations averaged 1 to 3 inches in the southern half of the state where there was more sleet and freezing rain and 3 to 11 inches in the northern half of the state with the highest accumulations in the extreme northern part of the state. Ice accretions in the southern part of the state averaged around one-quarter of an inch and reached nearly four-tenths of an inch in Cumberland and Burlington Counties. Many schools never opened or had delayed openings. Non-essential state workers did not have to report to work until 10 a.m. EST. New Jersey Transit delays into New York City averaged 40 minutes. For the municipalities, the heaviest snow could not have fallen at a more inopportune time just before and during the morning commute. The combination of the ice on trees and power lines and stronger winds during the day caused about 21,000 homes and businesses to lose power in southern New Jersey. Snow accumulations in Burlington County included 2.5 inches in Chesterfield and 1.7 inches in Mount Holly.	Burlington County HMP
December 15, 2005	Snow/Ice	N/A	N/A	Mix of snow and freezing rain. Snowfall accumulations were less than one inch. The shore and Delaware Bay facing counties changed over to plain rain quickly. It took a bit longer for the strong southeast flow from the still relatively warm Atlantic Ocean to change the freezing rain to rain farther inland. Before the change to plain rain occurred, around one quarter of an inch of ice accrued on exposed surfaces. Travel on untreated roadways was treacherous. In Burlington County, areas primarily in the northwest were most severely impacted.	Burlington County HMP
January 15, 2006	Snow	N/A	N/A	A very intense low pressure system produced bands of heavier snow across New Jersey and affected the northwestern and southeastern part of the state the most. Some embedded thunderstorms within the bands formed across southern New Jersey. The strong winds combined with the heavy snow to produce near blizzard conditions during the one to two hour period when the heaviest snow fell.	Burlington County HMP

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				Accumulations along the Sussex and Morris County border averaged 3 to 6 inches. Similar accumulations occurred from Burlington and Ocean Counties southeast through Cape May County. Lesser accumulations occurred elsewhere in the state. Because the heavy snow occurred late on a Saturday night and was over by Sunday morning, very few accidents were reported. Most of the reported accidents were minor: mainly spinouts and fender-benders. Specific accumulations in Burlington County included 5.7 inches in Mount Laurel and 5.5 inches in Florence.	
February 11-12, 2006	Snow	N/A	N/A	Major northeast winter storm, accompanied by thunder and lightning. Winds gusting to around 40 mph across inland areas, with higher gusts along the coast, producing near white out conditions. New Jersey Transit suspended all bus service statewide on the 12th. A school bus slid into a ditch in Southampton (Burlington County) on the 13th and turned onto its side. No injuries were reported, however three children were taken to a nearby hospital as a precaution. A Willingboro (Burlington County) police officer suffered a broken ankle and leg when his patrol vehicle slid off the road in slippery conditions during the morning of the 12th on Route 130. The officer's vehicle was totaled as a result of the accident. Sports activities were cancelled or postponed in Burlington County during the 11th and 12th, with even a code blue weather emergency was issued in Burlington County during the storm. The Burlington Center Mall in Burlington County closed on the 12th due to the winter storm. Some specific snowfall amounts in Burlington County include, 14.0 inches in Lumberton and 12.8 inches in Mount Laurel.	Burlington County HMP
March 2, 2006	Snow/Ice	N/A	N/A	Wintry mix of snow, sleet and freezing rain across New Jersey mainly to the west of the New Jersey Turnpike. Snow accumulations averaged 2 to 4 inches in northwestern New Jersey and less than one inch in Mercer County and the Raritan Basin. Ice accretions across Warren and Morris Counties averaged one quarter of an inch and around one tenth of an inch in Sussex County and Mercer Counties and the Raritan Basin. Ice accretions in the local Philadelphia suburbs were just a trace. The indirect insulation from the sun kept roadways wet and most of the ice accretions were on exposed surfaces as well as bridges and overpasses. Minimal power outages occurred. The rapid movement of this system prevented heavier precipitation from occurring. In Burlington County, primarily northwestern areas were impacted.	Burlington County HMP
April 14-20, 2007	Severe Storms and Inland/Coastal Flooding (Nor'Easter)	DR-1694	Yes		
December 24, 2008	Winter Weather	N/A	N/A	A wintry mix of sleet and freezing rain fell during the first half of the morning on the 24th across central and northern New Jersey. The resulting glaze on untreated roadways led to numerous accidents. Ice accretions in the southern part of the state were less than one-tenth of an inch while ice accretions across the northern	NOAA-NCDC

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				part of the state averaged between one-tenth and two-tenths of an inch. Precipitation briefly started as sleet a little after before changing to freezing rain overnight. Temperatures continued to rise that morning and by 9 a.m. EST, the freezing rain changed to plain rain. This unseasonably cold weather made it easier for slippery conditions to develop on untreated roadways and led to a rash of accidents. No damages were reported in Burlington County.	
January 19, 2009	Winter Weather	N/A	N/A	An upper-level disturbance from the eastern Great Lakes produced an area of moderate to locally heavy snow across mainly portions of northern New Jersey. The enhanced snowfall rates along with temperatures below freezing, produced very slippery conditions. The snow tapered off from southwest to northeast during the early evening hours of the 19th. A fatal accident occurred in Burlington County during the morning of the 19th when a combination of snow and fog produced slippery roads. The fatal crash occurred in Westampton Township when a car slid and went underneath a tractor-trailer. No other details were available. Some snowfall totals in Burlington County included 0.4 of an inch in Mount Holly township. No damages were reported.	NOAA-NCDC
December 19 - 20, 2009	Heavy Snow/ Strong Wind/ Winter Weather	DR-1873	Yes	A major winter storm dropped heavy snow across most of New Jersey. Snowfall averaged 6 to 12 inches across northwest New Jersey and the Raritan Basin and 12 to 24 inches across central and southern New Jersey. Snow began around Noon in the Raritan Basin and mixed with sleet at times during the day on the 19th. The snow fell at its heaviest between the afternoon and early evening, and lingered through 8 a.m. on the 20th. Since this storm occurred on the weekend, the number of traffic accidents was down. Nevertheless, there were 77 reported accidents in Burlington County. The winter storm came at an inopportune time for retailers as the Saturday (the 19th) before Christmas is usually one of the busiest shopping days of the year. The storm left motorists stranded, caused accidents, school closures, delayed public services and interrupted public transit. Representative snowfall in Burlington County included in Tabernacle Township and 19.0 inches in Moorestown Township. Delran Township experienced road closures throughout the Township. Record snowfall disrupted transportation and public safety systems in Hainesport Township. Mansfield Township experienced numerous road closures and power outages. Westampton Township experienced road closures, utility outages, and commercial closures. The Township was responsible for snow removal. Washington Township required on-call duties for employees and equipment for snow removal. Tabernacle Township had minor damage from this event, with power outages and road closures. Springfield Township had several road closures. Moorestown Township	NOAA-NCDC, SHELDUS, FEMA, Planning Committee Input

Date of Event	Event Type	FEMA Declaration #	County Designated?	Location and Description	Source(s)
				had road closures. Medford Township had road, school and commercial closure. SHELDUS reported over $25K in damages in Burlington County.	
February 5 - 6, 2010	Severe Winter Storm and Snowstorm	DR-1889	Yes	A major winter storm dropped 10 to 20 inches across central of New Jersey from the afternoon of the 5th into the afternoon of the 6th. Many county and municipalities declared snow emergencies. On March 23, President Barack Obama declared Atlantic, Burlington, Cape May, Camden, Cumberland, Gloucester and Salem Counties a Major Disaster Area. About 100,000 homes and businesses lost power in the state. Some roads and highways were impassable, speed limits were reduced, and Amtrak canceled train service. Where the snow was relatively lighter, more accidents and fender benders were reported. Representative snowfall in Burlington County included 21.0 inches in Willingboro Township, 19.6 inches in Tabernacle Township, and 19.0 inches in Maple Shade Borough. Delran Township experienced road closures throughout the Township. Evesham Township experienced power outages and a structural collapse was documented due to heavy snow accumulation. Mansfield Township experienced numerous road closures and power outages. Westampton Township experienced road closures, utility outages, and commercial closures; Township was responsible for snow removal. Washington Township experienced power outages. Tabernacle Township had minor damage from this event, with power outages and road closures. Springfield Township had several road closures. Pemberton Township had road closures, utility outages and commercial closes; Township experienced $53 K in losses. Palmyra Township had disruption with their transportation and public safety systems; roads were closed. Moorestown Township had road closures. Medford Township had to open a shelter for its residents; schools and roads were closed. As of 4/4/2013, total public assistance grants obligated to affected NJ communities topped $13.7M.	NOAA-NCDC, Planning Committee Input
February 9 - 10, 2010	Winter Storm/ Winter Weather	DR-1889	Yes	For the second time within a week a major winter storm affected New Jersey. Blizzard conditions occurred at times across the extreme southern part of the state during the afternoon and early evening of the 10th. Snowfall averaged 7 to 15 inches across northwest New Jersey, 12 to 20 inches across central New Jersey and 6 to 12 inches across the southern third of New Jersey. Ice accretions were less than one tenth of an inch. Two storm related deaths occurred in Burlington and Middlesex Counties. In Burlington County, a 51-year-old man in Riverside died after a porch awning collapsed onto him. A Sunnyside Farm barn collapsed in Westampton and the roof of a Rite-Aid collapsed in Marlton. A shelter was opened in Medford as	NOAA-NCDC, FEMA

Date of Event	Event Type	FEMA Declaration #	County Designated?	Location and Description	Source(s)
				1,900 homes within the township lost power. Record snowfall disrupted transportation and public safety systems in Hainesport Township. Representative snowfall in Burlington County included 16.0 inches in Medford Township, 15.9 inches in Mount Holly Township, 15.1 inches in Tabernacle Township, and 14.5 inches in Mount Laurel Township.	
March 12 - April 15, 2010	Severe Storms and Flooding/ Strong Wind	N/A	N/A	A Nor'Easter moved into the area on March 12. On March 13, strong to high winds downed thousands of trees and tree limbs, hundreds of telephone poles, and caused utility outages throughout the state. The strongest winds occurred during the afternoon on the 13th. Governor Chris Christie declared a state of emergency on March 14th, and on March 26 requested a major disaster declaration. A state-wide federal disaster declaration was announced on April 2, making IA and PA available for affected areas. At the time of this report, a total $16.9M in IA had been approved and $30.7M in PA had been obligated throughout the State of New Jersey. Peak wind gusts included 65 mph in Woodland Township at Chatsworth, 63 mph at McGuire AFB, and 61 mph in Burlington (City). SHELDUS reported $100K in damages.	NOAA-NCDC
December 26-27, 2010	Severe Winter Storm and Snowstorm	DR-1954	Yes	A severe winter storm affected 15 counties in New Jersey, including Burlington County. In Hainesport Township, roads were closed or severely compromised. Mansfield Township experienced numerous road closures and power outages. Westampton Township experienced road closures, utility outages and commercial closures; Township was responsible for snow removal. Washington Township cleared and sanded roadways throughout their Township. Tabernacle Township had minor damage from this event, with power outages and road closures. Springfield Township had to close roads due to snow accumulation. Pemberton Township had road closures, utility outages and commercial closures. Palmyra Township had disruption with their transportation and public safety systems; roads were closed. Moorestown Township had road closures.	FEMA, Planning Committee Input
October 29, 2011	Severe Winter Storm	DR-4048	No	A winter storm dropped heavy snow across parts of central and all of northwest New Jersey. Across the Raritan Basins precipitation changed from rain to snow by 11 a.m. in most places, falling heavy at times until 5 p.m. As precipitation became lighter, it mixed with some sleet and rain, ending late that evening. In the Raritan Basin accumulations averaged 3 to 7 inches. Over 800,000 utility customers in the state lost power, not fully restored until Nov. 4th. On November 30, President Obama declared a state-wide major disaster declaration. According to FEMA's preliminary damage assessment, the storm's primary impact was costs associated with debris removal. As of 4/4/2013, total	FEMA, NOAA-NCDC

Date of Event	Event Type	FEMA Declaration #	County Designated?	Location and Description	Source(s)
				public assistance cost estimate state-wide was over $24.7M. Representative snowfall in Burlington County included 1.2 inches in Florence and Mount Laurel Townships. No property damages were reported.	
April 2012	Nor'Easter	N/A	N/A	In Delran Township, roads were closed in the Riverside Park neighborhood. The fire department responded to numerous calls for assistance to pump out basements.	

Sources: NOAA-NCDC, FEMA, SHELDUS, Burlington County HMP, NJ HMP
Note: Monetary figures within this table were U.S. Dollar (USD) figures calculated during or within the approximate time of the event. If such an event would occur in the present day, monetary losses would be considerably higher in USDs as a result of inflation.

DR	Disaster Declaration
EM	Emergency Declaration
FEMA	Federal Emergency Management Agency
HMP	Hazard Mitigation Plan
IA	Individual Assistance
K	Thousand ($)
M	Million ($)
N/A	Not Applicable
NCDC	National Climatic Data Center
NJ	New Jersey
NOAA	National Oceanic and Atmospheric Administration
PA	Public Assistance
SHELDUS	Spatial Hazard Events and Losses Database for the United States

Probability of Future Events

According to the NJ HMP, winter storms are frequent events for the State and occur from late November until March. Because of New Jersey's northern location at a climactic crossroads and its distinctive geography, it experiences the full effect of the winter season. Normally experiencing lower temperatures on most winter days, the north has a greater chance of all types of winter storms occurring (NJOEM, 2012).

This plan indicates the probability of future occurrences in terms of frequency based on historical events. Using the historical data presented in Table 5.4.8-4, Burlington County and its participating jurisdictions have experienced 131 winter weather events between February 3, 1995 and January 25, 2013 – an average of seven storms per year. Based on historic records, it is by far most likely that the storm will be one involving snow or a wintery mix as opposed to consisting of merely an ice event.

Table 5.4.8-4. Probability of Occurrence of Winter Storms/Ice Storms, Burlington County

Type	Total Number of Events	Probability of Occurrence * (%)	Average Annual Number of Events **
Snow Events	45	34%	2.5
Snow/Ice Events/Winter Weather	84	64%	4.67
Ice Events	2	2%	0.11
All Winter Storm / Ice Storm Events	**131**	**100%**	**7.28**

Source: NOAA's NCDC Storm Events Database

Note: * The probability of occurrence is presented in terms of frequency based on historical events. Probability of Occurrence has been calculated by dividing the number of events of a given type by the total number of events for all categories. For example, the probability of occurrence of a snow event in Burlington County = 45/131 = 34%. In other words, if a winter storm/ice storm event were to occur, there is a 49% chance that it would be a snow event.
** Average annual number of events has been calculated by dividing the number of events of a given type by the number of years of historical record (which, in this case, is 11 years. For example, the average annual number of snow events in the County = 45/18 = 2.5.

The identified hazards of concern for Burlington County are ranked in Section 5.3. The probability of occurrence, or likelihood of the event, is one parameter used for ranking hazards. Based on historical records and input from the County Planning Mitigation Committee, the probability of occurrence for severe winter storms in Burlington County is considered 'frequent' (event likely to occur within 25 years) as presented in Table 5.3-3 and impacts only related to severe winter storms, excluding those associated with hurricanes, tropical storms, and flooding, are expected to be medium.

It is estimated that Burlington County and all of its jurisdictions, will continue to experience direct and indirect impacts of severe winter storms annually that may induce secondary hazards such as flooding, infrastructure deterioration or failure, utility failures, power outages, water quality and supply concerns, and transportation delays, accidents and inconveniences.

VULNERABILITY ASSESSMENT

To understand risk, a community must evaluate what assets are exposed or vulnerable in the identified hazard area. For severe winter storm events, the entire County has been identified as the hazard area. Therefore, all assets in Burlington County (population, structures, critical facilities and lifelines), as described in Burlington County Profile section (Section 4), are vulnerable. The following section includes an evaluation and estimation of the potential impact severe winter storm events have on Burlington County including:

- Overview of vulnerability
- Data and methodology used for the evaluation
- Impact, including: (1) impact on life, safety and health, (2) general building stock, (3) critical facilities (4) economy and (5) future growth and development
- Further data collections that will assist understanding of this hazard over time

Overview of Vulnerability

Severe winter storms are of significant concern to Burlington County because of their frequency and magnitude in the region. Additionally, they are of significant concern due to the direct and indirect costs associated with these events; delays caused by the storms; and impacts on the people and facilities of the region related to snow and ice removal, health problems, cascade effects such as utility failure (power outages) and traffic accidents, and stress on community resources.

Data and Methodology

National weather databases and local resources were used to collect and analyze severe winter storm impacts on Burlington County and the participating municipalities. The 2010 U.S. Census data and default HAZUS-MH 2.1 general building data was used to support an evaluation of assets exposed to this hazard and the potential impacts associated with this hazard.

Impact on Life, Health and Safety

According to the NOAA National Severe Storms Laboratory (NSSL); every year, winter weather indirectly and deceptively kills hundreds of people in the U.S., primarily from automobile accidents, overexertion and exposure. Winter storms are often accompanied by strong winds creating blizzard conditions with blinding wind-driven snow, drifting snow and extreme cold temperatures and dangerous wind chill. They are considered deceptive killers because most deaths and other impacts or losses are indirectly related to the storm. People can die in traffic accidents on icy roads, heart attacks while shoveling snow, or of hypothermia from prolonged exposure to cold. Heavy accumulations of ice can bring down trees and power lines, disabling electric power and communications for days or weeks. Heavy snow can immobilize a region and paralyze a city, shutting down all air and rail transportation and disrupting medical and emergency services. Storms near the coast can cause coastal flooding and beach erosion as well as sink ships at sea. The economic impact of winter weather each year is huge, with costs for snow removal, damage and loss of business in the millions (NSSL, 2006).

Heavy snow can immobilize a region and paralyze a city, stranding commuters, stopping the flow of supplies, and disrupting emergency and medical services. Accumulations of snow can collapse buildings and knock down trees and power lines. In rural areas, homes and farms may be isolated for days, and unprotected livestock may be lost. In the mountains, heavy snow can lead to avalanches. The cost of

snow removal, repairing damages, and loss of business can have large economic impacts on cities and towns (NSSL, 2006).

Heavy accumulations of ice can bring down trees, electrical wires, telephone poles and lines, and communication towers. Communications and power can be disrupted for days/weeks while utility companies work to repair the extensive damage. Even small accumulations of ice may cause extreme hazards to motorists and pedestrians. Bridges and overpasses are particularly dangerous because they freeze before other surfaces (NSSL, 2006).

For the purposes of this HMP, the entire population of Burlington County (448,734 people) is exposed to severe winter storm events (U.S. Census, 2010). Snow accumulation and frozen/slippery road surfaces increase the frequency and impact of traffic accidents for the general population, resulting in personal injuries. Refer to Table 4-2 in Burlington County Profile for population statistics for each participating municipality.

The elderly are considered most susceptible to this hazard due to their increased risk of injuries and death from falls and overexertion and/or hypothermia from attempts to clear snow and ice. In addition, severe winter storm events can reduce the ability of these populations to access emergency services. Residents with low incomes may not have access to housing or their housing may be less able to withstand cold temperatures (e.g., homes with poor insulation and heating supply). Table 5.4.8-5 summarizes the population over the age of 65 and individuals living below the Census poverty threshold.

Table 5.4.8-5. Burlington County Population Statistics (2010 U.S. Census)

Municipality	Census 2010 Total Pop.	Pop. 65+ Census 2010		Low-Income Pop. ** HAZUS-MH	
		Total	% of Total	Total	% of Total
Bass River, Township of	1,443	187	13	129	8.5
Beverly, City of	2,577	292	11.3	271	10.2
Bordentown, City of	3,924	528	13.5	520	13.1
Bordentown, Township of	11,367	1,207	10.6	564	6.7
Burlington, City of	9,920	1,556	15.7	1,269	13.0
Burlington, Township of	22,594	2,719	12.0	1,537	7.6
Chesterfield, Township of	7,699	415	5.4	72	1.2
Cinnaminson, Township of	15,569	2,839	18.2	726	5.0
Delanco, Township of	4,283	689	16.1	332	10.3
Delran, Township of	16,896	2,009	11.9	1,185	7.6
Eastampton, Township of	6,069	283	4.7	423	6.8
Edgewater Park, Township of	8,881	1,403	15.8	876	11.1
Evesham, Township of	45,538	5,961	13.1	2,134	5.0
Fieldsboro, Borough of	540	57	10.6	18	3.4
Florence, Township of	12,109	1,534	12.7	956	8.9
Hainesport, Township of	6,110	874	14.3	233	5.6
Lumberton, Township of	12,559	1,312	10.4	952	9.1
Mansfield, Township of	8,544	2,382	27.9	501	9.8
Maple Shade, Township of	19,131	2,530	13.2	2,321	12.2
Medford Lakes, Borough of	4,146	611	14.7	122	2.9
Medford, Township of	23,033	3,212	13.9	835	3.8

Municipality	Census 2010 Total Pop.	Pop. 65+ Census 2010		Low-Income Pop. ** HAZUS-MH	
		Total	% of Total	Total	% of Total
Moorestown, Township of	20,726	3,360	16.2	1,126	5.9
Mount Laurel, Township of	41,864	6,723	16.1	1,204	11.2
Mt. Holly, Township of	9,536	1,054	11.1	2,873	7.1
New Hanover, Township of	7,385	276	3.7	258	2.6
North Hanover, Township of	7,678	648	8.4	834	11.4
Palmyra, Borough of	7,398	973	13.2	677	9.5
Pemberton, Borough of	1,409	187	13.3	142	11.7
Pemberton, Township of	27,912	3,257	11.7	2,535	8.8
Riverside, Township of	8,097	850	10.5	881	11.1
Riverton, Borough of	2,779	498	17.9	214	7.8
Shamong, Township of	6,409	636	9.8	301	4.7
Southampton, Township of	10,464	3,347	32.0	1,509	14.5
Springfield, Township of	3,414	453	13.3	116	3.6
Tabernacle, Township of	6,949	777	11.2	319	4.4
Washington, Township of	1,781***	N/A	N/A	53	8.5
Westampton, Township of	8,813	914	10.4	331	4.6
Willingboro, Township of	31,629	5,037	15.9	1,657	5.0
Woodland, Township of	1,788	187	10.5	50	4.3
Wrightstown, Borough of	802	63	0.07	164	21.9
Burlington County	**448,734**	**26,231**	**5.8**	**31,220**	**7.4**

Source: U.S. Census 2000; HAZUS 2.1
Note: Pop. = population
* Individuals below poverty level (2012 Census poverty threshold for a 3-person family unit is $17,959)
** Households with an income of less than $20,000 based on 2000 U.S. Census statistics in HAZUS-MH v2.1

Impact on General Building Stock

The entire general building stock inventory in Burlington County is exposed and vulnerable to the severe winter storm hazard. In general, structural impacts include damage to roofs and building frames, rather than building content. Table 5.4.8-6 presents the total exposure value for general building stock for each participating municipality (structure only).

There was no historic information available that identified property damages within Burlington County due to a single severe winter storm event. Current modeling tools are not available to estimate specific losses for this hazard. As an alternate approach, this plan considers percentage damages that could result from severe winter storm conditions. Table 5.4.8-6 below summarizes percent damages that could result from severe winter storm conditions for Burlington County's total general building stock (structure only). Given professional knowledge and information available, the potential losses for this hazard are considered to be overestimated.

Table 5.4.8-6. General Building Stock Exposure (Structure Only) and Estimated Losses from Severe Winter Storm Events in Burlington County

Municipality	Total (All Occupancies) RV	1% Damage Loss Estimate	5% Damage Loss Estimate	10% Damage Loss Estimate
Bass River Township	$101,257,000	$1,012,570	$5,062,850	$10,125,700
Beverly City	$203,182,000	$2,031,820	$10,159,100	$20,318,200
Bordentown City	$364,327,000	$3,643,270	$18,216,350	$36,432,700
Bordentown Township	$756,748,000	$7,567,480	$37,837,400	$75,674,800
Burlington City	$847,191,000	$8,471,910	$42,359,550	$84,719,100
Burlington Township	$1,950,990,000	$19,509,900	$97,549,500	$195,099,000
Chesterfield Township	$299,950,000	$2,999,500	$14,997,500	$29,995,000
Cinnaminson Township	$1,416,712,000	$14,167,120	$70,835,600	$141,671,200
Delanco Township	$282,362,000	$2,823,620	$14,118,100	$28,236,200
Delran Township	$1,295,952,000	$12,959,520	$64,797,600	$129,595,200
Eastampton Township	$451,284,000	$4,512,840	$22,564,200	$45,128,400
Edgewater Park Township	$589,879,000	$5,898,790	$29,493,950	$58,987,900
Evesham Township	$3,885,335,000	$38,853,350	$194,266,750	$388,533,500
Fieldsboro Borough	$42,846,000	$428,460	$2,142,300	$4,284,600
Florence Township	$922,519,000	$9,225,190	$46,125,950	$92,251,900
Hainesport Township	$485,136,000	$4,851,360	$24,256,800	$48,513,600
Lumberton Township	$926,654,000	$9,266,540	$46,332,700	$92,665,400
Mansfield Township	$1,053,948,000	$10,539,480	$52,697,400	$105,394,800
Maple Shade Township	$1,455,690,000	$14,556,900	$72,784,500	$145,569,000
Medford Lakes Borough	$361,430,000	$3,614,300	$18,071,500	$36,143,000
Medford Township	$2,279,232,000	$22,792,320	$113,961,600	$227,923,200
Moorestown Township	$2,427,401,000	$24,274,010	$121,370,050	$242,740,100
Mount Holly Township	$942,557,000	$9,425,570	$47,127,850	$94,255,700
Mount Laurel Township	$4,195,041,000	$41,950,410	$209,752,050	$419,504,100
New Hanover Township	$825,998,000	$8,259,980	$41,299,900	$82,599,800
North Hanover Township	$419,942,000	$4,199,420	$20,997,100	$41,994,200
Palmyra Borough	$582,624,000	$5,826,240	$29,131,200	$58,262,400
Pemberton Borough	$110,647,000	$1,106,470	$5,532,350	$11,064,700
Pemberton Township	$1,970,889,000	$19,708,890	$98,544,450	$197,088,900
Riverside Township	$533,916,000	$5,339,160	$26,695,800	$53,391,600
Riverton Borough	$221,269,000	$2,212,690	$11,063,450	$22,126,900
Shamong Township	$500,704,000	$5,007,040	$25,035,200	$50,070,400
Southampton Township	$823,737,000	$8,237,370	$41,186,850	$82,373,700
Springfield Township	$282,453,000	$2,824,530	$14,122,650	$28,245,300
Tabernacle Township	$576,928,000	$5,769,280	$28,846,400	$57,692,800
Washington Township	$63,380,000	$633,800	$3,169,000	$6,338,000
Westampton Township	$769,854,000	$7,698,540	$38,492,700	$76,985,400
Willingboro Township	$2,284,353,000	$22,843,530	$114,217,650	$228,435,300
Woodland Township	$75,012,000	$750,120	$3,750,600	$7,501,200
Wrightstown Borough	$80,320,000	$803,200	$4,016,000	$8,032,000
Burlington County	**$37,659,649,000**	**$376,596,490**	**$1,882,982,450**	**$3,765,964,900**

Source: HAZUS-MH 2.0

Notes: RV = Replacement Cost Value. The building values shown are building structure only because damage from the severe winter storm hazard generally impact structures such as the roof and building frame (rather than building content). The valuation of general building stock and the loss estimates determined in Burlington County were based on the default general building stock database provided in HAZUS-MH 2.1.

Comment [AM2]: Ryan, you need to grab the building data from HAZUS (structure only). Join to the municipality file for 2000 Census and then summarize. Calculate the % of the total using the table headers.

A specific area that is vulnerable to the severe winter storm hazard is the floodplain. At risk general building stock and infrastructure in floodplains are presented in the flood hazard profile (Section 5.4.1). Generally, losses from flooding associated with severe winter storms should be less than that associated with a 100-year or 500-year flood. In summary, snow and ice melt can cause both riverine and urban flooding. Estimated losses due to riverine flooding in Burlington County are discussed in Section 5.4.1.

Impact on Critical Facilities

Full functionality of critical facilities such as police, fire and medical facilities is essential for response during and after a severe winter storm event. These critical facility structures are largely constructed of concrete and masonry; therefore, they should only suffer minimal structural damage from severe winter storm events. Because power interruption can occur, backup power is recommended for critical facilities and infrastructure. Infrastructure at risk for this hazard includes roadways that could be damaged due to the application of salt and intermittent freezing and warming conditions that can damage roads over time. Severe snowfall requires infrastructure to clear roadways, alert citizens to dangerous conditions, and following the winter requires resources for road maintenance and repair. Additionally, freezing rain and ice storms impact utilities (i.e., power lines and overhead utility wires) causing power outages for hundreds to thousands of residents.

Impact on Economy

The cost of snow and ice removal and repair of roads from the freeze/thaw process can drain local financial resources. Another impact on the economy includes impacts on commuting into, or out of, the area for work or school. The loss of power and closure of roads prevents the commuter population traveling to work within and outside of the County.

The County of Burlington budgets annually for rock salt and liquid calcium to be used for snow & ice removal application. In addition, supplemental snow removal services are budgeted for and publicly bid on an annual basis as well. Please note that these snow removal services are used only during snow events when required.

Future Growth and Development

As discussed in Sections 4 and 9, areas targeted for future growth and development have been identified across Burlington County. Any areas of growth could be potentially impacted by the severe winter storm hazard because the entire planning area is exposed and vulnerable. Please refer to the specific areas of development indicated in tabular form (subsection B) and/or on the hazard maps (subsection I) included in the jurisdictional annexes in Volume II, Section 9 of this plan.

Additional Data and Next Steps

The assessment above identifies vulnerable populations and economic losses associated with this hazard of concern. Historic data on structural losses to general building stock are not adequate to predict specific losses to this inventory; therefore, the percent of damage assumption methodology was applied. This methodology is based on FEMA's How to Series (FEMA 386-2), Understanding Your Risks, Identifying and Estimating Losses (FEMA, 2001) and FEMA's Using HAZUS-MH for Risk Assessment (FEMA 433) (FEMA, 2004). The collection of additional/actual valuation data for general building stock and critical infrastructure losses would further support future estimates of potential exposure and damage for the general building stock inventory.