

CHAPTER 7 – SEVERE WEATHER

Updates to the Wicomico County Chapter 7 -Severe Weather included the following:

- Updated Thunderstorm Wind Event Data
- Updated Tornado Event Data
- Updated Hail Event Data
- Updated Lightning Event Data
- Updated High Wind Event Data
- Updated Strong Wind Event Data
- Added pictures and updated graphics throughout the chapter.
- Added conclusion to the chapter.

CHAPTER 7 – SEVERE WEATHER

7.1 INTRODUCTION

Severe weather as described herein includes thunderstorms (wind), tornados, lightning, hail, and high/strong wind. The effects of thunderstorms, tornados, hail, lightning, and wind may cause many types of hazard impacts including power outages, communication failures, road closures, and loss of infrastructure. These hazards are random in nature and can occur countywide due to the lack of predictable hazard zones.

7.2 THUNDERSTORM WIND HAZARD CHARACTERIZATION

Thunderstorms are usually high intensity storms of short duration originating in a warm moist air mass that either is forced to rise by mountainous terrain or by colliding with a cooler dense air mass. The process of convection in the atmosphere brings about the release of moisture from the warm air mass as it rises, cools, and condenses. This condensation proceeds until most of the moisture in the air mass has been precipitated. Since the motion of the air is nearly vertical, and attains high velocities, rainfall is intense and generally concentrated over a small area in a short time frame. Thunderstorms can be 10-15 miles in diameter and normally last 20-30 minutes.

7.3 THUNDERSTORM WIND HAZARD RISK & HISTORY

Between 1958 and 2021, the *National Oceanic and Atmospheric Administration (NOAA), National Centers for Environmental Information (NCEI)* reported ninety-seven (97) thunderstorm wind event days that occurred in Wicomico County resulting in a total of one hundred thirty-two (132) total events recorded within the database. While only thunderstorm wind events with reported property damage greater than \$5,000 are shown in Table 7.1, it is important to note that many other thunderstorms wind events resulted in property damage less than \$5,000.

*The National Weather Service (NWS) considers a **thunderstorm wind** event severe only if produces wind gusts of 58 mph or higher, precipitates large hail (3/4 in. diameter or larger), or results in tornados.*

Note: Property damage estimates were not recorded in the database prior to 1995.

Table 7.1: Thunderstorm Wind Events with Reported Property Damage Greater than \$5,000

Location	Date	Event Narrative	Property Damage
Salisbury	November 11, 1995	Numerous power lines down and poles snapped. Trees down, some caused damage to buildings.	\$30,000
Powellville	November 11, 1995	Several power poles snapped off. Trees were downed. Roofs off two chicken houses in Parsonsburg; one chicken house destroyed, and VFW damaged in Powellville.	\$40,000
Salisbury	May 4, 1996	Several trees downed and roof blown off a chicken house.	\$12,000
Salisbury	July 16, 1997	Wind gust of 68 mph recorded at WBOC TV. Portions of a motel roof and industrial park roofs were blown off. Numerous trees and wires down.	\$30,000
Salisbury	June 13, 1998	Thunderstorm winds caused construction wall to collapse at Giant food store.	\$5,000
Hebron	June 26, 1998	Barn was destroyed and top of trees blown off.	\$10,000
Salisbury	April 28, 2002	Trees down on two houses.	\$5,000
Tyaskin	June 6, 2007	Approximately 15 trees were downed along Wetipquin Creek.	\$5,000

Location	Date	Event Narrative	Property Damage
Salisbury	June 29, 2012	A derecho produced a widespread path of damaging winds across much of the Lower Maryland Eastern Shore. Numerous trees were downed in Salisbury.	\$5,000
Mardela Springs	June 13, 2013	A squall line produced widespread wind damage across much of the Maryland Eastern Shore. Wind gusts up to 70 mph (60 knots) produced widespread damage across the county. The most significant damage was near Mardela Springs where several trees were downed onto homes. A storage shed was also blown over. Significant damage was also observed around the Mardela Springs Middle and High Schools. Softball dugouts were destroyed, soccer goals were damaged, and bleachers were blown over. Several trees were sheared and some toppled around the schools. Additional trees were downed in Delmar and Salisbury.	\$20,000
Countywide	January 11, 2014	Scattered severe thunderstorms in advance of a cold front produced damaging winds across portions of the Lower Maryland Eastern Shore. Long stretch of pool fence was blown over. Several large trees were also downed.	\$5,000
2021 HMP Update			
Salisbury	July 2, 2015	After collaboration with county emergency management, a wet microburst was determined to have downed several trees from Marble Court to Kaywood Drive, including the Tide Mill Apartment Complex. All damage was reported in a narrow one mile stretch just northwest of Salisbury Airport, or along the Route 13 Bypass.	\$5,000
Nr. Melson Rd.	July 13, 2016	Chicken coop was destroyed. Shingles were blown off a roof. Small tree was snapped off.	\$5,000
Parsonburg	June 28, 2019	Large trees were downed. There was also damage to a trailer, chicken house and trampoline. This damage occurred at the 7300 Block of Parsonburg Road and Grant Road.	\$10,000
Salisbury	July 17, 2019	Multiple trees and power lines were downed in Salisbury, including four reports of trees down on houses.	\$5,000
Fruitland	October 31, 2019	Winds caused a transformer fire in Fruitland.	\$5,000

Source: NOAA NCEI

Note: Estimated property damage is reported within the NCEI database.

In terms of number of occurrences, the NOAA NCEI listed a total of seventy (70) thunderstorm wind event day listings with reported property damage affecting Wicomico County during the time period of 1995-2021. According to the data, on average, Wicomico County experiences approximately 2.6 thunderstorm events with recorded property damage per year.

7.4 THUNDERSORM WIND VULVERABILITY

Thunderstorms can cause damage to buildings, downed trees which can block roads, and power outages from downed poles and lines in the County. The events per year rate for this hazard are high when compared to other hazards; most events cause little-or-no damage to buildings such as community lifelines and public facilities.



Source: Mardela Springs; Storm damage in Mardela Springs; Photo: WBOC reporter Amy Lu

7.5 TORNADO HAZARD CHARACTERIZATION

A tornado is defined by Strahler in his Physical Geography Text as a violently rotating column of air extending from a thunderstorm to the ground. Normally thunderstorms and tornados develop in warm, moist air in advance of strong eastward moving cold fronts in late winter and early spring. Tornados can also occur along a “dryline” which separates very warm, moist air to the east from hot, dry air to the west. Under the right temperature and moisture conditions, intense thunderstorms can produce tornados in areas of differential heating, which occurs on the Eastern Shore.

Tornados can be ranked by intensity using the Fujita Scale devised by Dr. Theodore Fujita at the University of Chicago in 1971. Since 2007, tornadoes are rated by the Nation Weather Service according to the Enhanced Fujita Scale (EF Scale). Ratings vary from EF0, for light damage, to EF5, for total destruction of a building. A tornado’s rating is determined by a combination of wind speed (Table 7.2) and damage estimates to structures. Figure 7.1, below, provides basic FEMA definitions for each category.

Table 7.2: Enhanced Fujita Scale for Tornado Damage

Enhanced Fujita Wind Scale	
EF Number	3 Second Gust (mph)*
0	65-85
1	86-110
2	111-135
3	136-165
4	166-200
5	Over 200

* The three-second gust is the highest sustained gust over a 3 second period having a 1 in 50 probability of being exceeded per year.

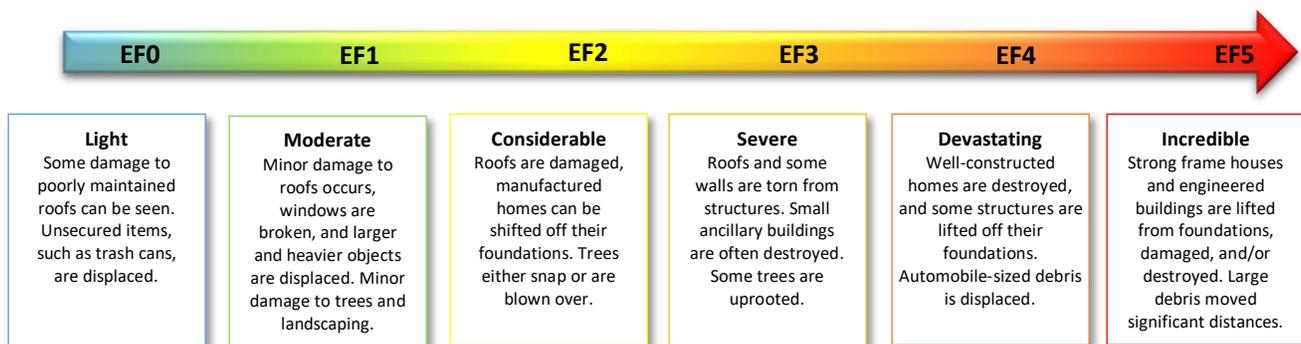
Source: NOAA.gov



Vehicles damaged by a possible tornado sit in a parking lot in Salisbury.

Source: Baltimore Sun, August 7, 2017. (Ralph Musthaler / AP)

Figure 7.1 – Enhanced Fujita Wind Scale



Local National Weather Service (NWS) offices are responsible for issuing tornado warnings. Tornado warnings indicate that a tornado has been spotted or that Doppler radar detects a thunderstorm circulation capable of spawning a tornado. Nationally, tornado season is from March through August. According to the [United States Tornadoes](#), July is the peak month for tornado activity in Maryland.

7.6 TORNADO HAZARD RISK & HISTORY

According to NOAA NCEI, during the time period of 1962 and 2020, there have been a total of eleven (11) tornadoes reported during eight (8) severe weather events in Wicomico County. Table 7.3 provides additional information on these events.

Table 7.3: Tornado Events

Location	Date	Event Narrative	Magn- itude	Width	Property Damage	Injuries
SW of Sharptown	June 24, 1962	No Report	F0	17 Yards	\$300	0
Nr. Adkins Mill Park	October 8, 1965	No Report	F1	150 yards	\$25,000	0
County	August 4, 1975	No Report	F1	77 Yards	\$25,000	0
Nr. Fruitland	May 10, 1990	No Report	F1	23 Yards	\$25,000	0
E. Side of Salisbury	May 10, 1990	No Report	F0	100 Yards	\$25,000	0
Nr. Willards	May 10, 1990	No Report	F1	23 Yards	\$25,000	2
Near Hebron	July 5, 2001	Several tree tops snapped or twisted.	F0	50 Yards	\$3,000	0
Quantico	April 28, 2002	Tornado (F0) downed trees and sheared off numerous tree branches along 4 mile path that ended 2 miles southwest of Quantico.	F0	100 Yards	\$5,000	0
2021 HMP Update						
Fruitland - Salisbury	August 7, 2017	Tornado initially touched down near Salisbury Univ. along HW13 & Dogwood Dr. damaging several businesses. It struck a strip mall along HW13 tossing vehicles around in parking lot. A concrete building in the area collapsed due to bay doors being open. Tornado most intense at time of touchdown near Univ. It tracked NE and damaged a home on Rogers Street.	EF1	150 yards	\$750,000	0
Catchpenny - Quantico	August 4, 2020	Brief EF0 tornado developed over the Wicomico River and tracked NW across the Country Club S. neighborhood and Green Hill Country Club. Minor damage occurred to several homes in the back section of CC south. Siding, shingles, and gutters were torn from houses & numerous trees uprooted. Several trees also uprooted on the golf course of the Green Hill CC.	EF0	100 yards	\$50,000	0
Mardela Springs	August 4, 2020	A damage survey conducted by the NWS Wakefield office found a path of storm damage consistent with an EF2 tornado. The tornado touched down near Athol Road just south of Mardela Springs, causing some downed trees and roof damage. It then moved across Main St., causing a house to shift off its foundation. A shed was also totally destroyed. Trees were stripped of bark.	EF2	150 yards	\$230,000	0

Source: NOAA NCEI

Note: Estimated property damage is reported within the NCEI database.

In terms of number of occurrences, the NOAA NCEI listed a total of eight (8) tornado events affecting Wicomico County from 1962-2020. According to the data, on average, Wicomico County experiences approximately 0.14 tornado events per year.

7.7 TORNADO VULNERABILITY

According to the information from the NOAA NCEI, there has been approximately \$1.2 million in property damages due to tornado activity. Although no fatalities have been reported from tornados in Wicomico County, on May 10, 1990, an F1 tornado injured two people. The entire state of Maryland is subject to the possibility of strong tornados. Even though the possibility of such a tornado occurring in Wicomico County is low, it is a real danger and can occur at almost any time, anywhere in the County. However, design standards for all new development within Wicomico County are required to withstand 100 mph wind speeds.



According to a news report by WBAL in Baltimore, on August 4, 2020, a tornado generated by Tropical Storm Isaias moved a resident’s house in Mardela Springs, Wicomico County more than 40 feet off its foundation.

Source: WBAL in Baltimore, August 4, 2020

7.8 HAIL HAZARD CHARACTERIZATION

Hail is only formed during a thunderstorm event. Property damage, specifically crop damage can be caused as a result of hail. Nationally hail causes approximately \$1 billion in damage to property and crops each year. In fact, on April 10, 2001, hail caused \$2 billion in damages in Kansas City. Due to the complexities and various factors involved in the formation of hail particle size and weight can vary tremendously. The typical size of hail is less than 2 inches in diameter; however, hail size may be up to seven inches in diameter as recorded in Nebraska.

According to NOAA, hail is a form of precipitation that occurs when updrafts in thunderstorms carry raindrops upward into extremely cold areas of the atmosphere where they form into ice.

7.9 HAIL HAZARD RISK & HISTORY

No property or crop damage was reported from hail events by the NOAA, NCEI Database for Wicomico County. This could be because if any damage did occur it was not significant enough to be reported. As shown on in Table 7.4, the majority of hail events that have occurred in Wicomico County are before the peak of the growing season which reduces the chance of crop damage.

Table 7.4: Hail Events

Location	Date	Event Narrative	Magnitude
Wicomico	May 15, 1967	No Report	1.25 inches
Wicomico	July 1, 1979	No Report	1.75 inches
Wicomico	August 27, 1992	No Report	1 inch
Salisbury	July 3, 1996	No Report	1.75 inches
Fruitland	March 29, 1997	No Report	1 inch
Delmar	June 2, 1998	No Report	.75 inches

Location	Date	Event Narrative	Magnitude
Fruitland	June 2, 1998	No Report	.75 inches
Salisbury	June 16, 1998	No Report	.75 inches
Salisbury	April 9, 1999	No Report	1 inch
Fruitland	July 24, 1999	No Report	1 inch
Mardela Springs	May 22, 2001	No Report	1.25 inches
Quantico	May 22, 2001	No Report	1.25 inches
Quantico	May 26, 2001	No Report	.75 inches
Delmar	July 5, 2001	No Report	.75 inches
Hebron	April 28, 2002	No Report	1.75 inches
Salisbury	August 2, 2002	No Report	.75 inches
Salisbury	August 2, 2002	No Report	1 inch
Salisbury	July 4, 2006	No Report	.75 inches
Hebron	May 9, 2009	Quarter size hail was reported on Quantico Road.	1 inch
Salisbury	May 29, 2009	Half dollar size hail was reported.	1.25 inches
Parsonburg	May 29, 2009	Golf ball size hail was reported.	1.75 inches
Wicomico	May 29, 2009	Half dollar size hail was reported.	1.25 inches
Willards	May 29, 2009	Golf Ball size hail was reported.	1.75 inches
Mount Hermon	June 3, 2009	Penny size hail was reported in the vicinity of Snow Hill and Johnson Road.	.75 inches
Tyaskin	June 3, 2009	Nickel size hail was reported.	.88 inches
Melson	June 3, 2009	Nickel size hail was reported.	.88 inches
Salisbury	August 1, 2011	Scattered severe thunderstorms in advance of a weak cold front produced large hail across portions of the Lower Maryland Eastern Shore.	1.75 inches
Delmar	August 19, 2011	Scattered severe thunderstorms in advance of a cold front produced damaging winds and large hail across portions of the Lower Maryland Eastern Shore. Quarter size hail was reported.	1.00 inches
2021 HMP Update			
Pittsville	June 24, 2016	Isolated severe thunderstorm along a frontal boundary produced large hail across portions of the Lower Maryland Eastern Shore. Golf ball size hail was reported near Pittsville.	1.75 inch

Source: NOAA NCEI

Note: Estimated property damage is reported within the NCEI database.

In terms of number of occurrences, the NOAA, NCEI listed a total of 21 hail event days affecting Wicomico County from 1967-2020. According to the data, on average, Wicomico County experiences approximately 0.39 hail events per year.

7.10 HAIL VULNERABILITY

Damage to crops is one of the most significant concerns during a hail event. Wicomico County has had the majority of its recorded hail events either before or at the beginning of the growing season. This reduces the amount of crop damage for the County. In addition to crop damage, property damage occurs during hail events. Auto dealerships are particularly vulnerable due to the large volume of product located outdoors. The scale of damage due to the number of cars on large open parking lots can oftentimes be significant, as it is accumulative impact.

7.11 LIGHTNING HAZARD CHARACTERIZATION

According to NOAA, lightning is created as a discharge of built-up energy due to the separation of positive and negative charges which are generated inside a thunderstorm. According to the National Weather Service (NWS), on average, approximately 49 people die each year nationally as a result of lightning strikes. In Maryland, there have been twelve (12) lightning deaths according to the *National Lightning Safety Institute*. All lightning is dangerous and even the

weakest thunderstorm produces lightning. People engaged in swimming, golfing, or hiking are at the highest risk for a lightning strike. Lightning strikes have resulted in over 15 thousand structural fires and burn approximately two million acres of forest per year in the United States.

7.12 LIGHTNING HAZARD RISK & HISTORY

As indicated in Table 7.5 below, lightning strikes have caused multiple structural fires and injured one person and killed another in Wicomico County within the twenty-three (23) years of reported data.

Table 7.5: Lightning Events

Location	Date	Event Narrative	Property Damage
Fruitland	June 15, 1998	Lightning strike caused a fire to a barn and also struck and killed a 20-year-old man.	\$20,000
Salisbury	April 9, 2001	Lightning strike caused a fire to a chicken house.	\$10,000
Fruitland	July 1, 2009	One person was struck by lightning. The individual was released after receiving medical attention.	Not Available
Salisbury	September 5, 2012	Lightning caused three house fires in a short period of time in the Salisbury city limits. Scattered thunderstorms in advance of a cold front produced lightning which caused several house fires across portions of the Lower Maryland Eastern Shore.	\$75,000
2021 HMP UPDATE			
Hebron	June 21, 2016	Scattered severe thunderstorms in advance of a frontal boundary produced damaging winds across portions of the Lower Maryland Eastern Shore. The storms also produced lightning strikes which caused two fires. Lightning strike produced a garage fire.	\$5,000

Source: NOAA NCEI

Note: Estimated property damage is reported within the NCEI database.

In terms of number of occurrences, the NOAA NCEI listed a total of five (5) lightning events with either damages or injuries affecting Wicomico County from 1998-2020. According to the data, on average, Wicomico County experiences approximately 0.22 lightning events per year.

7.13 LIGHTNING VULNERABILITY

As shown in the hazard risk and history for lightning, structural fires do occur in the County as a result of lightning strikes. Fortunately, the damage is usually minor. Community lifelines and public facilities should be aware of the risks of such a hazard occurring, particularly power failure. Emergency backup generators should be installed at these facilities.

7.14 HIGH WIND / STRONG WIND EVENTS IN WICOMICO COUNTY

High and strong wind events can also occur in the County without the presence of thunderstorms. There are several reasons as to how winds can occur without the presence of thunderstorms, such as strong low-pressure systems, cold fronts, remnants of hurricanes, and other meteorological causes. Tables 7.6 and 7.7 list high wind and strong wind events, respectively, that have occurred in Wicomico County according to NOAA NCEI.

High wind events as characterized by NWS are winds that are over 50 knots (57.5 mph), and strong wind events are less than 50 knots.

Table 7.6: High Wind Events

Location	Date	Event Narrative	Magnitude (MPH)	Property Damage
Salisbury	November 2, 1999	Non-thunderstorm wind gust of 54 knots (62 mph) with trough passage in downtown Salisbury along Route 50.	62	Not Available
Countywide	September 1, 2006	The remnants of Ernesto along the Mid Atlantic coast combined with strong high pressure over New England produced very strong winds across the Lower Maryland Eastern Shore. Sustained winds in mph ranged from the lower 40s to near 50 with maximum gusts ranging from the mid-50s to as high as the mid-70s. Some higher sustained winds included 45 mph (39 knots) at Salisbury. The high winds caused numerous downed trees and power outages, along with significant structural damage.	45 – 66	5 million
Not Available	May 11, 2008	Ocean City Coast Guard Station measured a wind gust of 63 mph. High winds from strong low pressure downed trees and powerlines and caused some structural damage. There were widespread power outages.	63	\$25,000
Salisbury	December 31, 2008	Wind gust of 54 knots (62 mph) was measured at Salisbury. Several trees were downed.	62	\$2,000
Countywide	February 25, 2011	Wind gust of 59 mph was measured by SBY.	59	\$2,000
Countywide	October 29, 2012	The very strong winds caused by Tropical Cyclone Sandy downed trees, produced minor structural damage, and caused scattered power outages.	58	\$10,000
2021 HMP UPDATE				
Countywide	January 23, 2016	Strong Low Pressure moving from the Southeast United States northeast and off the Mid Atlantic Coast produced very strong wind gusts across portions of the Lower Maryland Eastern Shore. Wind gust of 50 knots (58 mph) was measured at SBY.	58	\$0k
Countywide	March 2, 2018	Intense low pressure spinning off the southern New England coast produced very strong northerly winds across portions of the Lower Maryland Eastern Shore. The very strong winds downed numerous trees, produced structural damage, and caused power outages. The very strong winds downed trees, produced minor structural damage, and caused power outages. Wind gust of 53 knots (61 mph) was measured at SBY.	61	\$25,000
Countywide	October 11, 2018	Tropical Cyclone Michael tracked from South Carolina northeast and off the Mid Atlantic Coast from Thursday morning, October 11 into early Friday morning, October 12. Very strong northwest winds on the back side of the storm produced damaging wind gusts across portions of the Lower Maryland Eastern Shore. Several trees were downed and there was minor structural damage.		\$5,000

Source: NOAA NCEI

In terms of number of occurrences, the NOAA, NCEI listed a total of nine (9) high wind events affecting Wicomico County during the years 1994-2020. According to the data, on average, Wicomico County experiences approximately 0.41 high wind events per year.

Table 7.7: Strong Wind Events

Location	Date	Event Narrative	Magnitude (MPH)	Property Damage
Salisbury	February 10, 2008	Wind gust of 48 mph was measured at Salisbury.	48	\$1,000
Salisbury	March 8, 2008	Wind gust of 42 knots (48 mph) was measured at Salisbury.	48	\$1,000
2021 HMP Update				
No Strong Wind events were reported in the NCDC database since the 2016 HMP Planning Process.				

Source: NOAA NCEI

Note: Estimated property damage is reported within the NCEI database.

In terms of number of occurrences, the NOAA NCEI listed a total of two (2) strong wind events affecting Wicomico County from the years 2008-2020. According to the data, on average, Wicomico County experiences approximately 0.15 strong wind events per year.

7.15 HIGH WIND / STRONG WIND VULNERABILITY

As shown in the hazard risk and history for high/strong winds, damages can and do occur in the County as a result of high and strong winds. The primary vulnerability due to high/strong winds is from downed trees impacting power lines and other infrastructure, resulting in power outages, road blockages, and other infrastructure damage. Additionally, these wind events have the potential to be dangerous because they may not be associated with an anticipated hazard such as an approaching thunderstorm or other event.

7.16 CONCLUSION

Severe weather oftentimes results in power outages, which disrupts operations at facilities that provide vital services to and for the community. Continuous power at community lifeline facilities are a priority. Generators are an important part of any preparedness, mitigation, and continuity of operations planning.

Emergency generator back-up power at Wicomico County community lifelines facilities listed within Appendix D were reviewed by the Hazard Mitigation Planning Committee (HMPC) for this plan update. This review yielded the following updates:

- Since the implementation of the 2016 Wicomico County HMP Update, several facilities have upgraded their generator capabilities. The previously identified facilities of James M. Bennett High School and the Wicomico Youth and Civic Center have received updated and /or new generators.
- Additionally, plans are ongoing to install new generators at Salisbury Middle and Parkside High Schools.
- The recommendation for generators at the Wicomico County Solid Waste Complex is on-going and partially complete.
- Finally, the installation of generators at high priority pumping locations in Salisbury: Waverly Drive, College Avenue, and Cherokee Lanes have been completed.

Damages from severe weather can result in problems at communication towers. Impacts to communication towers are problematic especially during a hazard event. Review communication towers, specifically those used by Public Safety, for grounding and surge protection devices.