



11. SEVERE WEATHER

11.1 HAZARD PROFILE

11.1.1 Hazard Description

For this HMP update and as deemed appropriated by the Cape May County Planning Partnership, the severe weather hazard includes thunderstorms and lightning, high winds, hail, tornadoes, and hurricanes.

Thunderstorms and Lightning

A thunderstorm is a local storm produced by a cumulonimbus cloud and accompanied by lightning and thunder (NWS 2021). A thunderstorm forms from a combination of moisture, rapidly rising warm air, and a force capable of lifting air, such as a warm and cold front, a sea breeze, or a mountain. Thunderstorms form from the equator to as far north as Alaska. Although thunderstorms generally affect a small area when they occur, they have the potential to become dangerous due to their ability in generating tornadoes, hailstorms, strong winds, flash flooding, and lightning. The National Weather Service (NWS) considers a thunderstorm severe only if it produces damaging wind gusts of at least 58 miles per hour (mph), hail of at least one-inch diameter, or tornadoes. Typical thunderstorms are 15 miles in diameter and last an average of 30 minutes. An estimated 100,000 thunderstorms occur each year in the United States, with approximately 10 percent of them classified as severe (NWS 2016).

Lightning is a bright flash of electrical energy produced by a thunderstorm. The resulting clap of thunder is the result of a shock wave created by the rapid heating and cooling of the air in the lightning channel. Lightning can damage homes and injure people. In the United States, an average of 300 people are injured and 80 people are killed by lightning each year. Lightning can occur anywhere there is a thunderstorm and can travel via cloud-to-air, cloud-to-cloud (i.e., “intra-cloud”), and cloud-to-ground (NOAA 2014).

High Winds

Wind begins with differences in air pressures. It is rough horizontal movement of air caused by uneven heating of the Earth’s surface. Wind occurs at all scales, from local breezes lasting a few minutes to global winds resulting from solar heating of the Earth. High winds are often associated with other severe weather events such as thunderstorms, tornadoes, hurricanes, and tropical storms (NWS 2012). The following are common types of high wind events (NOAA 2023):

- **Straight-line wind** is a term used to define any thunderstorm wind that is not associated with rotation and is used mainly to differentiate from tornadic winds.
- A **microburst** is a small, concentrated downburst that produces an outward burst of strong winds at or near the surface. Microbursts are typically less than 2.5 miles across and last 5 to 10 minutes. Maximum windspeeds sometimes exceed 100 mph. There are two kinds of microbursts: wet and dry. A wet microburst is accompanied by heavy precipitation at the surface. Dry microbursts, common in places like the high plains and the intermountain west, occur with little or no precipitation reaching the ground.
- A **derecho** is a widespread, long-lived windstorm that is associated with a band of rapidly moving showers or thunderstorms. A derecho is defined as an event with a wind damage swath extending more than 240 miles that includes wind gusts of at least 58 mph or greater along most of its length. A typical derecho consists of numerous microbursts, downbursts, and downburst clusters.



Hail

Hail forms inside a thunderstorm where there are strong updrafts of warm air and downdrafts of cold water. If a water droplet is picked up by the updrafts, it can be carried well above the freezing level and become frozen. The frozen droplet falls and may thaw as it moves into warmer air toward the bottom of the thunderstorm. The droplet might be carried by another updraft back into the cold air to re-freeze. With each trip above and below the freezing level, the frozen droplet adds another layer of ice. The droplet with many layers of ice falls to the ground as hail (NSSL 2021).

Tornadoes

A tornado is a violently rotating column of air that extends from a thunderstorm to the ground with an average forward speed of 30 mph. Tornadoes typically develop from either a severe thunderstorm or hurricane as cool air rapidly overrides a layer of warm air. Tornadoes can occur at any time of the year, with peak seasons at different times for different states (NWS 2010).

Hurricanes

A hurricane is a tropical cyclone that attains hurricane status when its wind speed reaches at least 74 mph. A tropical cyclone is a rotating, organized system of clouds and thunderstorms that originates over tropical or subtropical waters and has a closed low-level circulation. Tropical depressions, tropical storms, and hurricanes are all considered tropical cyclones. These storms rotate counterclockwise around the center in the northern hemisphere and are accompanied by heavy rain and strong winds (NOAA 2023). Almost all tropical storms and hurricanes in the Atlantic Basin (which includes the Gulf of Mexico and Caribbean Sea) form between June and November, officially referred to as hurricane season. August and September are peak months for hurricane development in the North Atlantic Basin (NHC 2020).

Tropical cyclones strengthen when water evaporated from the ocean is released as the saturated air rises, resulting in condensation of water vapor contained in the moist air. They are fueled by a different heat mechanism than other cyclonic windstorms, such as nor'easters and polar lows. The characteristic that separates tropical cyclones from other cyclonic systems is that at any height in the atmosphere, the center of a tropical cyclone will be warmer than its surroundings, which is called a "warm core" storm system (NOAA 2023).

Storm Surge

Storm surge causes backwater flooding as a result of rising water elevations at coastal river mouths. Strong winds can increase tide levels and water-surface elevations in the connected bodies of water. Storm systems generate large waves that run up and can push high amounts of water inland along waterways opposite the direction of their typical flow, which can overtop banks and impact adjacent low-lying floodplains.

11.1.2 Location

Thunderstorms and Lightning

Thunderstorms affect relatively small, localized areas, rather than large regions like winter storms and hurricane events. They tend to take place in spring and summer and during the warmest times of the day (late afternoon and early evening) (NOAA n.d.). It is assumed for this HMP that the thunderstorm risk is the same everywhere in Cape May County.



Severe storm events occur throughout the State of New Jersey and are not bound by geographic extent. The likelihood of these events affecting Cape May County depends on storm conditions. Lightning occurs with thunderstorms, so it is most likely during spring and summer, and during the warmest times of the day (NOAA n.d.).

High Winds

All of Cape May County is subject to high winds from severe weather events.

Hail

Hail can form anywhere; however, they are more likely to fall in areas that have the most thunderstorms.

Tornadoes

Like thunderstorms, tornadoes do not have any specific geographic boundary and can occur anywhere in Cape May County.

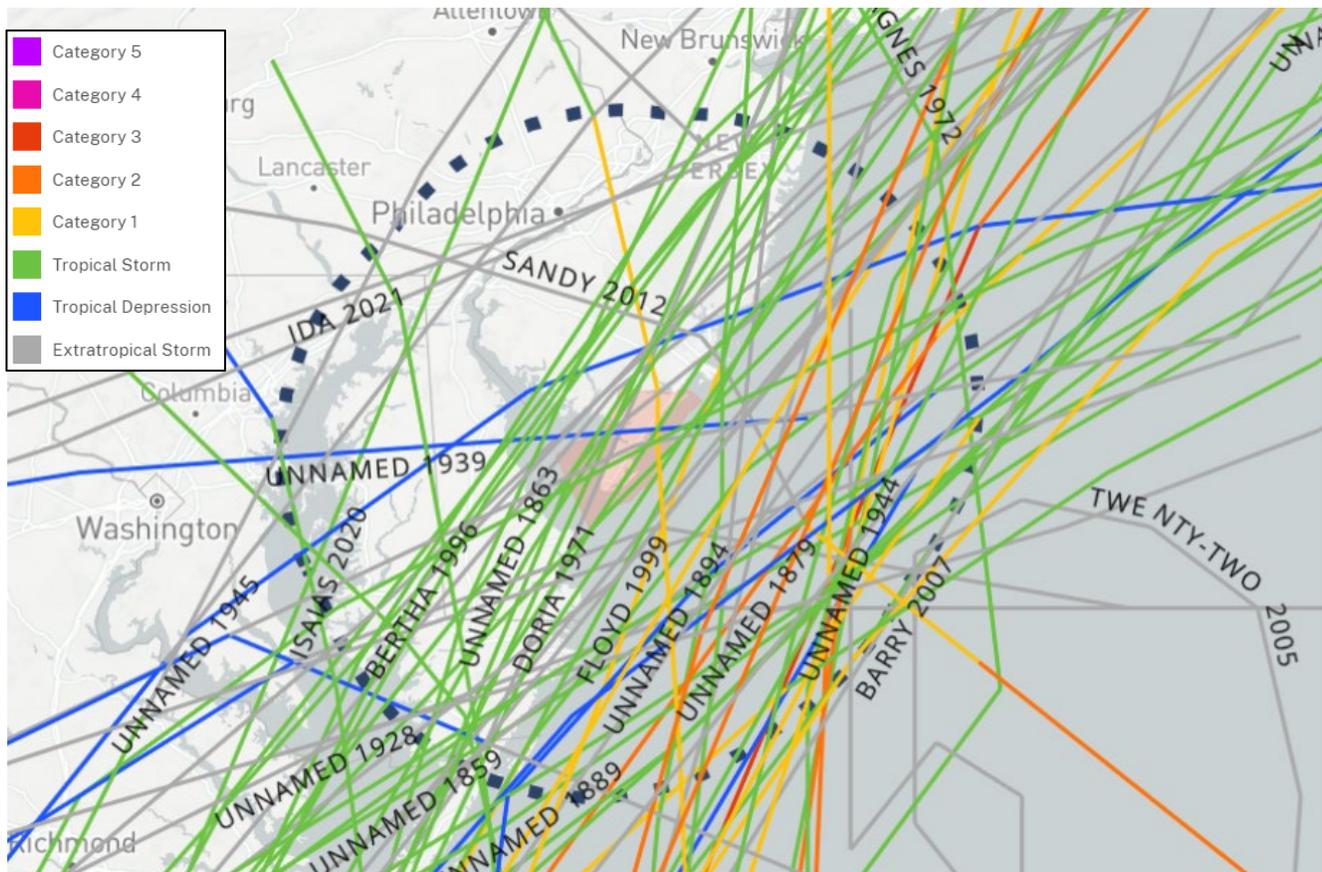
Hurricanes

Tropical systems develop in the Atlantic Ocean between the Lesser Antilles and the African coast, or in the warm tropical waters of the Caribbean and Gulf of Mexico. These storms may move up the Atlantic coast or through the the Gulf Coast states, bringing wind and rain as far north as New England before moving offshore and heading east. Figure 11-1 displays tropical cyclone tracks for Cape May County that tracked within 60 nautical miles (an approximate distance from the center of rotation where significant impacts could be felt) between 1842 and 2023.

Storm Surge

All locations along the U.S. East and Gulf coasts are vulnerable to storm surges. Storm surge can even travel up rivers and canals, reaching well inland from the coastline. Since Cape May County is a peninsula, it makes the County very vulnerable to storm surge.

Figure 11-1. Historical Tropical Storm and Hurricane Tracks 1842 to 2023



Source: NOAA 2023

Note: Cape May County is shaded in red.

11.1.3 Extent

Thunderstorms and Lightning

Severe thunderstorm statements, watches, and warnings are issued by the local NWS office and the Storm Prediction Center (SPC). The NWS and SPC will update the watches and warnings and notify the public when they are no longer in effect. NWS issues the following statements, watches, and warnings for thunderstorms (NWS 2023):

- A **Special Weather Statement** is issued for strong storms that are below severe levels but may have impacts. It is usually reserved for the threat of wind gust of 40 to 57 mph or hail between a half and one inch in diameter.
- A **Severe Thunderstorm Watches** is issued when severe thunderstorms are possible in and near watch areas.
- A **Severe Thunderstorm Warning** is imminent or occurring that is either detected by weather radar or reported by storm spotters. A severe thunderstorm is one that produces winds 58 mph or stronger or hail that is at least one inch in diameter. A warning means to take shelter.



As depicted in Figure 11-2, the NWS has five categories for severe thunderstorm risk: marginal, slight, enhanced, moderate, and high. The probabilistic forecast expresses the best estimate of a severe weather event occurring within 25 miles of a point (NWS 2019).

Figure 11-2. Thunderstorm Risk

THUNDERSTORMS (no label)	1 - MARGINAL (MRGL)	2 - SLIGHT (SLGT)	3 - ENHANCED (ENH)	4 - MODERATE (MDT)	5 - HIGH (HIGH)
No severe* thunderstorms expected	Isolated severe thunderstorms possible	Scattered severe storms possible	Numerous severe storms possible	Widespread severe storms likely	Widespread severe storms expected
Lightning/flooding threats exist with <u>all</u> thunderstorms	Limited in duration and/or coverage and/or intensity	Short-lived and/or not widespread, isolated intense storms possible	More persistent and/or widespread, a few intense	Long-lived, widespread and intense	Long-lived, very widespread and particularly intense
					

* NWS defines a severe thunderstorm as measured wind gusts to at least 58 mph, and/or hail to at least one inch in diameter, and/or a tornado. All thunderstorm categories imply lightning and the potential for flooding. Categories are also tied to the probability of a severe weather event within 25 miles of your location.

Source: NWS 2019

Currently, cloud-to-ground and intra-cloud lightning flashes are detected and mapped in real-time by two different networks: National Lightning Detection Network (NLDN) and the Earth Networks Total Lightning Network. These systems work by detecting radio atmospheric signals (sferics or spherics) emitted by fast electric currents (strokes) in lightning channels. A stroke can be a fast current within the cloud, or a return stroke in a channel to ground (NOAA n.d.).

Hailstorms

Most hailstorms are made up of a mix of different sizes, and only the very largest hail stones pose serious risk to people caught in the open (NOAA 2021). Large hail can damage aircraft, homes, or cars and can be deadly to livestock and people. Wind-driven hail can tear up siding on houses, break windows and blow into houses, break side windows on cars, and cause severe injury and/or death to people and animals. Hail size is often estimated by comparing the size of a single hailstone to a known object, as shown in Table 11-1.

Table 11-1. Hail Size

Description	Diameter (in inches)	Description	Diameter (in inches)
Pea	0.25	Golf ball	1.75
Marble or Mothball	0.50	Tennis ball	2.5
Penny or Dime	0.75	Baseball	2.75
Nickel	0.88	Tea cup	3.00
Quarter	1.00	Softball	4.00
Ping Pong Ball	1.25	Grapefruit	4.50



Source: NOAA 2023

High Winds

According to the Federal Emergency Management Agency (FEMA) Winds Zones, based on 40 years of tornado data and 100 years of hurricane data, Cape May County is in Wind Zone II, where wind speeds can reach up to 160 mph and is part of the hurricane-susceptible region as shown in Figure 11-3.

Table 11-2 provides descriptions of wind events and their associated sustained speed used by the NWS. Another scale used to classify wind conditions is the Beaufort wind scale.

Table 11-2. NWS Wind Descriptions

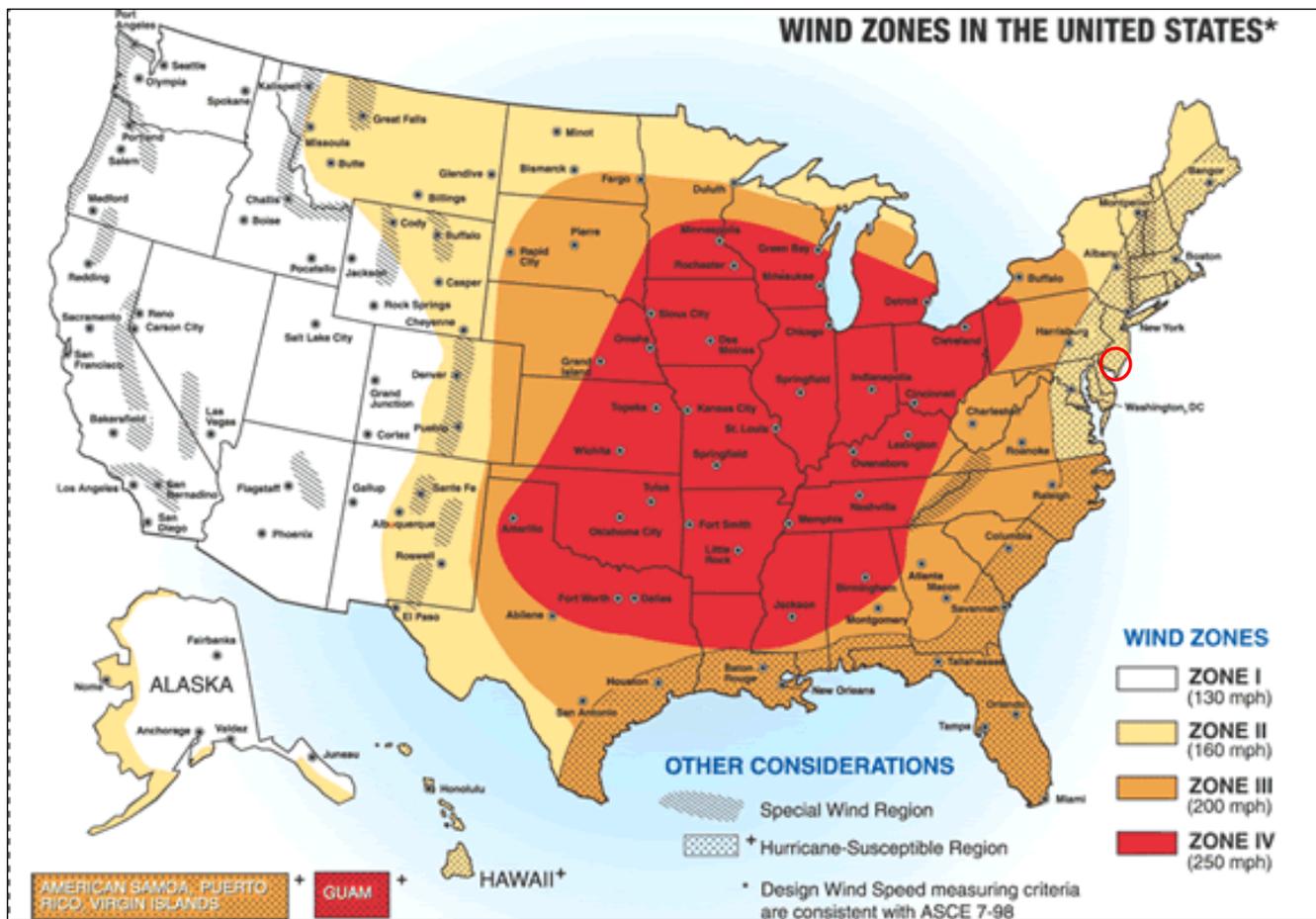
Descriptive Term	Sustained Wind Speed (mph)
Strong, dangerous, or damaging	≥40
Very Windy	30 to 40
Windy	20 to 30
Breezy, brisk, or blustery	15 to 25
None	5 to 15 or 10 to 20
Light or light and variable wind	0 to 5

Source: NWS n.d.

The NWS issues advisories and warnings for winds that are typically site-specific. The NWS issues high wind advisories, watches, and warnings when wind speeds can pose a hazard or are life threatening. The criterion for each of these varies from state to state. Wind warnings and advisories are defined as the following (NWS 2012):

- **Wind Advisories** are issues when sustained winds of 30 to 39 mph are forecast for one hour or longer, or wind gusts of 46 to 57 mph for any duration.
- **High Wind Watches** are issued when there is the possibility that High Wind Warning Criteria may be met at longer ranges (24 to 48 hours out).
- **High Wind Warnings** are issued when sustained wind speeds of 40 mph or greater lasting for one hour or longer or for winds of 58 mph or greater for any duration or widespread damage are possible.

Figure 11-3. Wind Zones in the United States



Source: FEMA 2012

Note: The red circle indicates the approximate location of Cape May County.

Tornadoes

Tornado watches and warning are issued by the local NWS office. A tornado watch is released when tornadoes are possible in an area. A tornado warning means a tornado has been sighted or indicated by weather radar. The current average lead time for tornado warnings is 13 minutes. Occasionally, tornadoes develop so rapidly that little, if any, advance warning is possible (NOAA 2011).

The magnitude or severity of a tornado is categorized using the Enhanced Fujita (EF) Tornado Intensity Scale. This scale determines tornado ratings by comparing wind speed and actual damage. Figure 11-4 illustrates the relationship between EF ratings, wind speed, and expected tornado damage.

Figure 11-4. EF Scale Rating Descriptions

EF Rating	Wind Speeds	Expected Damage	
EF-0	65-85 mph	'Minor' damage: shingles blown off or parts of a roof peeled off, damage to gutters/siding, branches broken off trees, shallow rooted trees toppled.	
EF-1	86-110 mph	'Moderate' damage: more significant roof damage, windows broken, exterior doors damaged or lost, mobile homes overturned or badly damaged.	
EF-2	111-135 mph	'Considerable' damage: roofs torn off well constructed homes, homes shifted off their foundation, mobile homes completely destroyed, large trees snapped or uprooted, cars can be tossed.	
EF-3	136-165 mph	'Severe' damage: entire stories of well constructed homes destroyed, significant damage done to large buildings, homes with weak foundations can be blown away, trees begin to lose their bark.	
EF-4	166-200 mph	'Extreme' damage: Well constructed homes are leveled, cars are thrown significant distances, top story exterior walls of masonry buildings would likely collapse.	
EF-5	> 200 mph	'Massive/incredible' damage: Well constructed homes are swept away, steel-reinforced concrete structures are critically damaged, high-rise buildings sustain severe structural damage, trees are usually completely debarked, stripped of branches and snapped.	

Source: NWS n.d.

Hurricanes

Numerical Scale

Hurricane magnitude is measured using the Saffir-Simpson Hurricane Scale. The Saffir-Simpson Hurricane Wind Scale rates storms from Categories 1 to 5 (from least to most severe) based on a hurricane's sustained wind speed. This scale estimates potential property damage. Hurricanes reaching Category 3 and higher are considered major hurricanes because of their potential for significant loss of life and damage. Category 1 and 2 storms are still dangerous and require preventative measures (NOAA 2023). Table 11-3 presents this scale, which is used to estimate the potential property damage and flooding expected when a hurricane makes landfall.



Table 11-3. The Saffir-Simpson Hurricane Scale

Category	Wind Speed (mph)	Expected Damage
1	74 to 95	Very dangerous winds will produce some damage: Homes with well-constructed frames could have damage to roof, shingles, vinyl siding, and gutters. Large tree branches will snap and shallow-rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96 to 110	Extremely dangerous winds will cause extensive damage: Homes with well-constructed frames could sustain major roof and siding damage. Many shallow-rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3 (major)	111 to 129	Devastating damage will occur: Homes with well-built frames may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4 (major)	130 to 156	Catastrophic damage will occur: Homes with well-built frames can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5 (major)	>157	Catastrophic damage will occur: A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

Source: NOAA 2023

Hurricane Alerts

NWS issues hurricane and tropical storm watches and warnings. These watches and warnings are issued or will remain in effect after a tropical cyclone becomes post-tropical, when such a storm poses a significant threat to life and property. The NWS allows the National Hurricane Center (NHC) to issue advisories during the post-tropical stage. The following are the definitions of the watches and warnings (NOAA 2023):

- A **Hurricane Warning** is issued when sustained winds of 74 mph or higher are expected somewhere within the specified area in association with a tropical, subtropical, or post-tropical cyclone. Because hurricane preparedness activities become difficult once winds reach tropical storm force, the warning is issued 36 hours in advance of the anticipated onset of tropical storm-force winds. The warning can remain in effect when dangerously high water or combination of dangerously high water and waves continue, even though winds may be less than hurricane force.
- A **Hurricane Watch** is issued when sustained winds of 74 mph or higher are possible within the specified area in association with a tropical, subtropical, or post-tropical cyclone. Because hurricane preparedness activities become difficult once winds reach tropical storm force, the hurricane watch is issued 48 hours prior to the anticipated onset of tropical storm-force winds.
- A **Tropical Storm Warning** is issued when sustained winds of 39 to 73 mph are expected somewhere within the specified area within 36 hours in association with a tropical, subtropical, or post-tropical storm.
- A **Tropical Storm Watch** is issued when sustained winds of 39 to 73 mph are possible within the specified area within 48 hours in association with a tropical, sub-tropical, or post-tropical storm.



Mean Return Period

In evaluating the potential for hazard events of a given magnitude, a mean return period (MRP) is often used. The MRP provides an estimate of the magnitude of an event that may occur within any given year based on past recorded events. MRP is the average period of time, in years, between occurrences of a particular hazard event, equal to the inverse of the annual frequency of exceedance (Dinicola 2009).

Hurricane return periods are the frequency at which a certain intensity of hurricane can be expected within a given distance of a given location. For example, a return period of 20 years for a major hurricane means that on average during the previous 100 years, a Category 3 or greater hurricane passed within 58 miles of a specific location approximately 5 times (NHC 2020).

Storm Surge

Storm surge heights range from several feet to more than 25 feet. The exact height of the storm surge and which coastal areas will be flooded depends on many factors: strength, intensity, and speed of the hurricane or storm; the direction it is moving relative to the shoreline; how rapidly the sea floor is sloping along the shore; the shape and elevation of the shoreline; and the astronomical tide. Storm surge is most damaging when it occurs along a shallow sloped shoreline, during high tide, and in a highly populated and developed area.

Typically, storm surge is estimated by subtracting the regular/astrological tide level from the observed storm tide. Storm surge does not include flooding caused by precipitation (NWS n.d.). Figure 8 illustrates water level differences for storm surge, storm tide, and a normal (predicted) high tide as compared to sea level (NOAA 2024).

11.1.4 Previous Occurrences

FEMA Major Disaster and Emergency Declarations

Between 1954 and 2025, Cape May County was included in 13 major disaster (DR) or emergency (EM) declarations for severe weather-related events (FEMA 2025). Table 11-4 lists these declarations.

Table 11-4. FEMA Declarations for Hazard Events in Cape May County (1954 to 2024)

FEMA Declaration Number	Date(s) of Event	Date of Declaration	Event Type
EM-3005-NJ	December 12, 1974	December 12, 1974	Coastal Storm
DR-749-NJ	September 27, 1985 – October 24, 1994	October 15, 1985	Hurricane Gloria
DR-936-NJ	January 4, 1992	March 3, 1992	Severe Storm
DR-1206-NJ	February 4- 8, 1998	March 3, 1998	Coastal Storm
EM-3148-NJ	September 16-18, 1999	September 17, 1999	Hurricane Floyd
EM-3257-NJ	August 29 – October 1, 2005	September 19, 2005	Hurricane Katrina Evacuations
DR-1867-NJ	November 11-15, 2009	December 22, 2009	Severe Storms and Flooding associated with Tropical Depression Ida and a Nor'easter
DR-1897-NJ	March 12 – April 15, 2010	April 2, 2010	Severe Storm and Flooding



FEMA Declaration Number	Date(s) of Event	Date of Declaration	Event Type
EM-3332-NJ DR-4021-NJ	August 26 – September 5, 2011	August 27, 2011	Hurricane Irene
DR-4048-NJ	October 29-30, 2011	November 30, 2011	Severe Storm
EM-3354-NJ DR-4086-NJ	October 26 – November 8, 2012	October 28, 2012	Hurricane Sandy
EM-3573-NJ DR-4614-NJ	September 1-3, 2021	September 5, 2021	Remnants of Hurricane Ida
DR-4574-NJ	August 4, 2020	December 11, 2020	Tropical Storm Isaias

Source: FEMA 2025

USDA Declarations

The Secretary of Agriculture from the U.S. Department of Agriculture (USDA) is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in contiguous counties. Between August 2019 and March 2025, Cape May County was not included in any USDA severe weather-related agricultural disaster declarations (USDA 2025).

Previous Events

Known hazard events that impacted Cape May County between August 2019 and March 2025 are discussed in Table 11-5. For events prior to 2019, refer to the 2019 Cape May County HMP.

Table 11-5. Severe Weather Events in Cape May County (2019 to 2025)

Event Date	Declaration or Proclamation Number	Cape County included in declaration?	Location Impacted	Description
April 26, 2019	-	-	Countywide	A thunderstorm caused a tree to split and fall on wires on Bayshore Rd.
June 29, 2019	-	-	Countywide	A thunderstorm was recorded by the Weatherflow gauge. Damaging winds and hail were seen as a result of this storm.
July 23, 2019	-	-	Countywide	A thunderstorm caused damaging winds and damage over a large area of the County.
August 7, 2019	-	-	Local	A thunderstorm blew down electrical wires which caused a transformer to catch fire. Fire crews were dispatched to the local fire.
February 2, 2020	-	-	Local	A local thunderstorm caused a tree to be downed on a house in Pacific Ave.
April 13, 2020	-	-	Local	A thunderstorm caused wires to be downed on US-9 in both directions.
April 21, 2020	-	-	Local	A local thunderstorm caused at least one tree downed causing transformers to blow in the area.
July 1, 2020	-	-	Local	A thunderstorm caused a tree to be downed on Garden State Parkway north of Seaville.



Event Date	Declaration or Proclamation Number	Cape County included in declaration?	Location Impacted	Description
August 4, 2020	DR-4574-NJ	Yes	Regional	Tropical Storm Isaias resulted in up to 60 mph winds and down trees and power lines within the County. A waterspout came ashore resulting in a tornado system reported in the Inlet State Park in Strathmere.
August 6, 2020 – August 7, 2020	-	-	Countywide	A thunderstorm system caused several wires to be downed onto a house. As well a tree was downed on Garden State Parkway near mile marker 21.9 near Seaville.
September 10, 2020	-	-	Regional	Tropical Storm Fay resulted in gust winds up to 53 mph at Strathmere and downed several trees in the County.
September 9, 2021	-	-	Regional	Tropical Storm Elsa resulted in an EF-1 tornado touching down near Woodbine where it uprooted two cedar trees. The tornado also destroyed private and public infrastructure. The local roof of a picnic shelter was dropped into the nearby pool in the area.
November 15, 2020	-	-	Regional	A thunderstorm resulted in wind gusts up to 60 mph. Several downed trees and power lines were reported caused property damage across the region. Power outage due to a blown transformer was reported at the Wildwood Schooner Island Marina and Light House Marina.
July 1, 2021	-	-	Countywide	A thunderstorm was reported to cause several power lines to be downed in the area. Wires were reported down near Dennisville-Petersburg Rd. in Petersburg.
July 21, 2021	-	-	Countywide	A thunderstorm was recorded to cause a tree to be downed on Cape rd. in Lower Township. A telephone also snapped in half on W. Preston Ave. due to the thunderstorm.
June 17, 2022	-	-	Local	A local thunderstorm caused wires to be downed at the local police department.
April 1, 2023	-	-	Local	A thunderstorm caused multiple trees to be downed on Corson Tavern Road on Route 9. A structure fire was caused by lightning in Rio Grande.
July 3, 2023	-	-	Local	A thunderstorm was recorded to cause trees downed on wires at the Sea Pine Campground near the Swainton section of Middle Township.
July 29, 2023	-	-	Local	A local thunderstorm caused trees and wires to be downed on East Katherine Ave. in Upper Township.



Event Date	Declaration or Proclamation Number	Cape County included in declaration?	Location Impacted	Description
July 12, 2024	-	-		A few thunderstorms developed along a stalled boundary. One storm produced a lightning strike that struck Cape May City Hall causing damage to electronics inside and setting a pickup truck in the parking lot on fire.
August 3, 2024	-	-	Local	A thunderstorm was reported to cause trees downed around Woodbine.
February 16-17, 2025	-	-	Countywide	A powerful system resulted in high winds across the region with wind gusts reaching close to 7- mph.

Sources: NOAA-NCEI 2025; FEMA 2025

11.1.5 Probability of Future Occurrences

Information on previous severe weather occurrences in the County was used to calculate the probability of future occurrence of such events, as summarized in Table 11-6. The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. In Chapter 14, the identified hazards of concern for Cape May County were ranked. The probability of occurrence, or likelihood of the event, is one parameter used for hazard rankings. Based on historical records and input from the Planning Partnership, the probability of occurrence for severe weather in the County is considered "frequent".

Table 11-6. Probability of Future Severe Weather Events in Cape May County

Hazard Type	Number of Occurrences Between 1950 and 2025	Percent Chance of Occurring in Any Given Year
Hail	20	46.66%
High Wind	75	100.00%
Hurricane	8	10.66%
Lightning	19	25.33%
Strong Wind	148	100.00%
Thunderstorm Wind	94	100.00%
Tropical Depression	5	6.66%
Tropical Storm	19	25.33%
Tornado	11	14.66%
Total	197	100.00%

Sources: NOAA-NCEI 2025; FEMA 2025; NOAA 2023

Notes: Due to limitations in data, not all drought events occurring between 1950 and 2025 are accounted for in the tally of occurrences. As a result, the number of hazard occurrences is calculated using the number of occurrences between 1950 and 2025.

Event totals include tropical cyclones paths that have traveled within 65 nautical miles of Cape May County. This distance represents a buffer of a distance where impacts would likely be felt even if direct landfall over the county did not occur. The total number of events is less than the total for all hazard types due to some individual storms transitioning from a higher category to a lower category within the buffer zone.



100% probability indicates that it is statistically likely for an event to occur every year. It does not indicate that the occurrence of an event is a certainty in any given year.

Climate Change Projections

Providing projections of future climate change for a specific region is challenging. Shorter term projections are more closely tied to existing trends, making longer term projections even more challenging. The further out a prediction reaches the more subject to changing dynamics it becomes.

A warmer atmosphere means storms have the potential to be more intense and occur more often. In New Jersey, extreme storms typically include coastal nor'easters, spring and summer thunderstorms, tropical storms, and on rare occasions hurricanes. Most of these events occur in the warmer months between April and October, with nor'easters occurring between September and April. Over the last 50 years, in New Jersey, storms that resulted in extreme rain increased by 71 percent which is a faster rate than anywhere else in the United States (NJDEP 2020).

11.1.6 Cascading Impacts on Other Hazards

Severe weather may exacerbate flooding and dam failures. As discussed, the heavy precipitation associated with these events can create major flooding issues in the County. Refer to Chapter 7 (Dam Failure) and Chapter 12 (Flood) for more information about these hazards of concern.

Severe weather events, especially hurricanes, often generate strong winds. These winds can be destructive to the functionality of utilities by breaching power lines and disconnecting the utility systems, as well as result in falling trees and branches. Fallen trees and branches increase available fuel for wildfires. For more information on the wildfire hazard, refer to Chapter 13 (Wildfire) for more information about this hazard of concern.

11.2 VULNERABILITY AND IMPACT ASSESSMENT

To understand risk, a community must evaluate what assets are exposed or vulnerable in the hazard area identified. The entire County has been identified as exposed to severe storms. Therefore, all assets in the County (population, structures, critical facilities, and lifelines), as described in the County Profile (Chapter 3), are exposed and vulnerable to severe storm events.

A Hazus (v6.1) probabilistic analysis was performed to analyze the wind hazard estimated losses for Cape May County for the 100- and 500-year mean return period events. In addition to estimating potential losses due to wind, an exposure analysis was conducted using the 2022 Sea – Lake Overland Surge from Hurricanes – SLOSH Model, which represents potential flooding from worst-case combinations of hurricane direction, forward speed, landfall point, and high astronomical tide. Please note these inundation zones do not include riverine flooding caused by hurricane surge or inland freshwater flooding.

11.2.1 Life, Health, and Safety

Overall Population

The entire population of Cape May County (95,263) is exposed to this hazard; however, the impact of these events on life, health, and safety depends on several factors, including the severity of the event and whether adequate



warning time was provided to residents. High winds and downed trees can significantly impact people by falling on cars or property, creating unsafe driving conditions, and causing other hazards.

As a result of a significant hurricane event, residents may be displaced or require temporary long-term sheltering. Hazus estimates that there will be five displaced households and five persons seeking short-term shelter from the 100-year MRP event. Further, Hazus estimates that there will be 1,647 households displaced and 771 persons seeking short-term sheltering caused by the 500-year MRP event (Table 11-7). Figure 11-5 and Figure 11-6 illustrate the 100- and 500-MRP Wind Gusts for Cape May County. For the 100 MRP, the majority of the southern portion of the County is located in the Category 2 Hurricane hazard area, which is characterized by up to 110 mph winds. For the 500 MRP, the majority of the County as a whole is located in the Category 3 Hurricane hazard area, which is characterized by up to 129 mph winds.

Table 11-8 presents the population distribution across various jurisdictions in Cape May County, emphasizing the number and percentage of residents within the SLOSH (Sea, Lake, and Overland Surges from Hurricanes) Category 1, 2, 3, and 4 hazard areas. Overall, 45.4-percent of the County population is located in the Category 1 hazard (43,260), 59.9-percent in the Category 2 hazard (57,099), 76.1-percent in the Category 3 hazard (72,473). And 90.5-percent in the Category 4 hazard (86,217). Only the Borough of Woodbine has no residents located in the Category 1 and Category 2 hazards. Notably, all jurisdictions have residents in the Category 3 and 4 hazard areas.

Table 11-7. Estimated Displaced Households and Persons Seeking Shelter Caused by the 100-Year and 500-Year MRP Hurricane Events

Jurisdiction	100-Year MRP Hurricane		500-Year MRP Hurricane	
	Displaced Households	Persons Seeking Short-Term Sheltering	Displaced Households	Persons Seeking Short-Term Sheltering
Avalon (B)	2	0	34	7
Cape May (C)	7	3	58	23
Cape May Point (B)	0	0	11	3
Dennis (T)	2	1	70	36
Lower (T)	24	13	381	186
Middle (T)	19	11	343	200
North Wildwood (C)	6	2	80	28
Ocean (C)	11	4	170	50
Sea Isle (C)	6	1	101	24
Stone Harbor (B)	1	0	24	6
Upper (T)	7	2	127	52
West Cape May (B)	1	0	19	5
West Wildwood (B)	1	0	20	14
Wildwood (C)	6	4	100	69
Wildwood Crest (B)	7	3	84	35
Woodbine (B)	0	0	25	33
Cape May County	100	44	1,647	771

Source: Hazus v6.1; Census Bureau 2020

Note: (B) Borough; (C) City; (T) Township



Table 11-8. Population in the SLOSH Category 1, 2, 3, and 4 Hazard Areas

Jurisdiction	Total Population (U.S. Census Bureau 2020 Decennial)	SLOSH Category 1 Hazard Area		SLOSH Category 2 Hazard Area		SLOSH Category 3 Hazard Area		SLOSH Category 4 Hazard Area	
		Number of Persons	% of Jurisdiction Total						
Avalon (B)	1,243	1,198	96.4%	1,237	99.5%	1,238	99.6%	1,240	99.8%
Cape May (C)	2,768	1,751	63.3%	2,720	98.3%	2,757	99.6%	2,757	99.6%
Cape May Point (B)	305	260	85.2%	303	99.3%	304	99.7%	304	99.7%
Dennis (T)	6,285	143	2.3%	928	14.8%	2,265	36.0%	4,754	75.6%
Lower (T)	22,057	6,626	30.0%	11,718	53.1%	17,085	77.5%	21,196	96.1%
Middle (T)	20,380	5,085	25.0%	9,950	48.8%	16,490	80.9%	19,993	98.1%
North Wildwood (C)	3,621	3,614	99.8%	3,620	100.0%	3,620	100.0%	3,620	100.0%
Ocean (C)	11,229	11,184	99.6%	11,222	99.9%	11,222	99.9%	11,222	99.9%
Sea Isle (C)	2,104	2,072	98.5%	2,101	99.9%	2,101	99.9%	2,102	99.9%
Stone Harbor (B)	796	771	96.9%	795	99.9%	795	99.9%	795	99.9%
Upper (T)	12,539	1,602	12.8%	2,758	22.0%	4,819	38.4%	8,424	67.2%
West Cape May (B)	1,010	359	35.5%	982	97.2%	1,010	100.0%	1,010	100.0%
West Wildwood (B)	540	539	99.8%	539	99.8%	539	99.8%	538	99.6%
Wildwood (C)	5,157	5,125	99.4%	5,127	99.4%	5,127	99.4%	5,123	99.3%
Wildwood Crest (B)	3,101	2,931	94.5%	3,099	99.9%	3,099	99.9%	3,099	99.9%
Woodbine (B)	2,128	0	0.0%	0	0.0%	2	0.1%	40	1.9%
Cape May County	95,263	43,260	45.4%	57,099	59.9%	72,473	76.1%	86,217	90.5%

Source: U.S. Census Bureau 2020; NOAA 2022

Note: (B) Borough; (C) City; (T) Township

Figure 11-5. 100-Year Peak Wind Gusts for Cape May County

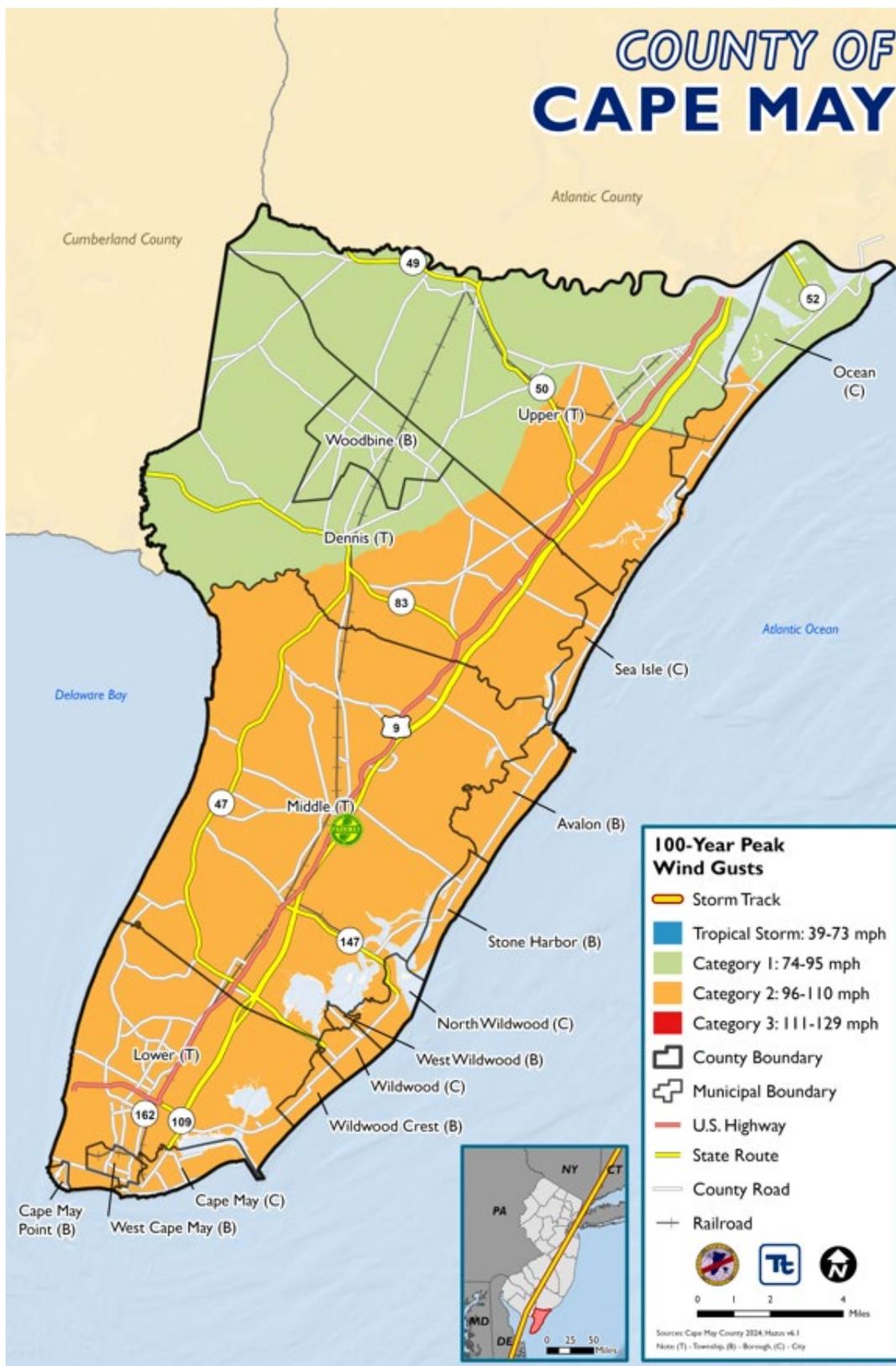
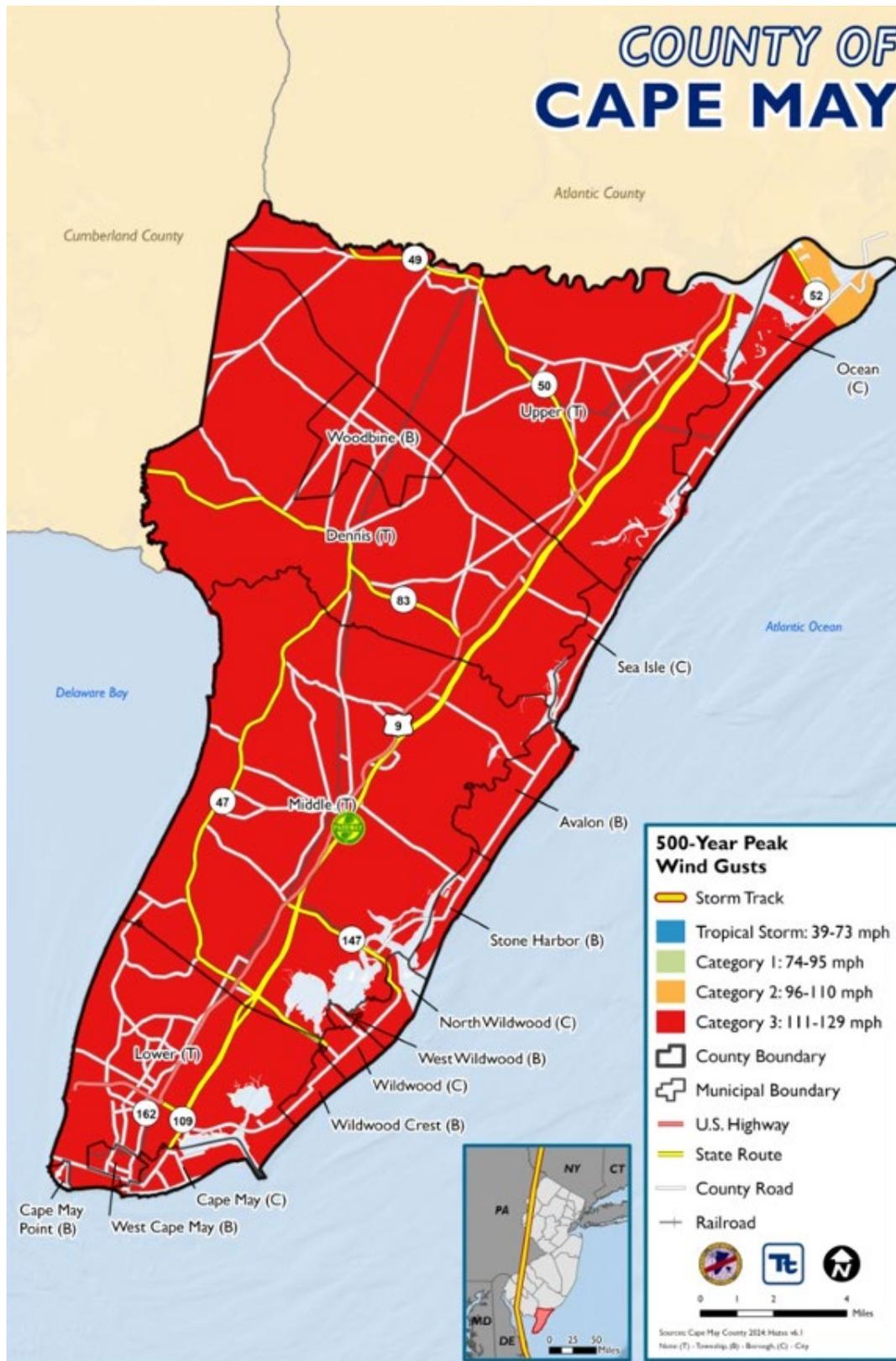


Figure 11-6. 500-Year Peak Wind Gusts for Cape May County





Socially Vulnerable Population

Research has shown that some populations, while they may not have more hazard exposure, may experience exacerbated impacts and prolonged recovery if impacted. This is due to many factors, including their physical and financial ability to react or respond during a hazard. Various factors contribute to the heightened vulnerability of certain populations. Individuals who rent their homes often lack control over necessary repairs, which can exacerbate the impact of hazards. Some residents depend on medical equipment that requires electricity, making power outages a serious health risk. Those without private transportation may face isolation if public transportation services are disrupted. Additionally, hourly workers may suffer financial losses if they are unable to work due to hazardous conditions, leading to cascading effects on their households, such as difficulties in affording rent or groceries.

Of the population exposed, the most vulnerable include the economically disadvantaged and the population over the age of 65. Economically disadvantaged populations may be more vulnerable because they are likely to evaluate their risk and make decisions to evacuate based on net economic impacts on their families. The population over age 65 is also more vulnerable because they are more likely to seek or need medical attention that may not be available due to isolation during a flood event, and they may have more difficulty evacuating.

Table 11-12 highlights the distribution of socially vulnerable populations residing within the SLOSH Category 4 hazard area. The Township of Lower has the highest number of vulnerable individuals, to include 5,301 persons over the age of 65, 1,067 persons under the age of 5 years, 3,490 persons with a disability, and 2,276 persons living in poverty within the SLOSH Category 4 hazard area. The Township of Middle has the highest number of non-English speaking person at 487 individuals located within the Category 4 hazard. For SLOSH categories one through three, refer to Table 11-9, Table 11-10, and Table 11-11.



Table 11-9. Estimated Number of Vulnerable Persons Located in the Category 1 SLOSH Hazard Area

Jurisdiction	Persons Over 65	Percent of Total	Persons Under 5	Percent of Total	Non-English Speaking Persons	Percent of Total	Persons with a Disability	Percent of Total	Persons in Poverty	Percent of Total
Avalon (B)	736	96.3%	20	95.2%	0	0.0%	154	96.3%	68	95.8%
Cape May (C)	489	63.2%	87	62.6%	27	62.5%	105	62.9%	87	62.6%
Cape May Point (B)	100	84.7%	0	0.0%	0	0.0%	36	83.7%	22	84.6%
Dennis (T)	29	2.2%	11	2.3%	0	0.0%	13	2.2%	7	2.2%
Lower (T)	1,657	30.0%	333	30.0%	65	29.8%	1,091	30.0%	711	30.0%
Middle (T)	1,206	25.0%	238	24.9%	124	25.0%	741	24.9%	444	24.9%
North Wildwood (C)	1,690	99.8%	0	0.0%	0	0.0%	700	99.7%	266	99.6%
Ocean (C)	3,805	99.6%	205	99.5%	40	97.5%	1,471	99.6%	1,137	99.6%
Sea Isle (C)	1,012	98.4%	5	83.3%	12	92.6%	259	98.5%	111	98.2%
Stone Harbor (B)	440	96.7%	18	94.7%	0	0.0%	80	96.4%	55	96.5%
Upper (T)	387	12.8%	90	12.7%	8	12.3%	150	12.7%	28	12.7%
West Cape May (B)	130	35.4%	14	33.3%	3	27.8%	44	34.9%	9	33.3%
West Wildwood (B)	178	99.4%	34	97.1%	0	0.0%	106	99.1%	17	94.4%
Wildwood (C)	794	99.4%	183	98.9%	371	99.3%	1,103	99.4%	897	99.3%
Wildwood Crest (B)	1,272	94.5%	52	92.9%	0	0.0%	636	94.5%	317	94.3%
Woodbine (B)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Cape May County	13,925	52.5%	1,290	31.3%	650	46.2%	6,689	47.6%	4,176	49.5%

Source: U.S. Census Bureau, American Community Survey 2018-2022; NOAA 2022

Note: (B) Borough; (C) City; (T) Township



Table 11-10. Estimated Number of Vulnerable Persons Located in the Category 2 SLOSH Hazard Area

Jurisdiction	Persons Over 65	Percent of Total	Persons Under 5	Percent of Total	Non-English Speaking Persons	Percent of Total	Persons with a Disability	Percent of Total	Persons in Poverty	Percent of Total
Avalon (B)	760	99.5%	20	95.2%	0	0.0%	159	99.4%	70	98.59%
Cape May (C)	760	98.2%	136	97.8%	42	97.2%	164	98.2%	136	97.8%
Cape May Point (B)	117	99.2%	0	0.0%	0	0.0%	42	97.7%	25	96.2%
Dennis (T)	192	14.7%	71	14.7%	5	14.5%	88	14.8%	47	14.5%
Lower (T)	2,931	53.1%	590	53.1%	115	52.7%	1,929	53.1%	1,258	53.1%
Middle (T)	2,359	48.8%	466	48.7%	242	48.7%	1,450	48.8%	870	48.8%
North Wildwood (C)	1,692	99.9%	0	0.0%	0	0.0%	701	99.9%	266	99.6%
Ocean (C)	3,818	99.9%	205	99.5%	40	97.5%	1,476	99.9%	1,141	99.9%
Sea Isle (C)	1,026	99.8%	5	83.3%	12	92.6%	262	99.6%	112	99.1%
Stone Harbor (B)	454	99.8%	18	94.7%	0	0.0%	82	98.8%	56	98.2%
Upper (T)	667	22.0%	155	21.9%	14	21.6%	258	21.9%	48	21.7%
West Cape May (B)	356	97.0%	40	95.2%	10	92.6%	122	96.8%	26	96.3%
West Wildwood (B)	178	99.4%	34	97.1%	0	0.0%	106	99.1%	17	94.4%
Wildwood (C)	794	99.4%	183	98.9%	371	99.3%	1,103	99.4%	897	99.3%
Wildwood Crest (B)	1,345	99.9%	55	98.2%	0	0.0%	672	99.9%	335	99.7%
Woodbine (B)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Cape May County	17,449	0.0%	1,978	48.0%	851	60.4%	8,614	61.3%	5,304	62.8%

Source: U.S. Census Bureau, American Community Survey 2018-2022; NOAA 2022

Note: (B) Borough; (C) City; (T) Township



Table 11-11. Estimated Number of Vulnerable Persons Located in the Category 3 SLOSH Hazard Area

Jurisdiction	Persons Over 65	Percent of Total	Persons Under 5	Percent of Total	Non-English Speaking Persons	Percent of Total	Persons with a Disability	Percent of Total	Persons in Poverty	Percent of Total
Avalon (B)	761	99.6%	20	95.2%	0	0.0%	159	99.4%	70	98.6%
Cape May (C)	770	99.5%	138	99.3%	42	97.2%	166	99.4%	138	99.3%
Cape May Point (B)	117	99.2%	0	0.0%	0	0.0%	42	97.7%	25	96.2%
Dennis (T)	470	36.0%	174	36.0%	12	34.7%	214	35.9%	117	36.0%
Lower (T)	4,273	77.5%	860	77.4%	168	77.0%	2,813	77.5%	1,835	77.5%
Middle (T)	3,910	80.9%	773	80.9%	402	80.9%	2,404	80.9%	1,442	80.9%
North Wildwood (C)	1,693	100.0%	0	0.0%	0	0.0%	701	99.9%	266	99.6%
Ocean (C)	3,818	99.9%	205	99.5%	40	97.5%	1,476	99.9%	1,141	99.9%
Sea Isle (C)	1,026	99.8%	5	83.3%	12	92.6%	262	99.6%	112	99.1%
Stone Harbor (B)	454	99.8%	18	94.7%	0	0.0%	82	98.8%	56	98.2%
Upper (T)	1,166	38.4%	272	38.4%	24	37.0%	452	38.4%	84	38.0%
West Cape May (B)	367	100.0%	42	100.0%	10	92.6%	126	100.0%	26	96.3%
West Wildwood (B)	178	99.4%	34	97.1%	0	0.0%	106	99.1%	17	94.4%
Wildwood (C)	794	99.4%	183	98.9%	371	99.3%	1,103	99.4%	897	99.3%
Wildwood Crest (B)	1,345	99.9%	55	98.2%	0	0.0%	672	99.9%	335	99.7%
Woodbine (B)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Cape May County	21,142	79.7%	2,779	67.5%	1,081	76.8%	10,778	76.7%	6,561	77.7%

Source: U.S. Census Bureau, American Community Survey 2018-2022; NOAA 2022

Note: (B) Borough; (C) City; (T) Township



Table 11-12. Estimated Number of Vulnerable Persons Located in the Category 4 SLOSH Hazard Area

Jurisdiction	Persons Over 65	Percent of Total	Persons Under 5	Percent of Total	Non-English Speaking Persons	Percent of Total	Persons with a Disability	Percent of Total	Persons in Poverty	Percent of Total
Avalon (B)	762	99.7%	20	95.2%	0	0.0%	159	99.4%	70	98.6%
Cape May (C)	770	99.5%	138	99.3%	42	97.2%	166	99.4%	138	99.3%
Cape May Point (B)	117	99.2%	0	0.0%	0	0.0%	42	97.7%	25	96.2%
Dennis (T)	987	75.6%	365	75.6%	26	75.2%	450	75.5%	245	75.4%
Lower (T)	5,301	96.1%	1,067	96.0%	209	95.8%	3,490	96.1%	2,276	96.1%
Middle (T)	4,741	98.1%	937	98.0%	487	98.0%	2,914	98.1%	1,749	98.1%
North Wildwood (C)	1,692	99.9%	0	0.0%	0	0.0%	701	99.9%	266	99.6%
Ocean (C)	3,818	99.9%	205	99.5%	40	97.5%	1,476	99.9%	1,141	99.9%
Sea Isle (C)	1,027	99.9%	5	83.3%	12	92.6%	262	99.6%	112	99.1%
Stone Harbor (B)	454	99.8%	18	94.7%	0	0.0%	82	98.8%	56	98.2%
Upper (T)	2,039	67.2%	476	67.1%	43	66.4%	790	67.1%	148	67.0%
West Cape May (B)	367	100.0%	42	100.0%	10	92.6%	126	100.0%	26	96.3%
West Wildwood (B)	178	99.4%	34	97.1%	0	0.0%	106	99.1%	17	94.4%
Wildwood (C)	793	99.2%	183	98.9%	371	99.3%	1,102	99.3%	897	99.3%
Wildwood Crest (B)	1,345	99.9%	55	98.2%	0	0.0%	672	99.9%	335	99.7%
Woodbine (B)	9	1.8%	2	1.3%	2	1.8%	14	1.8%	12	1.9%
Cape May County	24,400	92.0%	3,547	86.2%	1,242	88.2%	12,552	89.3%	7,513	89.0%

Source: U.S. Census Bureau, American Community Survey 2018-2022; NOAA 2022

Note: (B) Borough; (C) City; (T) Township



11.2.2 General Building Stock

All buildings are exposed to severe weather events such as hailstorms and lightning strikes. While hailstorms are not frequently known to cause major injuries or damage in the State of New Jersey, an extreme event can carry hail stones traveling at speeds greater than 100 miles per hour (National Weather Service 2019). This could cause structural damage for the general building stock in the County. Severe summer weather that causes lightning could be a threat to the County’s general building stock if the lightning starts a fire. Over 22,000 fires caused by lightning occurred annually throughout the U.S. between 2007 and 2011, which was valued at approximately \$450 million of damages per year (National Fire Protection Association 2013).

For high wind events, building construction plays a major role in the extent of damage resulting from a storm event. Due to differences in construction, residential structures are generally more susceptible to wind damage than commercial and industrial structures. Wood and masonry buildings, in general, regardless of their occupancy class, tend to experience more damage than concrete or steel buildings. High-rise buildings are also very vulnerable structures. Mobile homes are the most vulnerable to damage, even if tied down, and offer little protection to people inside.

The Hazus wind model was run to estimate potential losses to buildings. Expected building damage was evaluated across the following wind damage categories: no damage/very minor damage, minor damage, moderate damage, severe damage, and total destruction. Table 11-13 summarizes the definition of the damage categories.

Table 11-13. Description of Damage Categories

Qualitative Damage Description	Roof Cover Failure	Window Door Failures	Roof Deck	Missile Impacts on Walls	Roof Structure Failure	Wall Structure Failure
No Damage or Very Minor Damage Little or no visible damage from the outside. No broken windows, or failed roof deck. Minimal loss of roof cover, with no or very limited water penetration.	≤2%	No	No	No	No	No
Minor Damage Maximum of one broken window, door or garage door. Moderate roof cover loss that can be covered to prevent additional water entering the building. Marks or dents on walls requiring painting or patching for repair.	>2% and ≤15%	One window, door, or garage door failure	No	<5 impacts	No	No
Moderate Damage Major roof cover damage, moderate window breakage. Minor roof sheathing failure. Some resulting damage to interior of building from water.	>15% and ≤50%	> one and ≤ the larger of 20% & 3	1 to 3 panels	Typically 5 to 10 impacts	No	No
Severe Damage Major window damage or roof sheathing loss. Major roof cover loss. Extensive damage to interior from water.	>50%	> the larger of 20% & 3 and ≤50%	>3 and ≤25%	Typically 10 to 20 impacts	No	No
Destruction Complete roof failure and/or, failure of wall frame. Loss of more than 50% of roof sheathing.	Typically >50%	>50%	>25%	Typically >20 impacts	Yes	Yes

Source: FEMA 2022



Building damage as a result of the 100-year and 500-year MRP hurricane wind events were estimated using Hazus, as summarized in Table 11-14. 298 residential buildings are expected to be destroyed and 95 residential and 87 commercial buildings will be severely damaged by the 100-year MRP event. For the 500-year MRP event, majority of the losses are estimated to be within the residential occupancy class. An estimated 5,796 buildings will be destroyed and 4,280 buildings will be experiencing severe damages. Furthermore, 20,484 will be moderately damaged and 42,159 will have minor damages.

Table 11-14. Expected Damages from 100- and 500- Year MRP Events

Total Number of Buildings in Occupancy	Severity of Expected Damage	100-Year Mean Return Period		500-Year Mean Return Period	
		Building Count	% Buildings in Occupancy Class	Building Count	% Buildings in Occupancy Class
Residential Exposure (Single and Multi-Family Dwellings)					
103,129	NONE	82,231	79.7%	44,446	43.1%
	MINOR	17,966	17.4%	36,381	35.3%
	MODERATE	2,539	2.5%	13,978	13.6%
	SEVERE	95	0.1%	2,542	2.5%
	DESTRUCTION	298	0.3%	5,783	5.6%
Commercial Buildings					
23,888	NONE	19,458	81.5%	11,221	47.0%
	MINOR	2,753	11.5%	5,087	21.3%
	MODERATE	1,590	6.7%	5,975	25.0%
	SEVERE	87	0.4%	1,595	6.7%
	DESTRUCTION	0	0.0%	11	0.0%
Industrial Buildings					
38	NONE	32	84.2%	19	50.0%
	MINOR	4	10.5%	8	21.1%
	MODERATE	2	5.3%	8	21.1%
	SEVERE	0	0.0%	3	7.9%
	DESTRUCTION	0	0.0%	0	0.0%
Other Buildings^a					
2,956	NONE	2,568	86.9%	1,609	54.4%
	MINOR	278	9.4%	683	23.1%
	MODERATE	104	3.5%	523	17.7%
	SEVERE	6	0.2%	140	4.7%
	DESTRUCTION	0	0.0%	2	0.1%

Source: Hazus v6.1; Cape May County 2024

a. Other = Government, Religion, Agricultural, Education

Understanding the distribution of buildings in SLOSH hazard areas is crucial for assessing potential risks and economic impacts in Cape May County. Table 11-15 provides an overview of the number and RCV of buildings located in the SLOSH Category 4 hazard area across various jurisdictions within the County. The Township of Lower has the highest number of buildings located in this hazard area, accounting for less than 96.4-percent of the



jurisdictional total, with an RCV of an estimated \$22 billion. Table 11-17 summarizes the information for SLOSH Categories 1, 2, and 3.

Table 11-16 indicates that the Township of Lower has the highest number of residential buildings (17,967) and commercial buildings (6,091) located in the SLOSH Category 4 hazard area. The Township of Upper has the highest number of industrial buildings (13) located in the SLOSH Category 4 hazard area. The Township of Middle has the highest number of government, religion, agricultural, and education buildings (997) located in the SLOSH Category 4 hazard area. Table 11-18 summarizes the information for SLOSH Categories 1, 2, and 3.

Table 11-21 shows the total acres of land use type category in Cape May County (Residential Land Use, Non-Residential Land Use, Natural Land Use Type) that is exposed to the Category 1, 2, 3 and 4 SLOSH Hazard Areas.

Table 11-20 and Table 11-21 summarizes the replacement cost value damage estimated for the 100- and 500-year MRP Hurricane events, respectively. The total estimated damage to buildings for all occupancy types across Cape May County is estimated to be approximately \$2.2 billion and \$15.2 billion for the 100- and 500-year MRP events, respectively. Most of these losses are to residential buildings. Due to differences in building construction, residential structures are generally more susceptible to wind damage than commercial and industrial structures. The damage counts include buildings damaged at all severity levels from minor damage to destruction. Total dollar damage reflects the overall impact on buildings at an aggregate level. The City of Sea Isle is estimated to experience the greatest damage in a 100-and 500-year MRP event, approximately \$334 million and \$2.7 billion, respectively. Damages to buildings are a direct result of wind speeds, direction, and duration, which is dependent upon the storm’s intensity and track.

Table 11-15. Buildings in the SLOSH Category 4 Hazard Area

Jurisdiction	Jurisdiction Total Buildings		Buildings in the SLOSH Category 4 Hazard Area			
			Number of Buildings		Replacement Cost Value	
	Count	Replacement Cost Value	Count	% of Jurisdiction Total	Value	% of Jurisdiction Total
Avalon (B)	6,696	\$25,723,512,232	6,682	99.8%	\$25,691,811,207	99.9%
Cape May (C)	4,650	\$16,203,622,284	4,633	99.6%	\$16,126,432,668	99.5%
Cape May Point (B)	850	\$1,686,539,666	850	100.0%	\$1,686,539,666	100.0%
Dennis (T)	8,700	\$8,299,131,210	6,840	78.6%	\$6,567,006,451	79.1%
Lower (T)	25,387	\$22,775,836,898	24,482	96.4%	\$21,597,271,207	94.8%
Middle (T)	20,691	\$27,392,475,766	20,366	98.4%	\$26,863,962,368	98.1%
North Wildwood (C)	5,843	\$11,753,681,214	5,840	99.9%	\$11,753,229,666	100.0%
Ocean (C)	19,235	\$44,649,077,467	19,224	99.9%	\$44,637,398,530	100.0%
Sea Isle (C)	7,416	\$23,896,778,328	7,408	99.9%	\$23,889,486,360	100.0%
Stone Harbor (B)	4,202	\$8,177,015,155	4,199	99.9%	\$8,173,091,592	100.0%
Upper (T)	10,936	\$14,864,714,357	7,598	69.5%	\$10,250,832,686	69.0%
West Cape May (B)	1,760	\$2,893,441,733	1,760	100.0%	\$2,893,441,732	100.0%
West Wildwood (B)	920	\$1,064,788,340	914	99.3%	\$1,059,587,590	99.5%



Jurisdiction	Jurisdiction Total Buildings		Buildings in the SLOSH Category 4 Hazard Area			
			Number of Buildings		Replacement Cost Value	
	Count	Replacement Cost Value	Count	% of Jurisdiction Total	Value	% of Jurisdiction Total
Wildwood (C)	4,460	\$12,875,631,194	4,432	99.4%	\$12,840,156,509	99.7%
Wildwood Crest (B)	6,159	\$11,797,908,652	6,157	100.0%	\$11,797,446,176	100.0%
Woodbine (B)	2,107	\$3,249,453,892	32	1.5%	\$23,712,860	0.7%
Cape May County	130,012	\$237,303,608,388	121,417	93.4%	\$225,851,407,268	95.2%

Source: Cape May County 2024; RS Means 2024; NOAA 2022

Note: (B) Borough; (C) City; (T) Township

Table 11-16. Buildings in the SLOSH Category 4 Hazard Area by General Occupancy Class

Jurisdiction	Buildings in the SLOSH Category 4 Hazard Area by General Occupancy Class			
	Residential	Commercial	Industrial	Other
Avalon (B)	5,802	835	0	45
Cape May (C)	4,040	447	0	146
Cape May Point (B)	779	60	0	11
Dennis (T)	4,380	2,221	0	239
Lower (T)	17,967	6,091	0	424
Middle (T)	14,415	4,948	6	997
North Wildwood (C)	4,599	1,143	0	98
Ocean (C)	17,814	1,252	1	157
Sea Isle (C)	6,648	724	0	36
Stone Harbor (B)	3,804	372	0	23
Upper (T)	5,342	2,108	13	135
West Cape May (B)	1,377	344	0	39
West Wildwood (B)	783	122	0	9
Wildwood (C)	3,249	1,060	10	113
Wildwood Crest (B)	5,389	740	0	28
Woodbine (B)	31	1	0	0
Cape May County	96,419	22,468	30	2,500

Source: Cape May County 2024; RS Means 2024; NOAA 2022

Note: (B) Borough; (C) City; (T) Township

Other = Government, Religion, Agricultural, Education



Table 11-17. Land Use Exposed to the Category 1, 2, 3 and 4 SLOSH Hazard Areas

Land Use Type	Total Acres of Land Use Type Category	Category 1 SLOSH Hazard Area	Percent of Total Acres	Category 2 SLOSH Hazard Area	Percent of Total Acres	Category 3 SLOSH Hazard Area	Percent of Total Acres	Category 4 SLOSH Hazard Area	Percent of Total Acres
Residential Land Use Type	22,646	8,225	36.3%	11,620	51.3%	15,812	69.8%	19,976	88.2%
Non-Residential Land Use Type	160,458	64,337	40.1%	78,467	48.9%	93,318	58.2%	108,348	67.5%
Natural Land Use Type	142,219	59,210	41.6%	70,183	49.3%	81,811	57.5%	93,984	66.1%
Cape May County	183,126	72,561	39.6%	90,087	49.2%	109,130	59.6%	128,324	70.1%

Source: Cape May County 2024; NJDEP 2020; NOAA 2022



Table 11-18. Buildings in the SLOSH Category 1, 2, and 3 Hazard Area

Jurisdiction	Buildings in the SLOSH Category 1 Hazard Area				Buildings in the SLOSH Category 2 Hazard Area				Buildings in the SLOSH Category 3 Hazard Area			
	Number of Buildings		Replacement Cost Value		Number of Buildings		Replacement Cost Value		Number of Buildings		Replacement Cost Value	
	Count	% of Total	Value	% of Total	Count	% of Total	Value	% of Total	Count	% of Total	Value	% of Total
Avalon (B)	6,472	96.7%	\$24,524,863,306	95.3%	6,668	99.6%	\$25,514,364,743	99.2%	6,674	99.7%	\$25,614,834,932	99.6%
Cape May (C)	2,917	62.7%	\$10,453,369,057	64.5%	4,547	97.8%	\$14,685,363,071	90.6%	4,632	99.6%	\$16,126,207,423	99.5%
Cape May Point (B)	722	84.9%	\$1,354,112,698	80.3%	846	99.5%	\$1,678,658,829	99.5%	850	100.0%	\$1,686,539,666	100.0%
Dennis (T)	192	2.2%	\$234,202,272	2.8%	1,266	14.6%	\$1,151,245,836	13.9%	3,221	37.0%	\$2,959,842,270	35.7%
Lower (T)	7,651	30.1%	\$6,505,096,925	28.6%	13,435	52.9%	\$11,381,994,491	50.0%	19,793	78.0%	\$16,541,298,868	72.6%
Middle (T)	4,965	24.0%	\$5,196,127,230	19.0%	9,773	47.2%	\$11,937,179,316	43.6%	16,243	78.5%	\$21,626,871,071	79.0%
North Wildwood (C)	5,832	99.8%	\$11,724,762,339	99.8%	5,840	99.9%	\$11,752,120,186	100.0%	5,841	100.0%	\$11,753,458,121	100.0%
Ocean (C)	19,161	99.6%	\$44,392,319,038	99.4%	19,224	99.9%	\$44,634,801,712	100.0%	19,224	99.9%	\$44,634,801,712	100.0%
Sea Isle (C)	7,300	98.4%	\$23,590,007,290	98.7%	7,405	99.9%	\$23,877,314,380	99.9%	7,407	99.9%	\$23,881,738,753	99.9%
Stone Harbor (B)	4,072	96.9%	\$7,809,987,818	95.5%	4,199	99.9%	\$8,170,530,323	99.9%	4,200	100.0%	\$8,174,020,779	100.0%
Upper (T)	1,223	11.2%	\$2,030,089,383	13.7%	2,235	20.4%	\$3,643,195,582	24.5%	4,315	39.5%	\$5,909,511,025	39.8%
West Cape May (B)	585	33.2%	\$894,253,086	30.9%	1,707	97.0%	\$2,820,762,869	97.5%	1,760	100.0%	\$2,893,441,732	100.0%
West Wildwood (B)	912	99.1%	\$1,062,511,173	99.8%	911	99.0%	\$1,062,400,402	99.8%	913	99.2%	\$1,062,882,889	99.8%
Wildwood (C)	4,432	99.4%	\$12,838,511,561	99.7%	4,435	99.4%	\$12,840,578,397	99.7%	4,435	99.4%	\$12,840,578,397	99.7%
Wildwood Crest (B)	5,832	94.7%	\$10,871,571,547	92.1%	6,155	99.9%	\$11,619,590,651	98.5%	6,157	100.0%	\$11,796,787,095	100.0%
Woodbine (B)	0	0.0%	\$0	0.0%	0	0.0%	\$0	0.0%	2	0.1%	\$148,367	<0.1%
Cape May County	72,268	55.6%	\$163,481,784,723	68.9%	88,646	68.2%	\$186,770,100,788	78.7%	105,667	81.3%	\$207,502,963,100	87.4%

Source: Cape May County 2024; RS Means 2024; NOAA 2022

Note: (B) Borough; (C) City; (T) Township



Table 11-19. Buildings in the SLOSH Category 1, 2, and 3 Hazard Area by General Occupancy Class

Jurisdiction	Buildings in the SLOSH Category 4 Hazard Area by General Occupancy Class				Buildings in the SLOSH Category 2 Hazard Area by General Occupancy Class				Buildings in the SLOSH Category 3 Hazard Area by General Occupancy Class			
	Residential	Commercial	Industrial	Other	Residential	Commercial	Industrial	Other	Residential	Commercial	Industrial	Other
Avalon (B)	5,609	823	0	40	5,788	836	0	44	5,794	836	0	44
Cape May (C)	2,567	260	0	90	3,986	420	0	141	4,040	447	0	145
Cape May Point (B)	665	47	0	10	775	60	0	11	779	60	0	11
Dennis (T)	132	43	0	17	855	353	0	58	2,087	1,006	0	128
Lower (T)	5,617	1,928	0	106	9,933	3,317	0	185	14,482	4,949	0	362
Middle (T)	3,667	1,018	0	280	7,174	2,056	0	543	11,890	3,416	2	935
North Wildwood (C)	4,592	1,143	0	97	4,599	1,143	0	98	4,600	1,143	0	98
Ocean (C)	17,753	1,251	1	156	17,814	1,252	1	157	17,814	1,252	1	157
Sea Isle (C)	6,553	712	0	35	6,645	724	0	36	6,647	724	0	36
Stone Harbor (B)	3,687	365	0	20	3,804	372	0	23	3,805	372	0	23
Upper (T)	1,016	193	1	13	1,749	432	12	42	3,056	1,167	12	80
West Cape May (B)	490	84	0	11	1,339	333	0	35	1,377	344	0	39
West Wildwood (B)	784	121	0	7	784	120	0	7	784	121	0	8
Wildwood (C)	3,250	1,060	10	112	3,251	1,061	10	113	3,251	1,061	10	113
Wildwood Crest (B)	5,096	721	0	15	5,389	738	0	28	5,389	740	0	28
Woodbine (B)	0	0	0	0	0	0	0	0	2	0	0	0
Cape May County	61,478	9,769	12	1,009	73,885	13,217	23	1,521	85,797	17,638	25	2,207

Source: Cape May County 2024; RS Means 2024; NOAA 2022

Note: (B) Borough; (C) City; (T) Township

Other = Government, Religion, Agricultural, Education



Table 11-20. Building Loss in Cape May County - 100-Year Mean Return Period Hurricane

Jurisdiction	Estimated Building Losses (All Occupancies)	Estimated Building Losses (Residential)	Estimated Building Losses (Commercial)	Estimated Building Losses (Industrial)	Estimated Damages (All Other Occupancies)
Avalon (B)	\$303,563,111	\$300,009,321	\$2,973,346	\$0	\$580,444
Cape May (C)	\$205,233,761	\$183,044,312	\$11,559,506	\$0	\$10,629,942
Cape May Point (B)	\$18,595,617	\$17,805,292	\$392,571	\$0	\$397,754
Dennis (T)	\$43,985,931	\$39,481,780	\$3,582,128	\$0	\$922,022
Lower (T)	\$230,247,395	\$214,171,118	\$8,906,704	\$34	\$7,169,538
Middle (T)	\$183,599,586	\$152,738,063	\$17,119,789	\$130,975	\$13,610,759
North Wildwood (C)	\$96,443,252	\$88,590,602	\$5,489,060	\$0	\$2,363,590
Ocean (C)	\$304,368,285	\$293,961,578	\$5,607,857	\$1,160	\$4,797,690
Sea Isle (C)	\$334,209,511	\$331,488,883	\$2,375,281	\$0	\$345,347
Stone Harbor (B)	\$95,056,359	\$93,778,281	\$1,123,021	\$0	\$155,057
Upper (T)	\$98,779,145	\$93,641,351	\$3,567,957	\$186,871	\$1,382,967
West Cape May (B)	\$38,503,866	\$36,867,429	\$812,852	\$0	\$823,585
West Wildwood (B)	\$17,008,830	\$12,153,535	\$4,078,243	\$10,000	\$767,052
Wildwood (C)	\$77,693,176	\$60,236,053	\$14,585,696	\$62,812	\$2,808,615
Wildwood Crest (B)	\$135,449,633	\$130,050,859	\$4,676,425	\$0	\$722,348
Woodbine (B)	\$8,526,649	\$6,846,704	\$271,005	\$54,961	\$1,353,979
Cape May County	\$2,191,264,105	\$2,054,865,161	\$87,121,442	\$446,813	\$48,830,688

Source: Hazus v6.1; Cape May County 2024; RS Means 2024

Note: (B) Borough; (C) City; (T) Township



Table 11-21. Building Loss in Cape May County- 500-Year Mean Return Period Hurricane

Jurisdiction	Estimated Building Losses (All Occupancies)	Estimated Building Losses (Residential)	Estimated Building Losses (Commercial)	Estimated Building Losses (Industrial)	Estimated Damages (All Other Occupancies)
Avalon (B)	\$2,341,191,999	\$2,316,139,101	\$20,912,572	\$0	\$4,140,326
Cape May (C)	\$925,986,672	\$833,374,594	\$48,373,603	\$0	\$44,238,474
Cape May Point (B)	\$108,169,217	\$103,885,980	\$2,157,109	\$0	\$2,126,127
Dennis (T)	\$368,696,424	\$337,013,580	\$22,618,850	\$0	\$9,063,993
Lower (T)	\$1,445,938,096	\$1,358,437,195	\$51,955,437	\$178	\$35,545,286
Middle (T)	\$1,324,636,161	\$1,126,401,061	\$99,873,898	\$768,684	\$97,592,518
North Wildwood (C)	\$686,506,120	\$637,643,750	\$34,438,297	\$0	\$14,424,073
Ocean (C)	\$2,015,135,634	\$1,954,446,672	\$32,673,366	\$9,280	\$28,006,316
Sea Isle (C)	\$2,712,131,351	\$2,691,492,022	\$17,791,102	\$0	\$2,848,227
Stone Harbor (B)	\$724,527,353	\$715,640,563	\$7,711,767	\$0	\$1,175,023
Upper (T)	\$691,900,501	\$662,281,242	\$19,482,635	\$1,344,551	\$8,792,073
West Cape May (B)	\$223,973,908	\$215,105,088	\$4,466,485	\$0	\$4,402,334
West Wildwood (B)	\$108,408,832	\$78,723,164	\$24,585,124	\$80,363	\$5,020,181
Wildwood (C)	\$498,790,729	\$391,515,899	\$87,928,530	\$497,427	\$18,848,873
Wildwood Crest (B)	\$887,304,803	\$855,598,438	\$27,429,445	\$0	\$4,276,920
Woodbine (B)	\$105,837,476	\$78,191,820	\$3,089,115	\$936,335	\$23,620,206
Cape May County	\$15,169,135,275	\$14,355,890,168	\$505,487,336	\$3,636,818	\$304,120,952

Source: Hazus v6.1; Cape May County 2024; RS Means 2024

Note: (B) Borough; (C) City; (T) Township



11.2.3 Community Lifelines and Other Critical Facilities

Critical facilities are at risk of being impacted by high winds associated with structural damage, or falling tree limbs/flying debris. Power loss can greatly impact households, business operations, public utilities, and emergency personnel. Emergency personnel such as police, fire, and EMS will not be able to effectively respond in a power loss event to maintain the safety of its citizens unless backup power and fuel sources are available. Loss of power can impact other public utilities, including potable water, wastewater treatment, and communications. In addition to public water services, property owners with private wells might not have access to potable water until power is restored. Lack of power to emergency facilities, including police, fire, EMS, and hospitals, will inhibit a community's ability to effectively respond to an event and maintain the safety of its citizens.

Storm surge can severely impact roads and roadway infrastructure, which are included in the transportation lifeline. Table 11-22 shows the total miles of evacuation routes within the County that is exposed to the Category 1, 2, 3 and 4 SLOSH Hazard Areas.

As a result of a 100-year MRP event, Hazus estimates that the Food, Hydration, Shelter lifeline has the greatest chance of sustaining minor damage (12.9 percent), followed by the Hazardous Materials lifelines (12.3 percent probability). Hazardous Materials lifeline also has the greatest chance of moderate damages, at an approximate 9.1 percent probability. Hazardous Materials lifeline also has the greatest chance of severe and complete damage, at an approximate 1.6 percent and 0.1 probability. As a result of a 500-year MRP event, Hazus estimates that the Transportation lifeline has the greatest chance of sustaining minor damage (22.82 percent), followed by the Food, Hydration, and Shelter lifelines (29.2 percent probability) for moderate damages. Also, Hazardous Materials has the greatest chance of sustaining severe damage (11.4 percent) and complete damage (1.7 percent). Table 11-23 and Table 11-24 summarize the damage state probabilities for critical facilities during the 100-year and 500-year MRP events. For 100-Year MRP event, there are five days recorded for loss of function of the Safety and Security lifeline, and for 500-Year MRP event, the Safety and Security lifeline records 234 days of loss of functionality.

In SLOSH hazard areas, these lifelines are particularly vulnerable to disruption. Table 11-25 through Table 11-28 provide detailed information on the distribution and risk levels of various community lifelines within different SLOSH hazard categories across Cape May County. Overall, Cape May County has 391 facilities located in Category 1 SLOSH hazard areas, representing 50.4 percent of the County's total facilities. In Category 2, there are 484 facilities (62.4 percent), in Category 3, there are 576 facilities (74.2 percent), and in Category 4, there are 649 facilities (83.6 percent). The Water Systems lifeline has the highest number of facilities in all SLOSH Hazard categories; Category 1 (110), Category 2 (133), Category 3 (153) and Category 4 (175). Refer to Chapter 3 (County Profile) for more information about the critical facilities and lifelines in Cape May County.

Table 11-22. Evacuation Routes Exposed to the Category 1, 2, 3 and 4 SLOSH Hazard Areas

Total Miles of Evacuation Routes in the County	Hazard Area Type	Total Miles of Evacuation Routes Exposed	Percent of Total
224	Category 1 SLOSH	95	42.6%
	Category 2 SLOSH	144	64.2%
	Category 3 SLOSH	183	82.0%
	Category 4 SLOSH	223	99.8%

Source: Cape May County 2024; NOAA 2022



Table 11-23. Estimated Impacts on Critical Facilities for the 100-Year MRP Event

Lifeline Category	Loss of Days	Average Percent Probability of Sustaining Damage 100-Year Mean Return Period Hurricane			
		Minor	Moderate	Severe	Complete
Communications	0	11.4%	6.4%	0.5%	0.0%
Energy	0	8.7%	3.4%	0.2%	0.0%
Food, Hydration, Shelter	0	12.9%	8.0%	0.2%	0.0%
Hazardous Materials	0	12.3%	9.1%	1.6%	0.1%
Health and Medical	0	9.5%	5.0%	0.1%	0.0%
Safety and Security	5	9.3%	4.4%	0.1%	0.0%
Transportation	0	7.7%	0.8%	0.1%	0.0%
Water Systems	0	11.7%	5.5%	0.5%	0.0%

Source: Hazus v6.1; Cape May County 2024

Table 11-24. Estimated Impacts to Critical Facilities for the 500-Year MRP Event

Lifeline Category	Loss of Days	Average Percent Probability of Sustaining Damage 500-Year Mean Return Period Hurricane			
		Minor	Moderate	Severe	Complete
Communications	0	20.4%	26.2%	8.8%	<0.1%
Energy	0	21.2%	18.8%	5.1%	<0.1%
Food, Hydration, Shelter	0	21.3%	29.2%	6.6%	0.0%
Hazardous Materials	0	18.6%	28.2%	11.4%	1.7%
Health and Medical	40	17.9%	25.8%	4.1%	<0.1%
Safety and Security	234	17.7%	24.5%	5.7%	<0.1%
Transportation	0	28.2%	10.0%	1.2%	0.0%
Water Systems	0	22.2%	23.5%	8.6%	<0.1%

Source: Hazus v6.1; Cape May County 2022,2024; HIFLD 2024; USACE 2024



Table 11-25. Number of Facilities in the SLOSH Category 1 Hazard Area, by Lifeline Category

Jurisdiction	Number of Facilities in the SLOSH Category 1 Hazard Area, by Lifeline Category									Total Facilities in Hazard Area	
	Communications	Energy	Food, Hydration, Shelter	Hazardous Materials	Health & Medical	Safety & Security	Transportation	Water Systems	Other Critical Facilities	Count	% of Total
Avalon (B)	1	0	0	0	1	6	0	12	8	28	87.5%
Cape May (C)	0	0	0	3	1	4	0	10	4	22	52.4%
Cape May Point (B)	0	0	0	0	0	2	0	5	1	8	80.0%
Dennis (T)	3	0	0	0	0	4	0	1	1	9	15.5%
Lower (T)	0	0	3	1	0	1	1	23	11	40	32.8%
Middle (T)	3	0	0	3	0	12	0	9	5	32	20.8%
North Wildwood (C)	6	0	1	0	3	12	0	4	8	34	97.1%
Ocean (C)	2	0	0	3	8	11	4	16	29	73	94.8%
Sea Isle (C)	0	0	0	1	2	5	1	11	9	29	100.0%
Stone Harbor (B)	5	0	0	0	1	5	0	7	7	25	96.2%
Upper (T)	1	0	0	2	0	3	2	3	5	16	22.2%
West Cape May (B)	0	0	0	0	1	0	0	0	0	1	14.3%
West Wildwood (B)	0	0	0	0	0	3	0	1	2	6	60.0%
Wildwood (C)	0	1	2	2	7	10	2	6	13	43	95.6%
Wildwood Crest (B)	12	0	0	0	1	3	0	2	7	25	86.2%
Woodbine (B)	0	0	0	0	0	0	0	0	0	0	0.0%
Cape May County	33	1	6	15	25	81	10	110	110	391	50.4%

Source: Cape May County 2022,2024; HIFLD 2024; USACE 2024; NOAA 2022

Note: (B) Borough; (C) City; (T) Township



Table 11-26. Number of Facilities in the SLOSH Category 2 Hazard Area, by Lifeline Category

Jurisdiction	Number of Facilities in the SLOSH Category 2 Hazard Area, by Lifeline Category									Total Facilities in Hazard Area	
	Communications	Energy	Food, Hydration, Shelter	Hazardous Materials	Health & Medical	Safety & Security	Transportation	Water Systems	Other Critical Facilities	Count	% of Total
Avalon (B)	1	0	0	0	1	6	0	12	8	28	87.5%
Cape May (C)	2	0	0	3	3	8	0	10	12	38	90.5%
Cape May Point (B)	0	0	0	0	0	4	0	5	1	10	100.0%
Dennis (T)	4	0	0	0	1	5	0	2	1	13	22.4%
Lower (T)	0	0	3	1	1	2	2	35	13	57	46.7%
Middle (T)	6	0	1	4	6	25	0	18	13	73	47.4%
North Wildwood (C)	6	0	1	0	3	13	0	4	8	35	100.0%
Ocean (C)	2	0	0	3	8	11	4	16	29	73	94.8%
Sea Isle (C)	0	0	0	1	2	5	1	11	9	29	100.0%
Stone Harbor (B)	5	0	0	0	1	5	0	7	7	25	96.2%
Upper (T)	2	1	0	2	1	3	3	3	5	20	27.8%
West Cape May (B)	0	0	0	0	1	3	0	1	1	6	85.7%
West Wildwood (B)	0	0	0	0	0	3	0	1	2	6	60.0%
Wildwood (C)	0	1	2	2	7	10	2	6	13	43	95.6%
Wildwood Crest (B)	14	0	0	0	1	4	0	2	7	28	96.6%
Woodbine (B)	0	0	0	0	0	0	0	0	0	0	0.0%
Cape May County	42	2	7	16	36	107	12	133	129	484	62.4%

Source: Cape May County 2022,2024; HIFLD 2024; USACE 2024; NOAA 2022

Note: (B) Borough; (C) City; (T) Township



Table 11-27. Number of Facilities in the SLOSH Category 3 Hazard Area, by Lifeline Category

Jurisdiction	Number of Facilities in the SLOSH Category 3 Hazard Area, by Lifeline Category									Total Facilities in Hazard Area	
	Communications	Energy	Food, Hydration, Shelter	Hazardous Materials	Health & Medical	Safety & Security	Transportation	Water Systems	Other Critical Facilities	Count	% of Total
Avalon (B)	1	0	0	0	1	6	0	12	8	28	87.5%
Cape May (C)	2	0	0	3	4	9	0	10	13	41	97.6%
Cape May Point (B)	0	0	0	0	0	4	0	5	1	10	100.0%
Dennis (T)	4	0	0	0	1	6	0	7	2	20	34.5%
Lower (T)	0	0	3	2	3	7	3	44	24	86	70.5%
Middle (T)	17	0	1	7	16	39	0	24	21	125	81.2%
North Wildwood (C)	6	0	1	0	3	13	0	4	8	35	100.0%
Ocean (C)	2	0	0	3	8	11	4	16	29	73	94.8%
Sea Isle (C)	0	0	0	1	2	5	1	11	9	29	100.0%
Stone Harbor (B)	5	0	0	0	1	5	0	7	7	25	96.2%
Upper (T)	2	1	0	2	1	3	4	3	5	21	29.2%
West Cape May (B)	0	0	0	0	1	3	0	1	1	6	85.7%
West Wildwood (B)	0	0	0	0	0	3	0	1	2	6	60.0%
Wildwood (C)	0	1	2	2	7	10	2	6	13	43	95.6%
Wildwood Crest (B)	14	0	0	0	1	4	0	2	7	28	96.6%
Woodbine (B)	0	0	0	0	0	0	0	0	0	0	0.0%
Cape May County	53	2	7	20	49	128	14	153	150	576	74.2%

Source: Cape May County 2022,2024; HIFLD 2024; USACE 2024; NOAA 2022

Note: (B) Borough; (C) City; (T) Township



Table 11-28. Number of Facilities in the SLOSH Category 4 Hazard Area, by Lifeline Category

Jurisdiction	Number of Facilities in the SLOSH Category 4 Hazard Area, by Lifeline Category									Total Facilities in Hazard Area	
	Communications	Energy	Food, Hydration, Shelter	Hazardous Materials	Health & Medical	Safety & Security	Transportation	Water Systems	Other Critical Facilities	Count	% of Total
Avalon (B)	1	0	0	0	1	6	0	12	8	28	87.5%
Cape May (C)	2	0	0	3	4	9	0	10	13	41	97.6%
Cape May Point (B)	0	0	0	0	0	4	0	5	1	10	100.0%
Dennis (T)	7	0	0	0	2	10	0	20	5	44	75.9%
Lower (T)	0	0	3	3	7	14	4	50	25	106	86.9%
Middle (T)	19	0	1	7	18	41	0	27	24	137	89.0%
North Wildwood (C)	6	0	1	0	3	13	0	4	8	35	100.0%
Ocean (C)	2	0	0	3	8	11	4	16	29	73	94.8%
Sea Isle (C)	0	0	0	1	2	5	1	11	9	29	100.0%
Stone Harbor (B)	5	0	0	0	1	5	0	7	7	25	96.2%
Upper (T)	5	2	0	2	4	8	5	3	9	38	52.8%
West Cape May (B)	0	0	0	0	1	3	0	1	1	6	85.7%
West Wildwood (B)	0	0	0	0	0	3	0	1	2	6	60.0%
Wildwood (C)	0	1	2	2	7	10	2	6	13	43	95.6%
Wildwood Crest (B)	14	0	0	0	1	4	0	2	7	28	96.6%
Woodbine (B)	0	0	0	0	0	0	0	0	0	0	0.0%
Cape May County	61	3	7	21	59	146	16	175	161	649	83.6%

Source: Cape May County 2022,2024; HIFLD 2024; USACE 2024; NOAA 2022

Note: (B) Borough; (C) City; (T) Township



11.2.4 Economy

Severe weather events can have both short- and long-lasting impacts on the economy. Overall, economic impacts include the loss of business function (e.g., tourism, recreation), damage to inventory, relocation costs, wage loss, and rental loss due to the repair or replacement of buildings. Impacts on the transportation lifeline affects both short-term (e.g., evacuation activities) and long-term (e.g., day-to-day commuting and goods transport) transportation needs. Recovery and clean-up costs can also be costly and impact the economy as well (NJOEM 2024). When a business is closed during storm recovery, there is lost economic activity in the form of day-to-day business and wages to employees. Utility infrastructure (power lines, gas lines, electrical systems) could suffer damage, resulting in the loss of power, which can impact business operations and heating or cooling provision to the population.

Debris management can be costly and impact the local economy. Hazus estimates the debris produced as result of the 100- and 500-year MRP wind events. Table 11-29 summarizes the estimated debris by municipality. The estimates do not include debris generated by flooding, so this is likely a conservative estimate and could be higher if multiple impacts occur. For both MRP events, debris production from brick and wood is the greatest, with the 100-year MRP creating an estimated 187,992 tons of debris and the 500-year MRP event creating approximately 1,293,397 tons.

Table 11-29. Debris Production for 100- and 500-Year Mean Return Period Event Winds

Jurisdiction	Brick and Wood (tons)		Concrete and Steel (tons)		Tree (tons)		Eligible Tree Volume (cubic yards)	
	100-Year	500-Year	100-Year	500-Year	100-Year	500-Year	100-Year	500-Year
Avalon (B)	21,957	171,530	0	1,767	484	967	4,835	6,962
Cape May (C)	16,343	70,715	128	886	1,572	2,831	15,713	20,575
Cape May Point (B)	1,407	8,518	0	73	818	1,727	8,179	5,180
Dennis (T)	3,481	33,205	0	314	25,666	83,065	256,657	87,542
Lower (T)	19,793	129,942	22	1,216	15,165	32,989	151,654	131,892
Middle (T)	15,910	115,734	0	1,047	40,415	100,767	404,152	202,512
North Wildwood (C)	8,534	57,389	7	691	0	0	0	0
Ocean (C)	26,573	166,169	57	1,782	564	1,500	5,637	6,940
Sea Isle (C)	31,246	254,761	230	2,761	85	171	851	1,288
Stone Harbor (B)	8,296	62,929	0	591	178	357	1,783	3,173
Upper (T)	7,500	60,308	0	601	28,582	74,949	285,818	124,880
West Cape May (B)	2,913	17,638	0	151	1,694	3,575	16,935	10,726
West Wildwood (B)	1,949	9,822	1	69	33	65	324	493
Wildwood (C)	8,638	45,331	2	328	140	281	1,406	2,215
Wildwood Crest (B)	12,799	81,002	34	1,147	0	0	0	0
Woodbine (B)	653	8,403	1	190	3,076	10,252	30,757	16,404
Cape May County	187,992	1,293,397	482	13,614	118,472	313,496	1,184,700	620,781

Source: Hazus v6.1; Cape May County 2024

Note: (B) Borough; (C) City; (T) Township



11.2.5 Natural, Historic and Cultural Resources

Natural

Severe weather creates longer periods of rainfall, which can erode natural banks along waterways and degrade soil stability for terrestrial species. Tornadoes can tear apart habitats causing fragmentation across ecosystems (United States Environmental Protection Agency 2023).

Researchers believe that severe weather events will significantly impact natural resources, particularly water supplies, leading to the spread of diseases across ecosystems (United States Climate Resilience Toolkit 2016). As the physical environment becomes more altered, species may contract or migrate in response, causing additional stressors to the entire ecosystem within Cape May County. The impacts of hurricane-related winds on the environment typically occur over a larger area, resulting in widespread, severe damage to tree and plant species. This includes uprooting or destruction of trees and an increased threat of wildfire in areas where dead trees are not removed. Chapter 12 (Flood) provides additional environmental impacts due to flooding from heavy rainfalls.

Table 11-22 shows the total acres of land in Cape May County that is exposed to the Category 1, 2, 3 and 4 SLOSH Hazard Areas.

Table 11-30. Acres of Land Exposed to the Category 1, 2, 3 and 4 SLOSH Hazard Areas

Total Acres in County	Hazard Area Type	Number of Acres Exposed	Percent of Total
183,126	Category 1 SLOSH	71,648	39.1%
	Category 2 SLOSH	89,136	48.7%
	Category 3 SLOSH	108,112	59.0%
	Category 4 SLOSH	127,265	69.5%

Source: Cape May County 2024; NJDEP 2020; NOAA 2022

Historic

Winds associated with severe weather can cause significant damage or destruction to the County’s historical infrastructure. Historic sites are particularly vulnerable due to their age and construction prior to modern building standards. The materials used in these structures may be aged and prone to maintenance issues, making them more susceptible to damage. Additionally, these sites are irreplaceable artifacts, and any damage may necessitate compliance with stringent landmark laws for restoration, complicating and increasing the cost of repairs.

Venues such as museums and historic buildings are at risk of structural damage during flood events caused by hurricane rains. Many historic resources and structures were built close to waterways, which increases their flood risk. Severe flood events could result in devastating loss of life and property in and around these historical landmarks.

Cultural

Winds associated with severe weather can cause significant damage or destruction to the County’s cultural resources. These resources, often housed in historical buildings and homes, are particularly vulnerable due to their construction prior to modern building standards, which may not withstand high winds. The materials used in these structures may be aged and prone to maintenance issues, further increasing their susceptibility to damage.



Cultural heritage sites, especially those exposed to the elements, are subject to weathering and deterioration. Outdoor cultural resources and events are also at risk, as severe weather conditions can lead to postponements or cancellations, disrupting cultural activities and community engagement.

The vulnerability of cultural resources is heightened by their irreplaceable nature. Damage to these sites can result in the loss of unique historical and cultural artifacts, which cannot be easily restored or replaced. Additionally, the restoration of damaged cultural resources often requires adherence to stringent preservation laws and guidelines, making the process more complex and costly.

11.3 FUTURE CHANGES THAT MAY AFFECT RISK

Understanding future changes that affect vulnerability can assist in planning for future development and ensure establishment of appropriate mitigation, planning, and preparedness measures. The following sections examine potential conditions that may affect hazard vulnerability.

11.3.1 Potential or Planned Development

Understanding future changes that impact vulnerability in Cape May County is crucial for planning development and ensuring appropriate mitigation, planning, and preparedness measures. New development and residents will face hurricane and tropical storm hazards, but increased standards and codes may reduce their vulnerability to wind and flood-related hazards compared to older buildings.

New development will replace open land and vegetation with buildings, roads, and other infrastructure that is less able to absorb precipitation. This transformation can make surfaces that were once permeable and moist become impermeable and dry, leading to increased surface runoff and altered water conveyance patterns.

Areas targeted for future growth and development have been identified across the County. These areas are vulnerable to severe storm events, and new development sites should adhere to building codes that provide high wind protection and flood-proofing measures. Specific areas of recent and new development are detailed in tables and hazard maps included in the jurisdictional annexes in Volume II of this plan.

11.3.2 Projected Changes in Population

An increase in population density can create issues for local residents during evacuation of a natural hazard severe storm event. Historically, flooding and debris associated with severe storm events have severely impacted transportation corridors as well as infrastructure. Densely populated areas of the County may require utility system upgrades to keep up with utility demands (e.g., water, electric) during storms to prevent increased stresses on these systems. Refer to Chapter 3 (County Profile), which includes a more thorough discussion about population trends for the County.

11.3.3 Climate Change

Projecting future climate change for specific regions is challenging, especially for longer terms due to changing dynamics. Since the late 1890s, New Jersey's average temperature has increased by 3.5°F (1.9°C), faster than the Northeast and global averages. By 2050, temperatures in New Jersey are expected to rise by 4.1 to 5.7°F (2.3 to 3.2°C), with potential increases up to 10°F (5.6°C) under high emissions scenarios. Summers will be hotter, and winters will see fewer cold waves and less snow (NJDEP 2020).



Precipitation in New Jersey has slightly increased, with a 7.9 percent rise over the last decade. By 2050, annual precipitation could increase by 4 percent to 11 percent, with more intense rain events and potential summer droughts. Extreme storms, including nor'easters and thunderstorms, have become more frequent, with a 71 percent increase in extreme rain events over the past 50 years.

11.3.4 Other Identified Conditions

The State of New Jersey will see an increase in average annual temperatures and precipitation. Climate change has the ability to make winter weather events less frequent, but more severe when they do happen. Annual precipitation amounts in the region are projected to increase, primarily in the form of heavy rainfalls, which have the potential to freeze into heavy snowfall and icing. This increase in snow and ice could result in an increased risk to life and health, an increase in structural losses, a diversion of additional resources to response and recovery efforts, and an increase in business closures affected by severe winter events due to loss of service or access (The Climate Reality Project 2022).