HAZARD VULNERABILITY AND RISK ASSESSMENT

44 Code of Federal Regulations

44 CFR §201.6(c)(2)(ii):	A description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description must include an overall summary of each hazard and its impact on the community. All plans approved after October 1, 2008 must also address NFIP insured structures that have been repetitively damaged by floods. The plan should describe vulnerability in terms of:
(A)	The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas;
(B)	An estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate;
(C)	Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions

44 CFR §201.6(c)(2)(iii): For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

Background

To complete the Hardee County 2025 Multi-Jurisdictional Local Mitigation Strategy (LMS), the LMS Working Group will perform a Hazard Vulnerability and Risk Assessment (Assessment) to determine the impacts that hazards have on built environments and how they affect the safety of residents. The results of the Hazard dentification and Analysis (Section III) indicate hazards that warrant an Assessment due to the frequency of occurrence and resulting damage. The Assessment uses the information generated in the hazard identification, analysis, and hazard profile to identify locations where residents may suffer the greatest injury or property damage in the event of a disaster. The Assessment identifies the effects of hazard events by estimating the relative hazardous condition exposure of people, buildings, and infrastructure. Depending on the data available, an assessment may involve counting the number of structures or people in the path of hazards or describing what hazards may have on physical, social, and economic impacts.

Asset Inventory

Asset identification is a critical step in the hazard mitigation planning process. Taking an inventory of structures and populations provides insight into the County's vulnerability to hazards, and the magnitude of potential damages. Risk assessment models examine the impact of hazards on the built environment, including the general building stock (residential, commercial, industrial, etc.), critical facilities, government operations, shelters, hospitals and health care facilities, utilities, water and wastewater, hazardous material sites, and schools. The LMS Working Group will analyze data from the Florida Division of Emergency Management (FDEM) Geographical Information Systems (GIS) Critical Facilities inventory and local critical facility information to assess vulnerability. FDEM's Critical Facilities inventory includes shelters, health care facilities, schools, emergency services, and infrastructure.

General Acreage, Building Valuation, and Total Valuation

The LMS Working Group utilized County tax assessment data and 2022 US Census data to develop an inventory of the built environment and population. The LMS Working Group utilized GIS software

to estimate the number of acres, structures, and individuals at risk from select hazards for the incorporated and unincorporated areas of Hardee County. Department of Revenue (DOR) Use Codes assigned by the Hardee County Property Appraiser indicate approximately 37 percent of the lands within incorporated areas of Hardee County have a residential land DOR classification, 36 percent have a Government/Institutional Lands DOR Classification, 16 percent have an agricultural land DOR classification, 9 percent have a Commercial DOR Classification, and 2 percent have a miscellaneous land DOR classification. Hardee County Property Appraiser data indicates approximately 80 percent of the lands within unincorporated areas of Hardee County have an Agricultural land DOR classification and 15 percent have a miscellaneous DOR classification. DOR Use Codes identify the majority of the land in unincorporated Hardee County as agricultural, the majority of the building valuation is residential. (Figures IV.1 through IV.6 and Tables IV-1 and IV.2).

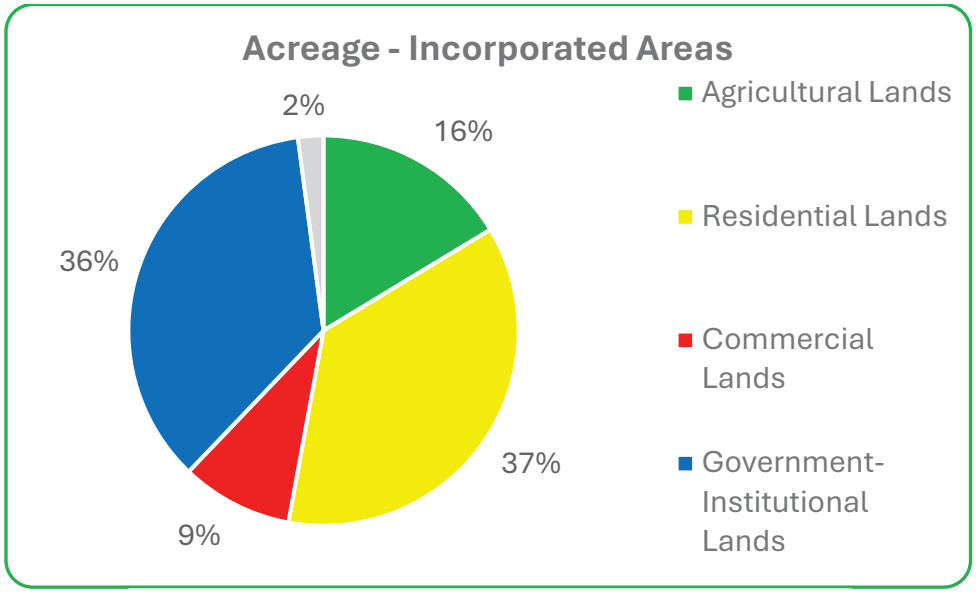


Figure IV.1: Acreage for Incorporated Areas

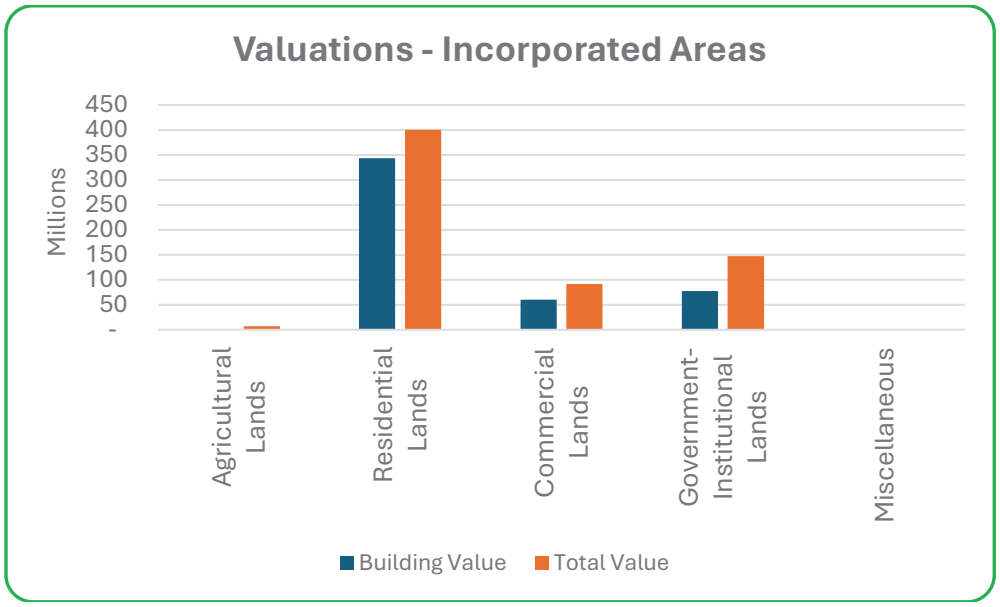


Figure IV.2: Valuations for Incorporated Areas

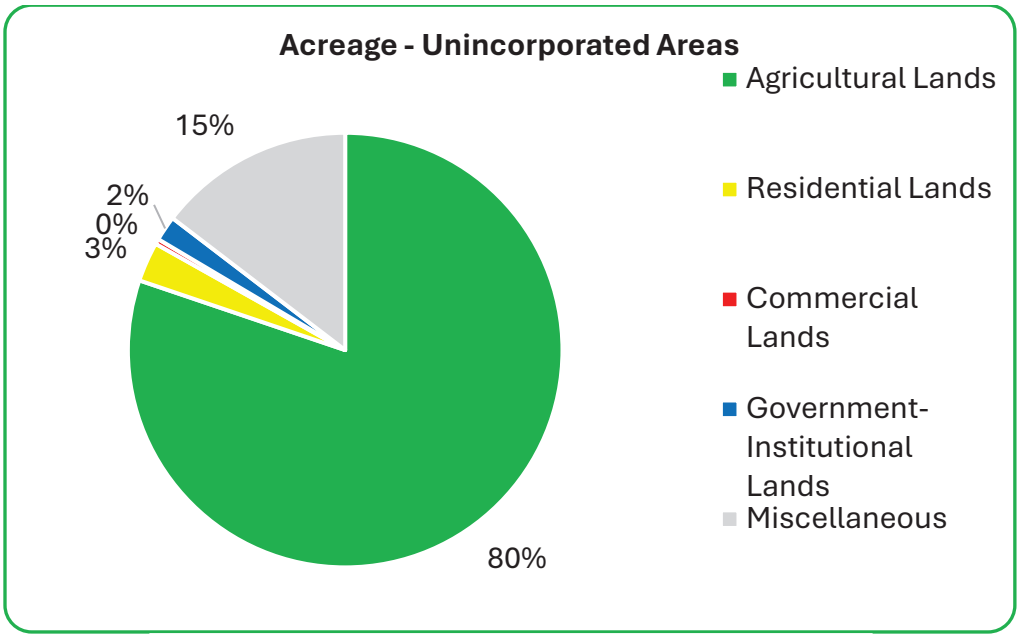


Figure IV.3: Acreage for Unincorporated Areas

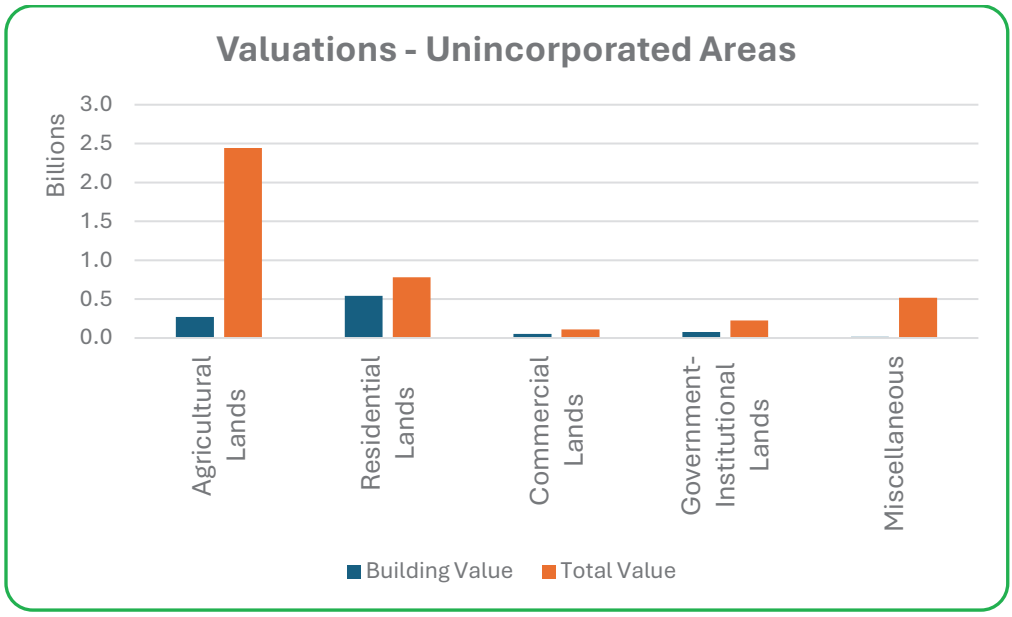


Figure IV.4: Valuations for Unincorporated Areas

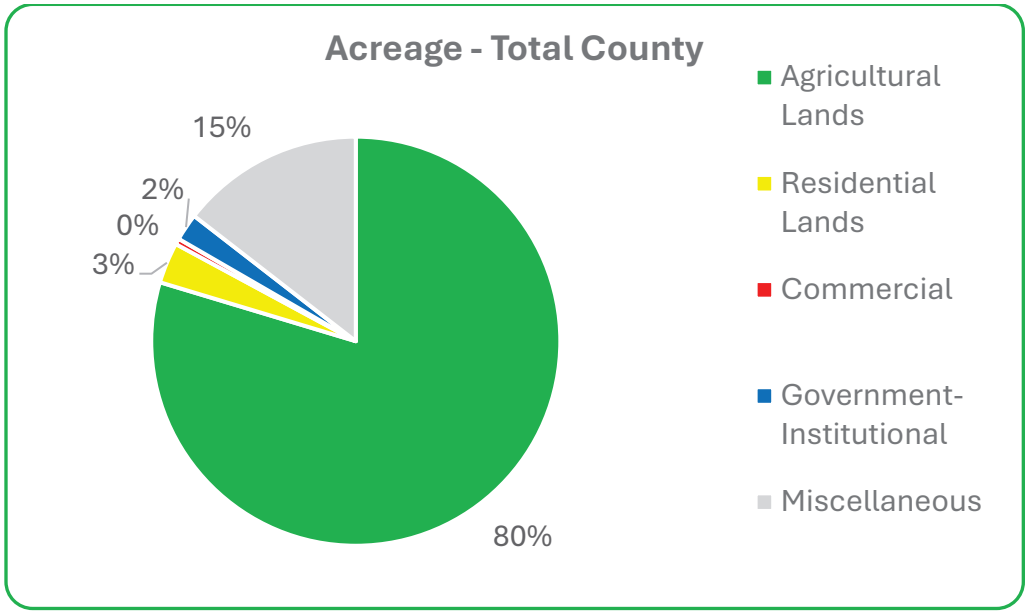


Figure IV.5: Acreage for Total County

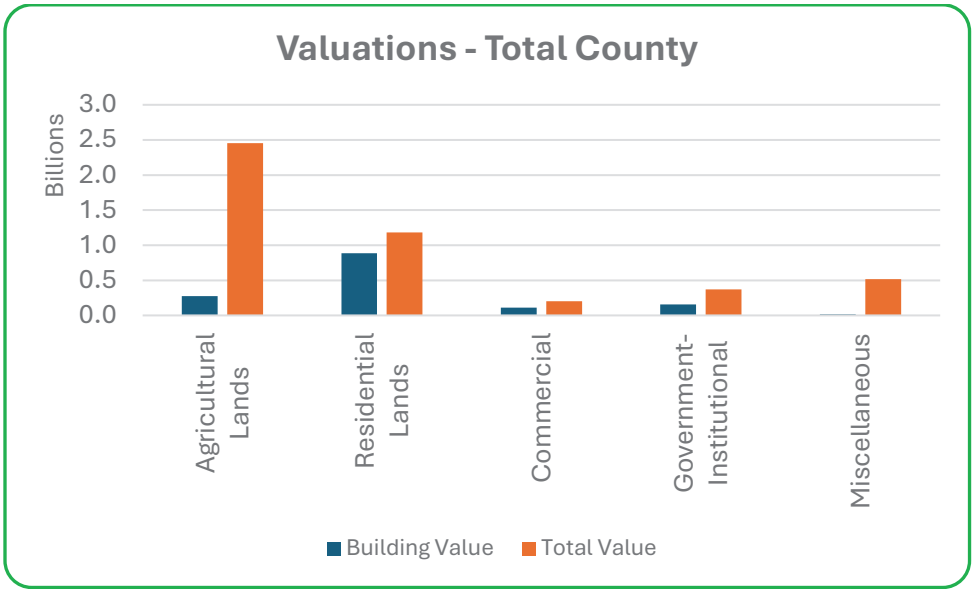


Figure IV.6: Valuations for Total County

Tables below include the summary of acreage, building value, and total value for the incorporated and unincorporated portions of the County and the County as a whole. The following Tables includes these values for each municipality.

TABLE IV-1:
ACREAGE, BUILDING VALUE, AND TOTAL VALUE INCORPORATED

Land Type	Acreage	Building Value ($)	Total Value ($)
Agricultural Lands	561	1,304,026	7,334,557
Residential Lands	1,254	343,274,046	400,556,607
Commercial/Industrial	318	60,186,766	91,395,365
Government/Institutional	1,227	77,222,662	147,112,962
Miscellaneous	72	512,169	1,512,905
Total Lands	3,431	482,499,669	647,912,396

Source: Hardee County Property Appraiser and Jurisdictions

TABLE IV-2:
ACREAGE, BUILDING VALUE, AND TOTAL VALUE UNINCORPORATED

Land Type	Acreage	Building Value ($)	Total Value ($)
Agricultural Lands	320,069	272,408,105	2,445,364,811
Residential Lands	11,726	544,148,897	781,746,073
Commercial/Industrial	1,553	51,979,370	111,678,657

Land Type	Acreage	Building Value ($)	Total Value ($)
Government/Institutional	7,441	79,467,321	224,625,495
Miscellaneous	58,312	16,129,188	517,363,036
Total Lands	399,101	964,132,881	4,080,778,072

Source: Hardee County Property Appraiser and Jurisdictions

TABLE IV-3:
ACREAGE, BUILDING VALUE, AND TOTAL VALUE TOTAL COUNTY

Land Type	Acreage	Building Value ($)	Total Value ($)
Agricultural Lands	320,630	273,712,131	2,452,699,368
Residential Lands	12,980	887,422,943	1,182,302,680
Commercial/Industrial	1,870	112,166,136	203,074,022
Government/Institutional	8,666	156,689,983	371,678,457
Miscellaneous	58,384	16,641,357	518,875,941
Total Lands	402,531	1,446,632,550	4,728,630,468

Source: Hardee County Property Appraiser and Jurisdictions

TABLE IV-4:
VALUATIONS BY MUNICIPALITY: BOWLING GREEN

Land Type	Acreage	Building Value ($)	Total Value ($)
Agricultural Lands	95	1,381,750	767,306
Residential Lands	413	20,426,201	93,622,486
Commercial/Industrial	34	1,643,268	4,922,258
Government/Institutional	109	2,983,791	7,746,570
Miscellaneous	16	401,839	57,520
Total Lands	668	26,836,849	107,116,140

Source: Hardee County Property Appraiser and Jurisdictions

TABLE IV-5:
VALUATIONS BY MUNICIPALITY: WAUCHULA

Land Type	Acreage	Building Value ($)	Total Value ($)
Agricultural Lands	439	4,255,943	151,658
Residential Lands	577	24,601,370	193,132,101
Commercial/Industrial	189	20,597,407	49,421,308
Government/Institutional	556	17,363,816	62,142,540
Miscellaneous	48	556,206	394,971
Total Lands	1,808	67,374,742	305,242,578

Source: Hardee County Property Appraiser and Jurisdictions

TABLE IV-6:
VALUATIONS BY MUNICIPALITY: ZOLFO SPRINGS

Land Type	Acreage	Building Value ($)	Total Value ($)
Agricultural Lands	27	308,090	385,062
Residential Lands	264	7,864,681	56,519,459
Commercial/Industrial	94	6,343,397	5,843,200
Government/Institutional	562	7,725,825	7,333,552
Miscellaneous	7	19,032	59,678
Total Lands	955	22,261,025	70,140,951

Source: Hardee County Property Appraiser and Jurisdictions

Critical Facilities

Hardee County has an inventory of existing critical facilities located within the hazard area. For purpose of this LMS, these include emergency service facilities, medical facilities, government facilities, schools, emergency/evacuation shelters, fire and police stations, emergency operations center, facilities used by special needs populations, power companies and any other facility identified by the Office of Emergency Management. This critical facilities list aligns with the critical infrastructure sectors outlined by the Department of Homeland Security and is updated annually.

The identified potentially at-risk critical facilities and structures for Hardee County are listed in the Critical Facility List maintained by Hardee County Office of Emergency Management. The Hardee County Comprehensive Emergency Management Plan contains additional information in regards to vulnerable existing critical facilities. The Critical Facility List contains confidential information so therefore is not published with this plan.

Government Operations

Hardee County and its jurisdictions use several facilities, offices, and stations to house and coordinate hazard and emergency response activities. These facilities also provide locations to direct operations prior to, during, and after a hazard event. Although many facilities are designed to withstand a variety of hazards, several other facilities are not designed as such and need additional hardening.

Schools/Shelters

Schools house thousands of children during each weekday, and entire communities use school facilities for educational, recreation, and other activities throughout the year. Emergency events may cause disruption to these activities. If schools are open for following emergency events, parents may focus on home and business cleanup and rebuilding.

School buildings are used as hurricane shelters in Hardee County. Emergency plans call for evacuation of affected communities to these shelters in the event of a major storm. As in many other areas in the United States, emergency preparedness officials have expressed concerns about the adequacy of shelters to house evacuated populations. Shelter criteria from the American Red Cross limits the number of existing structures to house people during evacuations. Shelters cannot be in evacuation zones, must be outside the Category 4 storm surge area, and must provide 20 square feet of space per individual.

According to the 2024 Statewide Emergency Shelter Plan, the Hardee General Population Demand is sufficient while the special needs demand is deficient.

Hospitals and Health Care Facilities

Hardee County does not have a trauma center. The nearest trauma center is located in Lakeland in Polk County. When a large-scale event (such as a hurricane) threatens the County and requires evacuations there may be impacts to the County hospital and other health care facilities. During this scenario, the hospital may be limited in their ability to provide care during or shortly after the event. Should the event cause significant damage, reentry may not occur for any portion of the general population until the hospital is able to provide care.

After sudden events in which evacuation is not an option, the hospitals and other health care facilities will serve as critical facilities for the treatment and care of the injured, as well as providing ongoing care to the remainder of the community. During a flood event, hospitals should expect an influx of residents, including infirm and aged individuals.

Utilities

Electrical and communication utility providers have contingency plans and design equipment to mitigate hazard events, but services may still be disrupted. After an event, these providers will need to mobilize labor and equipment to restore services. Loss of electrical power may affect fire protection resources and potable water, especially for smaller or individual water utility and electric systems. Such disruptions may impact emergency management officials' ability to predict when displaced populations can safely return to homes and businesses. Communication failures may

have an immediate impact on directing crews to fix services, and coordination of emergency management activities.

Water/Wastewater

Potable water supplies in Hardee County face a variety of hazards during a flood event. The first is possible contamination of the public utility and private wells that furnish potable water. Another hazard is loss of plant capacity resulting from floodwaters and the ability to properly dispose of sewage. This manifests through submerged sanitary sewers, septic systems, and wastewater treatment facilities. Periods of high saturation, like flood events, may reduce system efficiency. Septic systems submerged by floodwaters may pose health risks through the introduction of pathogenic organisms into the environment. The higher saturation associated with such events may result in septic drain field failures. Freeze events may lead to a drawdown of water as the agricultural industry uses water from wells to protect crops. If users draw enough water out of the aquifer, the water table may fall to a level where residents served by private wells no longer have access to water and well pumps may fail.

Methodology

The maps in Appendix B demonstrate vulnerability or potential effects of hazards for Hardee County and municipalities. The maps identify structures for each hazard and include municipal boundaries. While the impacts apply to the entire planning area, the analysis includes specific information for municipalities when available. The building and total valuations in Tables IV-1 and IV-2 serve as the basis for the potential estimated dollar losses. These numbers change based on the identified potential hazard impact areas, as applicable and the narrative for each identified hazard includes a summary by municipality.

FEMA National Risk Index

The FEMA National Risk Index Map is an interactive map to visually explore natural hazard risk data across the United States (https://hazards.fema.gov/nri/map). According to the website, the National Risk Index's interactive mapping and data-based interface enables users to visually explore individual datasets to better understand what is driving a community's natural hazard risk. Expected Annual Loss (EAL) represents the average economic loss in dollars resulting from natural hazards each year. It is calculated for each hazard type and quantifies loss for relevant consequence types: buildings, people, and agriculture. The risk analysis utilizes the information from this website to help analyze the risks in Hardee County.

Disclaimer

The maps and potential loss estimation tools provided in this document are for planning purposes only. Uncertainties are inherent in any loss estimation methodology and arise in part from incomplete scientific knowledge concerning natural hazards and their effects on the built environment. Uncertainties also result from approximations and simplifications necessary to conduct such a study including: incomplete or outdated data on inventory, demographic, or economic variables or parameters; the unique nature and severity of each hazard when it occurs; and the amount of advance notice that residents have to prepare for the incident. As a result,

potential exposure and loss estimates are approximations and should not be interpreted or used as precise results; they should only be used to understand relative risk.

Vulnerability and Risk Assessment

Risk estimate is based on the judgment of local planners and the LMS Working Group regarding the likely frequency of occurrence of a hazard event compared to its probable consequences or impacts. If a hazard event occurs frequently, and has very high consequences, that hazard poses a very high risk to the affected community. In comparison, if a hazard event is not expected to occur frequently, and even if it did, the consequences would be minimal, then the hazard is considered to pose a very low risk. The hazard vulnerability risk level for the LMS follows the approach utilized in the 2018 Florida Enhanced State Hazard Mitigation Plan.

- Low (One Occurrence every 10 years)
- Medium (One occurrence every 5-7 years)
- Medium/High (One occurrence every 3 years)
- High (One or more occurrence each year

As described in Section III, the following hazards are determined to be minimal to low risk/impact/severity to Hardee County, its municipalities, and partners. The LMS does not include any further evaluation in relation to vulnerability and consequences to people, property, critical infrastructure, environment, economy, and response operations.

- Winter Storm
- Earthquake
- Landslide
- Tsunami
- Erosion
- Storm Surge
- Sea Level Rise
- Mass Immigration/Migration
- Nuclear
- Space Weather

The LMS Working Group identified hazards with medium to high risk in relation to potential frequency and consequences of impact to Hardee County and its jurisdictions. They include:

- Extreme Temperatures (Heat and Freezes
- Hurricanes/Tropical Storms
- Severe Weather, including
  - Tornadoes
  - Hail
  - Lightning
  - Thunderstorms
- Land Subsidence (Sinkholes)
- Drought
- Flood
- Wildfires
- Domestic Security Incident/Civil Disturbances
- Cyber-Attacks
- Dam/Levee Failures
- Harmful Algal Blooms
- Hazardous Material Incidents/Radiological
- Human Health Incidents
- Transportation Incidents
- Agricultural Disruptions

Because these hazards have at least a medium risk in relation to frequency and consequences, the LMS includes them in the vulnerability analysis. Additional information on these hazards includes geographic areas; degree of severity or magnitude; comparison of jurisdictional risk; and existing and future structures and critical facilities. Due to similar linkages, the vulnerability assessment combines some of the hazards listed above.

Extent Atmospheric Hazard Vulnerability and Risk

Extreme Temperatures (Heat and Freeze)

Extent

A heat wave is an abnormally high temperature and unusually high humidity sustained over a period of at least one day. In Hardee County, these temperatures can range above 90°F. Heat waves in Florida typically occur during periods of drought, low humidity, and mostly clear skies. In May 1945, the temperature in Wauchula was recorded at 104˚F. August is the hottest month for Hardee County with an average high temperature of 92.4°, which ranks it as one of the hottest places in Florida. In Hardee County, there are 115.5 days annually when the high temperature is over 90°, which is one of the hottest places in Florida.

The lowest temperature in Hardee County was 12˚F in 1906. January has the coldest nighttime temperatures for Hardee County with an average of 48.1°. This is about average compared to other places in Florida. There are 4.2 days annually when the nighttime low temperature falls below freezing, which is colder than most places in Florida.

During extreme heat events, temperatures may reach over 100 degrees Fahrenheit. Potentially high relative humidity could drastically increase the apparent temperature by 10 degrees or more. While there is not a history of Extreme Heat in our county, we recognize it can affect our jurisdictions in Wauchula, Bowling Green, Town of Zolfo, Ona, and unincorporated portions of Hardee County in the future.

The magnitude or severity of freezes that may occur within the planning area could be as low as 20 degrees Fahrenheit or, in rare cases, a few degrees lower. The severity of the impacts associated with freezes depends on multiple factors including timing, location, and duration of the freeze and types of crops being grown during the event. Winter storms create a higher risk of car accidents, hypothermia, frostbite, carbon monoxide poising and heart attacks from overexertion.

Vulnerability Summary

Vulnerability to extreme temperatures is low to medium and Bowling Green, Wauchula, Zolfo Springs, and unincorporated Hardee County are all at risk. The County's very young, elderly, and homeless populations (see Section I) are at the highest risk for injury or death from extreme heat or cold. Extreme temperatures may have a greater impact on the homeless population, the elderly, and the very young. Impacts to persons who work outside are also of concern.

With its location in Central Florida, Hardee County is susceptible to periods of extreme heat. In addition to deaths, extreme heat events cause a wide range of other health problems such as rashes,

cramps, heat exhaustion, and heat stroke. Extreme heat can also make existing medical conditions worse.

Higher electrical demand during extreme temperatures often causes power outages that further exacerbate the impacts of the event. Extended periods of extreme temperatures can also have a negative impact on wildlife and fishery habitats. If water levels drop to where authorities expand water restrictions, agriculture is vulnerable.

The extent of severe cold and freeze damage is greatest where farms and groves are located; therefore, the agriculture industry is at risk. According to the Hardee County Farm Bureau, in 2022 Hadee County consisted of 920 farms totaling 290,964 acres that produced an average of $228 million in products sold.

Risk Assessment

A hot day in Hardee County is considered to be any day above a "feels like" temperature of 108ºF. Hardee County is expected to experience 7 hot days this year. Due to a changing climate, Hardee County will experience 26 days above 108ºF in 30 years. Hardee County's population of elderly and homeless individuals are especially at risk to the impacts of extreme temperature events. Based on current census data, 15 percent of Hardee County's population is 65 years of age or older.

As shown on the figures below, the FEMA Natural Risk Index for Natural Hazards identifies the majority of the block groups in the County as having a relatively moderate risk for cold wave and an expected annual loss of relative low. With a frequency of 0.2 event per year, the expected annual loss is 94 thousand dollars.

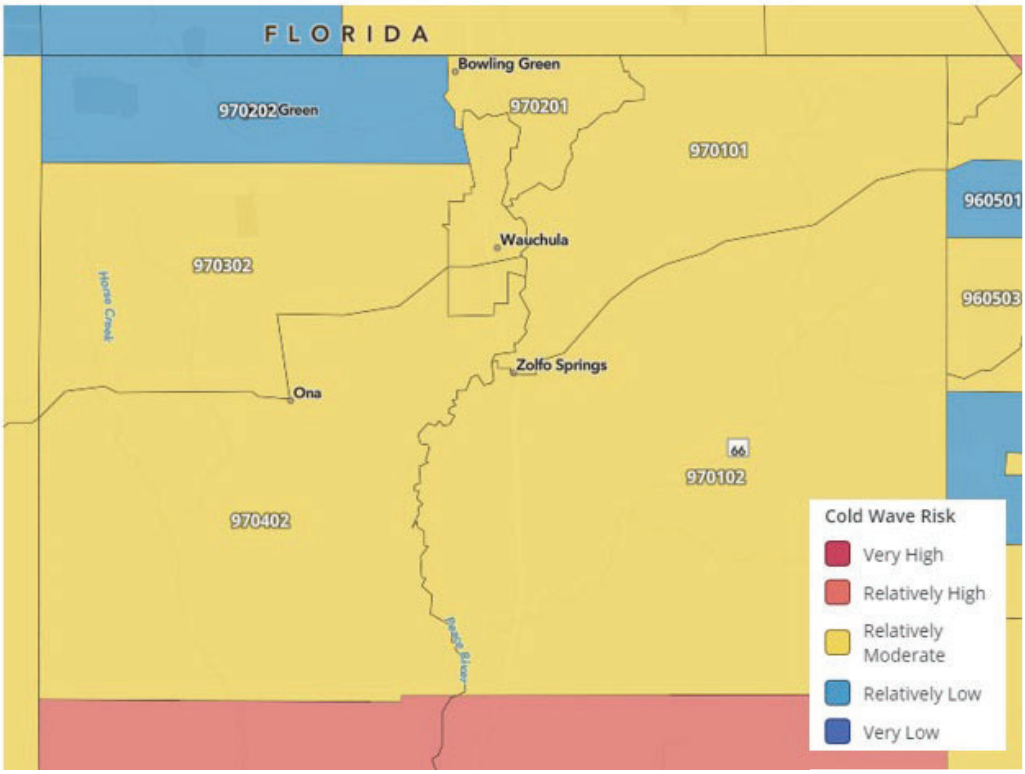


Figure IV.8: Cold Wave Risk Map; Source: *https://hazards.fema.gov/nri*

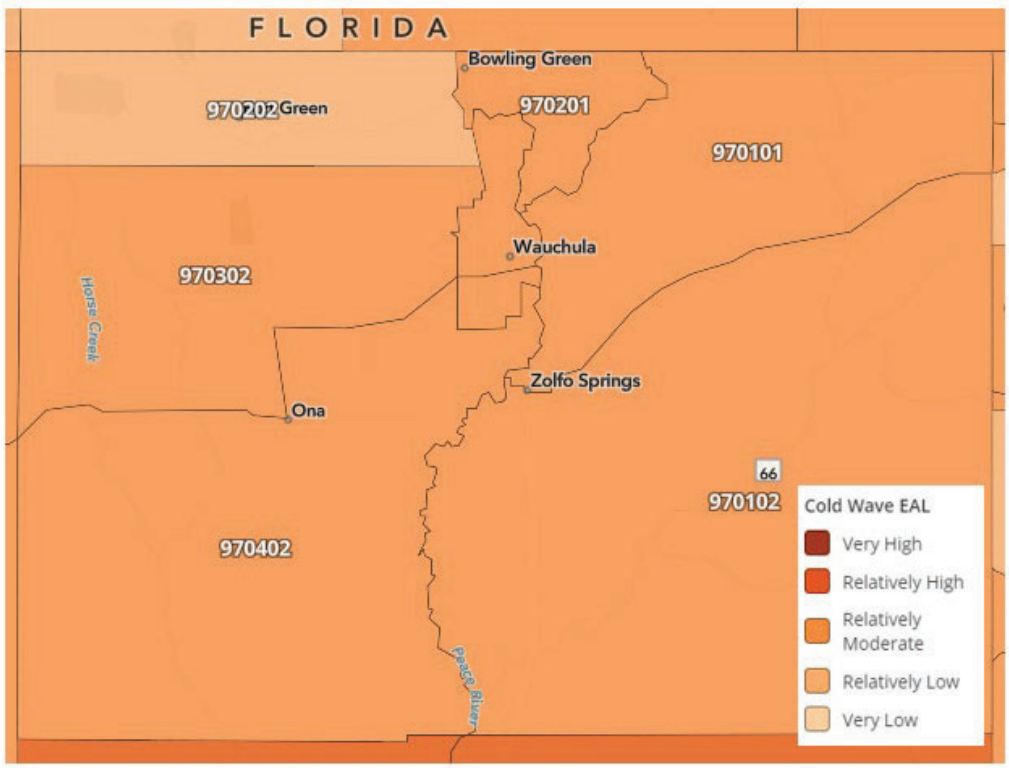


Figure IV.9: Cold Wave Expected Annual Loss Map; Source: *https://hazards.fema.gov/nri*

Hurricanes/Tropical Storms

Extent

Hardee County and its jurisdictions are at high risk from hurricanes, with 100% of homes in the county at some risk. The county has an extreme Wind Factor™ risk, which is based on the likelihood and speed of hurricanes and other severe storms. Average maximum wind speeds in Hardee County are higher than they were 30 years ago. Over the past 20 years, Hardee County has declared 23 disasters, most of which were related to hurricanes.

Vulnerability Summary

Hardee County's location in Central Florida makes it vulnerable to hurricane impacts including property and utility damage from high winds and rain-induced flooding. Older buildings, dilapidated housing, and other less hardened properties, such as mobile homes are most susceptible to damage. Approximately 24.2 percent of the housing stock is mobile homes or trailers. Widespread electrical outages are likely, as are water and sewage backup in flooded areas. Depending on the intensity of a hurricane, economic impacts can be severe. Hurricane and tropical storm events may impact all populations, but those at highest risk are the elderly, the disabled, lower income, and the homeless. Hurricanes can also cause extensive environmental damage.

As the population increases, ensuring that Hardee County has enough shelter space to provide for its residents and evacuees of surrounding areas is a priority. The protection of critical infrastructure, communication systems, and power sources is important to recovery after a hurricane/tropical

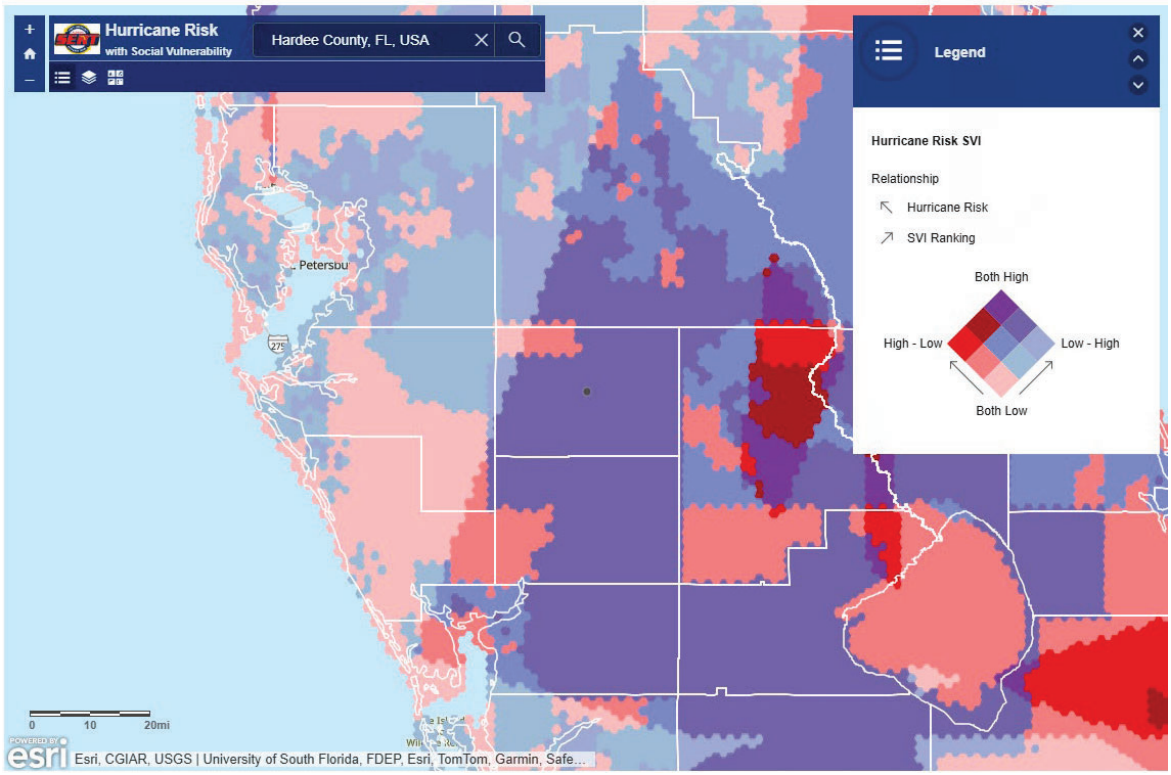
storm event. Hardee County and the jurisdictions should continue to ensure that private and public sector facilities meet existing building codes to withstand the impacts of hurricanes.

All of Hardee County is vulnerable to high winds during hurricanes and tropical storms. The greatest danger from winds is to those living in structurally unsound housing and mobile homes. Encouraging residents and business owners to protect their homes and facilities with storm shutters and generators will reduce the damage caused by tropical cyclones.

High winds can create significant quantities of debris from downed trees, branches, and damaged buildings. This debris can impede emergency response efforts, present a safety hazard for emergency and repair workers and citizens, and present significant removal, storage, and disposal issues.

All jurisdictions have an equal risk to hurricane impacts. Recent history indicates that residents can expect a hurricane to affect Hardee County every two to three years, and the most likely event will be a Category 3 or lesser storm. The probability of being affected by a hurricane is low to medium.

The following bivariate analysis map intersects hurricane risk data with Social Vulnerability Index (SVI) score. The map shows the relationship between hurricane risk and social vulnerability and visualizes the data using a combination of shades of red and blue. Shades of red correspond to hurricane risk and shades of blue correspond to SVI. As risk and the SVI score increases, the color darkens. When combined, the areas with the highest risk and SVI score are shown in purple. Bowling Green, Wauchula, Zolfo Springs, and the majority of unincorporated Hardee County are located in the purple.



Risk Assessment

As shown on the figures below, the FEMA Natural Risk Index for Natural Hazards identifies the majority of the block groups in the County as having a relatively high to high risk for hurricanes. The expected annual loss for the majority of the Block Groups is relatively high to very high. With a frequency of 0.2 event per year, the expected annual loss is 9.6 million dollars.

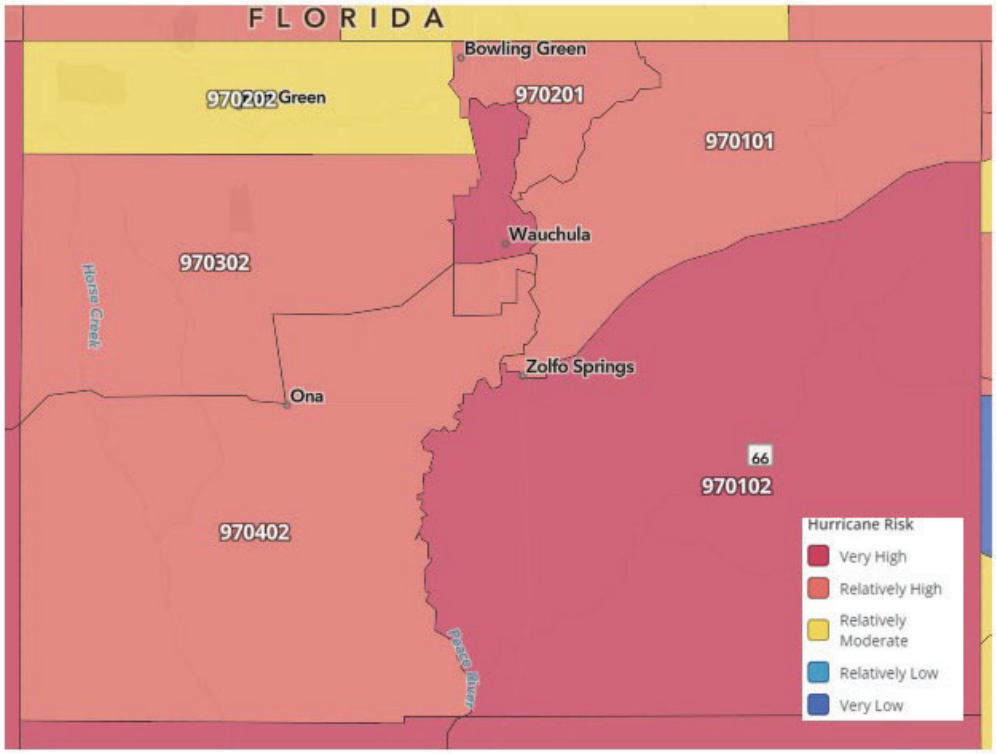


Figure IV.8: Hurricane Risk Map; Source*: https://hazards.fema.gov/nri*

Severe Weather (Tornadoes, Hail, Lightning, and Thunderstorms)

Extent

The magnitude or severity of future tornadoes is likely to be an F0-F1 tornado rating as measured by the Fujita Scale. Tornadoes effect the environment by destroying buildings and trees. Tornadoes also kill animals, which effect the food chain and disrupts the whole environment. They can also destroy farms, which means food shortages around the surrounding area.

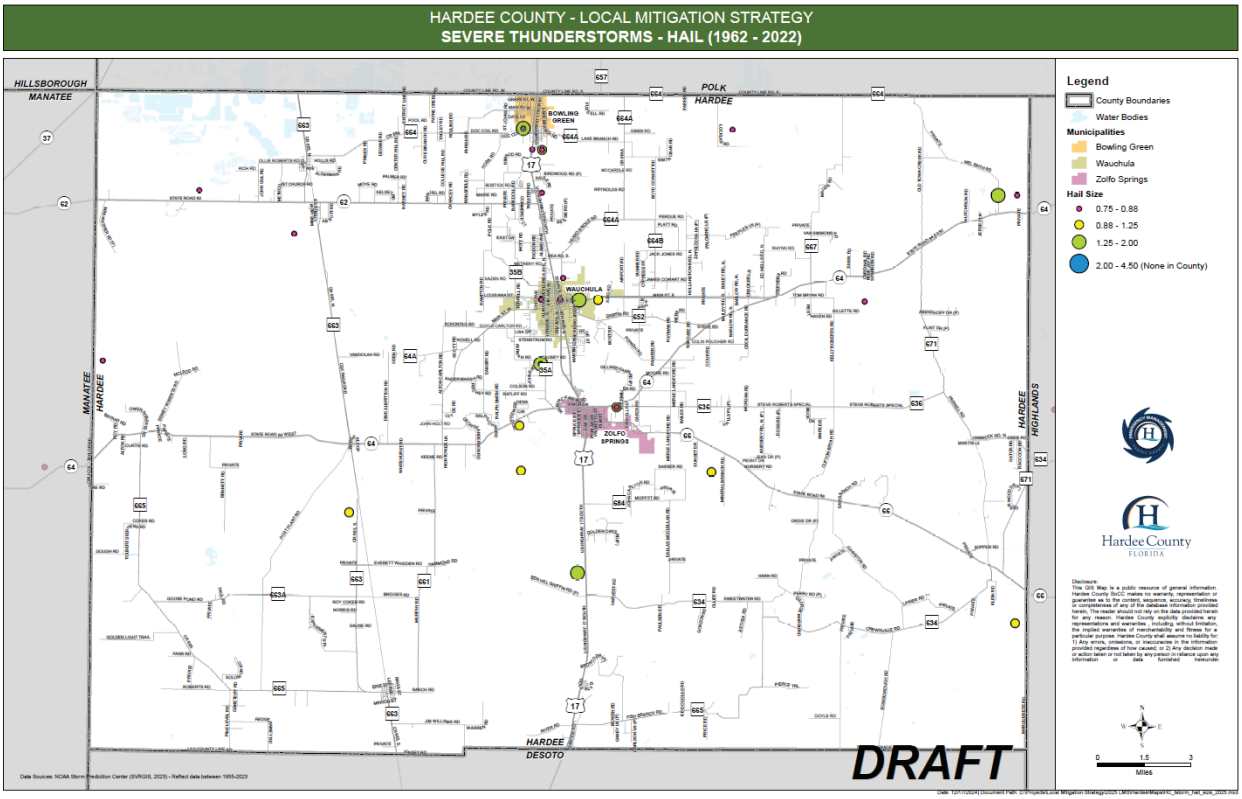


Figure VI.9: Hail locations and size; Source*: NOAA*

The magnitude or severity of thunderstorms is measured by the diameter of hail, the speed of wind, or the occurrence of tornadoes it produces. Severe thunderstorms, as defined above, are expected to occur at some point throughout the entire planning area. The extent of damage from the occurrence of severe thunderstorms largely depends on the amount of lightning and hail produced by the event, the speed of winds, and the amount, location and duration of rainfall associated with the event.

Every thunderstorm produces lightning, which kills more people each year than tornadoes. Heavy rain from thunderstorms can lead to flash flooding; which is the number one thunderstorm killer. Strong winds, hail, and tornadoes are also dangers associated with some thunderstorms.

Vulnerability Summary

Hailstorms associated with thunderstorms may occur in any area of the County, and may be associated with damage to roofs, skylights, windows, and automobiles. Hail is more likely to damage older construction and mobile homes. The FEMA National Risk Index identifies hail as a Very Low risk across the entire County and a Very Low Expected Annual Loss rating with an EAL value of $3,187.

The risk of lightning is high in Hardee County, mostly affecting electrical service to communities with restoration of service typically occurring within the same day. More critical is potential loss from physical damage and loss to government and business computer systems/networks. Many lightning victims are individuals who were engaged in work or recreation at the time of a lightning strike.

As shown on the Figure below, the FEMA National Risk Index identifies lightning at a risk from Relatively low through Very High. Wauchula has a Very High Risk. Bowling Green has a Relatively Low or Relatively High-Risk Index. Zolfo Springs has a Relatively Moderate and Relatively High-Risk Index. The County as a whole has a Relatively Low Risk Index. The expected annual loss is 129 thousand dollars with an exposure of 297 billion dollars/ s the entire County and a Very Low Expected Annual Loss rating with an expected annual loss of $129,291.

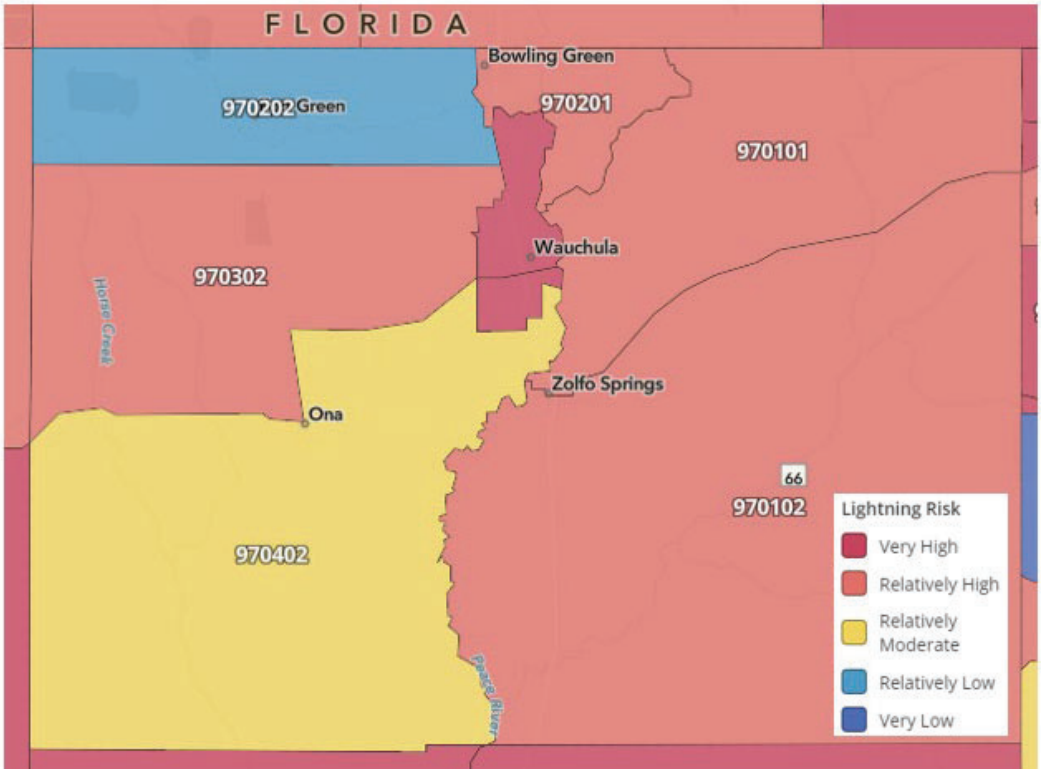


Figure IV.10: Lightning Risk Map; Source: *https://hazards.fema.gov/nri*

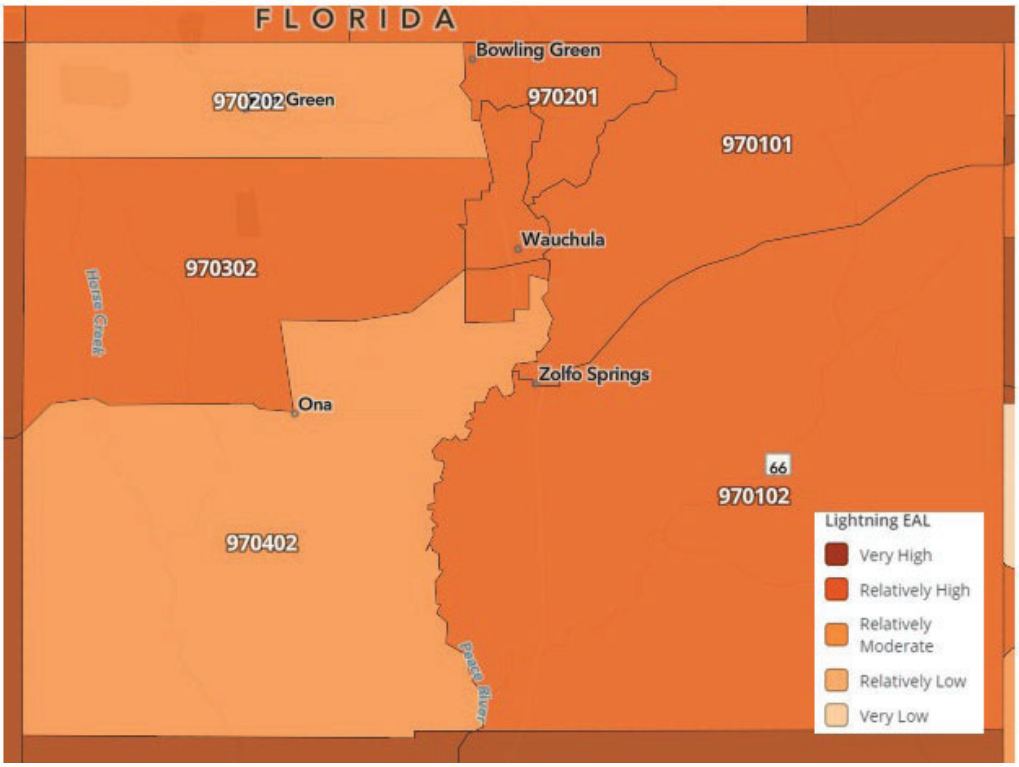


Figure IV.11: Lightning Expected Annual Loss Map; Source: *https://hazards.fema.gov/nri*

Hardee County and its jurisdictions are vulnerable to thunderstorms. Most of the time, local thunderstorms are ephemeral events that create localized nuisance flooding. However, some thunderstorms can create significant property damage from flooding, wind, hail, lightning, and tornadoes. Thunderstorms typically cause damage by downing trees and power lines. Downed trees can block key roadways within a community, making emergency response more difficult. Downed power lines block roadways, disrupt businesses when power fails, and pose threats to people when still energized.

Mobile homes are susceptible during severe thunderstorm activity. As discussed in Section I, approximately 24.2 percent of the housing units in Hardee County were mobile homes or trailers. People who work outside are also highly vulnerable to impacts from severe weather.

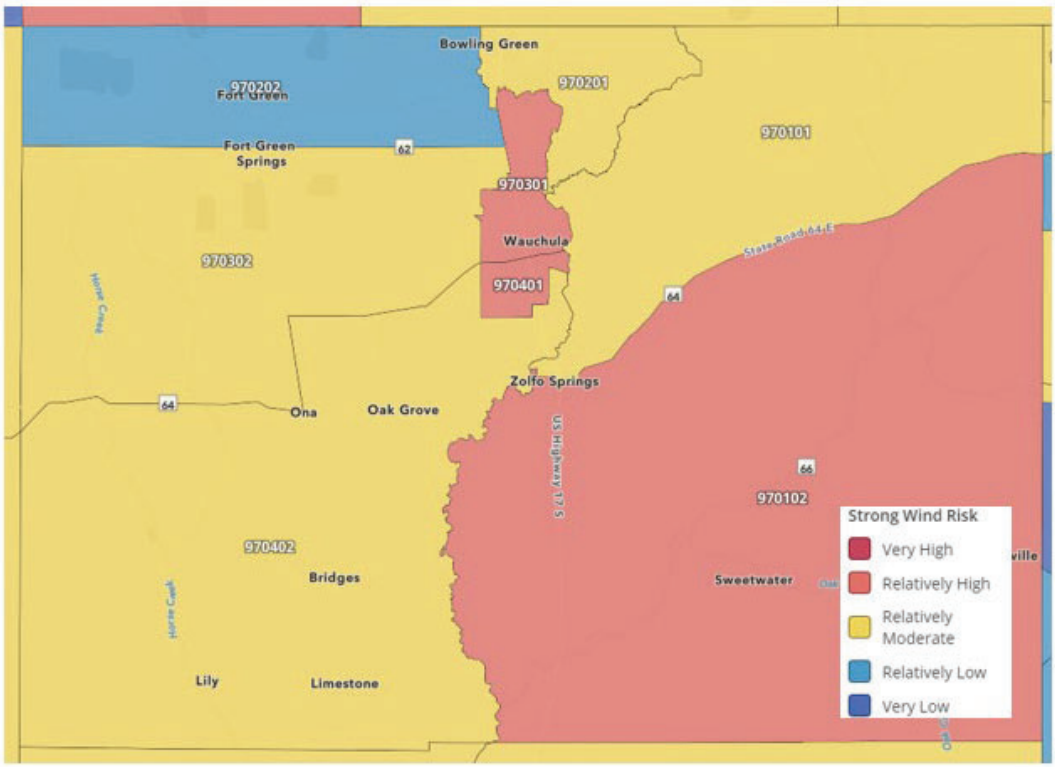


Figure IV.12: Strong Wind Risk Map; Source*: https://hazards.fema.gov/nri*

Hardee County has a relatively moderate to high risk for severe storms and tornadoes. Severe storms are common and most infrastructure can withstand the effects of such storms. Tornadoes have greater effects, but over smaller areas, so the vulnerability is moderate. Factors contributing to tornado vulnerability are the abundance of pre-engineered structures (including manufactured housing and metal buildings), recreational vehicles used as residences, and high concentrations of elderly populations. The most vulnerable populations include those in mobile home parks, recreational vehicles, and aged or dilapidated housing. The potential for damage and loss of life increases as a function of population density. As the number of structures and people increase, the probability a tornado will cause property damage or human casualties also increases. All critical facilities in the County and jurisdictions are susceptible to tornado impacts. Contributing factors that may determine vulnerability are early warning systems and the location and availability of storm shelters constructed to withstand the forces of a tornado.

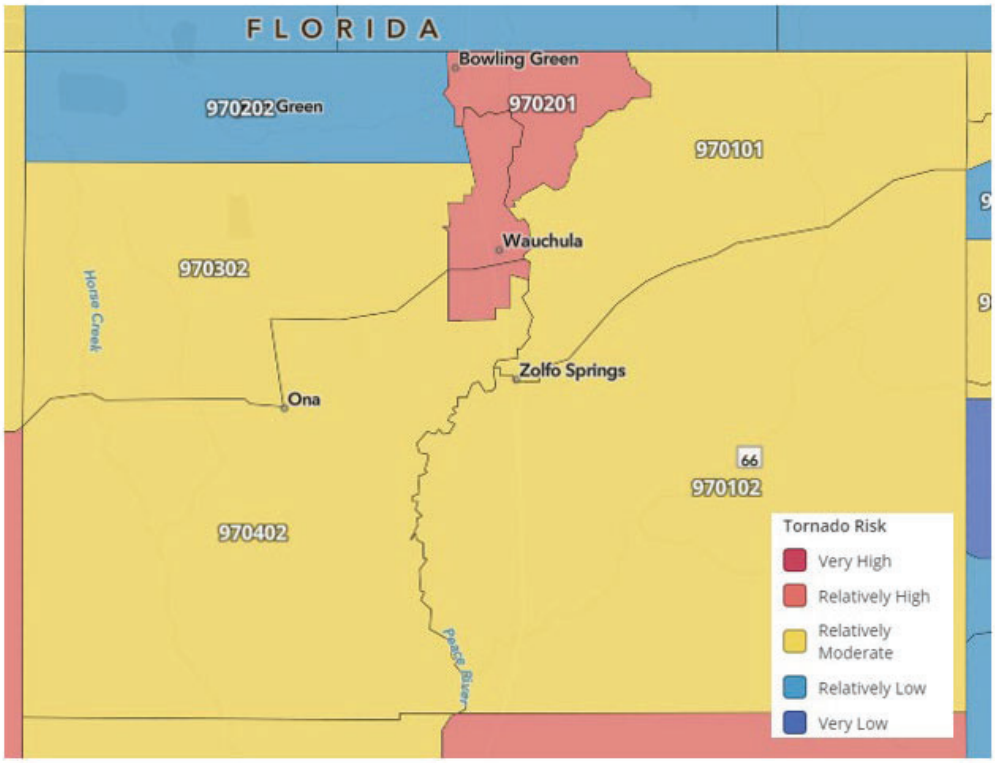


Figure IV.13: Tornado Risk Map; Source: *https://hazards.fema.gov/nri*

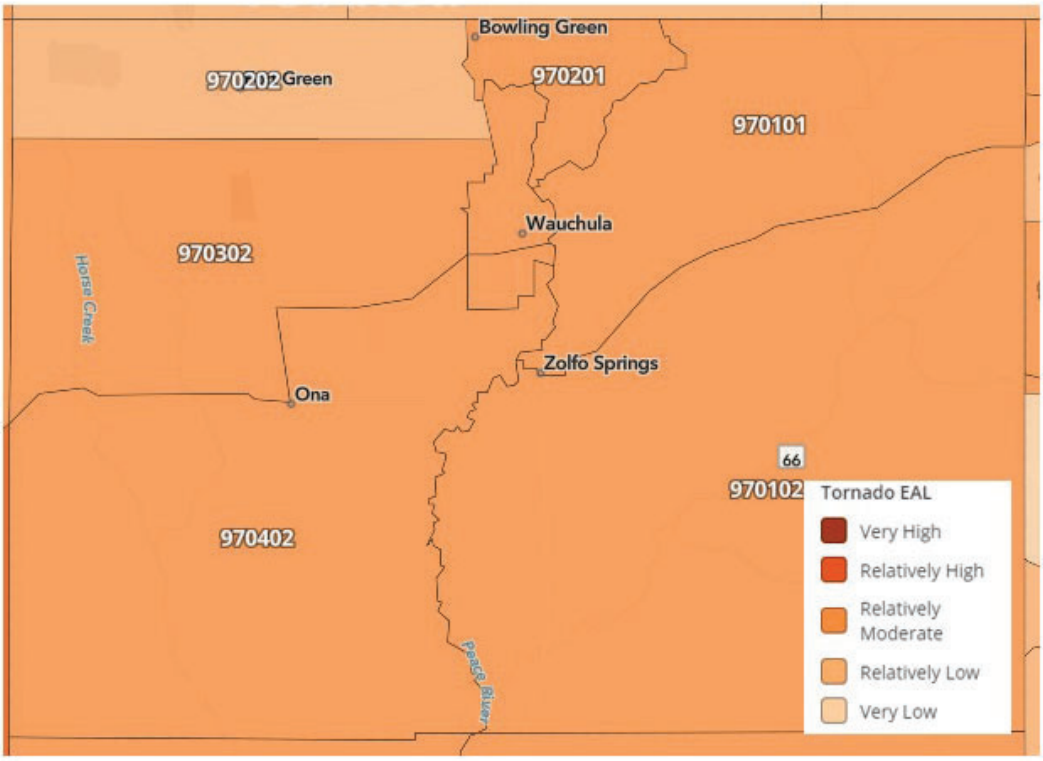


Figure IV.14: Tornado Expected Annual Loss Map; Source: *https://hazards.fema.gov/nri*

Geologic Hazard Vulnerability and Risk

Land Subsidence (Sinkholes)

Extent

The entire County has potential for sinkhole formation. Sinkhole area types are based on the type and thickness of material overlying the limestone. The type of sinkhole and its extent varies depending on the area type in which it is located. While all of Hardee County is included in the Type IV sinkhole area type, the Sinkhole Depths map (appendix B) shoes there have been few sinkholes in the County.

The magnitude or severity of sinkholes depends on the size, location, and the speed of sinkhole formation. The county lies in an area where few large-diameter, deep sinkholes may occur. In a worst-case scenario, a large diameter, deep sinkhole could appear suddenly and result in loss of human life and property.

Vulnerability Summary

Sinkholes can occur in any area of Hardee County. Depending on the location and size of a sinkhole, the social and economic impact can range from minor to extensive. Although sinkholes are not frequent, their occurrence within more populous areas could have substantial impacts.

Risk Assessment

There is a medium to high level of risk for sinkholes in Hardee County. Sinkhole impacts range from minor damage to a home or road, to an entire city block. With the median household income ranging from $36,234 in Wauchula to $54,231 in the County, most residents do not have enough insurance and are unable to pay for major repairs. Sinkholes may affect the economy in several ways:

- Reduce real estate sales and profits; and
- Increase in insurance costs and uninsured losses becoming more frequent as affordable insurance becomes less available.

As the entire County is located in the Type IV sinkhole area type, the entire value of the County is susceptible (See Section I). Climate change is expected to significantly increase the risk of sinkholes forming due to altered precipitation patterns, leading to more extreme rainfall events and prolonged droughts, which can both drastically fluctuate groundwater levels, causing the underlying rock to erode and collapse, creating sinkholes; essentially, the more extreme variations in water saturation in the soil due to climate change can exacerbate sinkhole formation.

Hydrologic Hazard Vulnerability and Risk

Drought

Extent

The Florida State Hazard Mitigation Plan defines droughts as “A drought is a deficiency in precipitation over an extended period.” A hydrological drought can affect the entire County. The Palmer Drought Severity Index (PDSI) uses readily available temperature and precipitation data to

estimate relative dryness. It is a standardized index that spans -10 (dry) to +10 (wet). Maps of operational agencies like NOAA typically show a range of -4 to +4, but more extreme values are possible. The extent of damage is normally minimal. As illustrated in Figure IV-18, the extent of drought in Florida has reached and exceeded -4 on occasion, but generally is at -2. Hardee County can expect a minor drought once every 2 to 3 years.

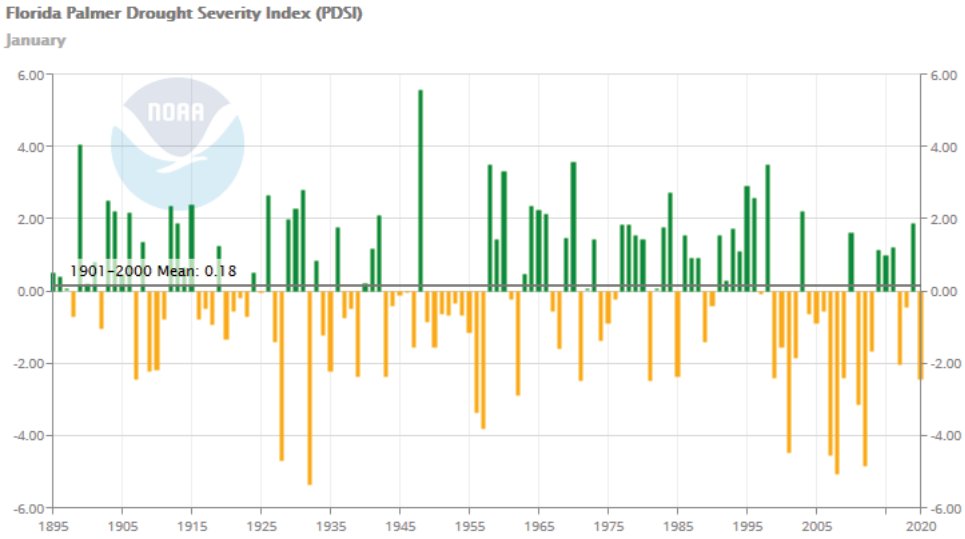


Figure IV.15: Florida Palmer Drought Severity Index; Source: NOAA

Vulnerability Summary

Drought affects water supplies, agriculture, and fire danger levels and is based on the severity of these impacts. The characteristics of population, activities, or the environment that make them susceptible to the effects of drought are the basis for the measurement of vulnerability to drought conditions. The degree of vulnerability depends on environmental and social characteristics of the region and the ability to anticipate, cope with, resist, and recover from drought. Drought can particularly exacerbate demand for potable water (until such time as more reclaimed water is available). Drought in Florida can contribute to sinkhole development, impede farm productivity, and strain local water supplies.

Vulnerability to drought/heat wave is low to medium. Vulnerability increases if water levels drop to a point where officials expand water restrictions to include agriculture.

Risk Assessment

All municipalities within the County are at a low risk of drought or heat wave hazard. Droughts do not impact structures, so the LMS does not include a dollar loss estimated.

The LMS Working Group did not perform an assessment of potential dollar costs since droughts are not expected to damage existing or future structures or critical facilities. Consequences associated with drought can impact public health, agricultural productivity, economic recovery assistance programs, and mass care.

Flood

Extent

The extent of flooding throughout the county depends largely on the amount, location, and duration of rainfall, current level of soil saturation, conditions upstream, and so forth. Under extreme circumstances, the magnitude or severity of flooding along the Peace River could reach a crest of 25 feet similar to that experienced in 1933. See Table 3.9 below for historic crest records for the Peace River. As most people are well aware, the immediate impacts of flooding include loss of human life, damage to property, destruction of crops, loss of livestock, and deterioration of health conditions owing to waterborne diseases.

The County and all three jurisdictions have several areas that have been impacted by flooding, especially after hurricane events. The Hardee County Vulnerability Assessment identifies flooding areas in 2030 and 2070.

Areas within the 100-year floodplain are vulnerable to flooding. These areas generally lie along the major waterways within the county, including the Peace River, Horse Creek and Charlie Creek. In addition, the residential community along Bronco Drive in the southern portion of unincorporated Hardee County and the Riverview Heights subdivision east of the City of Wauchula in unincorporated Hardee County are identified as areas that may be vulnerable to flooding based on repetitive flood claim information. Approximately 107,443 acres of land and waterways are vulnerable to flooding throughout the entire county. Flooding can affect our jurisdictions in Wauchula, Bowling Green, Town of Zolfo and unincorporated portions of the county.

Vulnerability Summary

Flooding causes a number of impacts to life and property. Direct effects include the loss of life, personal property, crops, business facilities, utilities, and transportation infrastructure. Floods can also indirectly cause economic and societal impacts when transportation routes are damaged or destroyed thus inhibiting the transport of needed supplies. Pooled waters can inundate drinking water supplies and harbor diseases that lead to public health issues, and moving waters can cause erosion damaging agriculture and infrastructure.

Flooding not only is a hazard to those living in flood-prone areas, but also can affect individuals outside their home. The Florida Division of Emergency Management has provided the following flood statistics:

- As little as one foot of moving water can move most cars off the road.
- Just six inches of fast-moving water can sweep a person of his or her feet.
- Most flood-related deaths occur at night and result from vehicular accidents.
- Urban and small stream flash floods often occur in less than one hour..

Risk Assessment

Areas within the 100-year floodplain are vulnerable to flooding. These areas generally lie along the major waterways within the county, including the Peace River, Horse Creek and Charlie Creek. In addition, the residential community along Bronco Drive in the southern portion of unincorporated Hardee County and the Riverview Heights subdivision east of the City of Wauchula in unincorporated

Hardee County are identified as areas that may be vulnerable to flooding based on repetitive flood claim information. Approximately 107,443 acres of land and waterways are vulnerable to flooding throughout the entire county. Flooding can affect our jurisdictions in Wauchula, Bowling Green, Town of Zolfo and unincorporated portions of the county.

The tables below show the potential loss within the Special High Hazard Area for unincorporated Hardee County, Bowling Green, Wauchula, and Zolfo Springs. If the Special Flood Hazard Area touches any portion of a parcel, that parcel is included in the potential losses.

TABLE IV-7a:
SPECIAL HIGH HAZARD AREA POTENTIAL LOSSES – UNINCORPORATED HARDEE COUNTY

Use	Parcel Acreage	Building Value ($)	Total Value ($)
Agriculture	289,489	170,625,001	2,042,192,584
Residential	5,818	139,488,135	228,201,859
Commercial/Industrial	1,016	16,287,525	56,125,415
Government/Institutional	7,011	59,029,559	195,423,022
Miscellaneous	36,277	5,105,334	374,308,274
Total	**339,610**	**390,535,554**	**2,896,251,154**

TABLE IV-7b:
SPECIAL HIGH HAZARD AREA POTENTIAL LOSSES – BOWLING GREEN

Use	Parcel Acreage	Building Value ($)	Total Value ($)
Agriculture	37	240,542	753,220
Residential	70	4,776,863	6,644,528
Commercial/Industrial	0	0	0
Government/Institutional	17	1,210,726	1,963,114
Miscellaneous	13	0	142,490
Total	**136**	**6,228,131**	**9,503,352**

TABLE IV-7c:
SPECIAL HIGH HAZARD AREA POTENTIAL LOSSES – WAUCHULA

Use	Parcel Acreage	Building Value ($)	Total Value ($)
Agriculture	367	0	3,340,256
Residential	155	18,565,358	21,686,119
Commercial/Industrial	37	1,442,317	3,173,527

Use	Parcel Acreage	Building Value ($)	Total Value ($)
Government/Institutional	414	18,632,708	46,293,791
Miscellaneous	45	0	394,235
Total	**1,017**	**28,640,383**	**74,887,928**

TABLE IV-7d:
SPECIAL HIGH HAZARD AREA POTENTIAL LOSSES – ZOLFO SPRINGS

Use	Parcel Acreage	Building Value ($)	Total Value ($)
Agriculture	27	385,062	697,628
Residential	76	8,237,839	9,859,357
Commercial/Industrial	41	255,473	2,936,846
Government/Institutional	517	1,188,958	15,350,174
Miscellaneous	7	0	11,532
Total	**669**	**10,067,332**	**28,855,537**

Other Natural Hazard Vulnerability and Risk

Agricultural Disruptions

Extent

With the risk of invasive pests, diseases, and severe weather, Hardee County's economy has a lot to lose when faced with hazards. As an example of how damaging an exotic pest can be, the detection of oriental fruit flies in Miami-Dade County in 2015 triggered a quarantine lasting several months, with economic losses that may have exceeded one billion dollars. In addition, the fact that Florida produces most of its fruit and vegetable crops during the winter means product is in the field and close to harvest during the coldest months of the year, rendering it vulnerable to freezes which can destroy a significant portion of a crop at the height of its production window.

According to the 2023 Enhanced State Hazard Mitigation Plan, the Florida Department of Agriculture and Consumer Services (FDACS), the Florida Department of Health (FDOH), and the Florida Department of Business and Professional Regulation (FDBPR) are tasked with preventing, preparing for, responding to, and ensuring recovery from food and feed emergencies and incidents in Florida. Currently, Florida has established the Food Emergency Response Plan, an annex to the State's Comprehensive Emergency Management Plan (CEMP), to govern the operational concepts, policies, and plans required to achieve the broad objectives for a response of one or more agencies.

Vulnerability Summary

The entire County is vulnerable to the effects of agricultural disruption. While the cities have less land being utilized for agricultural uses, several of the businesses and their employees rely on agriculture. According to the Hardee County Farm Bureau, in 2022 Hadee County consisted of 920 farms totaling 290,964 acres that produced an average of $228 million in products sold. While there are human health implications from infected food supply, it is likely that the economic consequences of an agricultural disruption will be the most significant.

Risk Assessment

According to the US EPA, agriculture is very sensitive to weather and climate. It also relies heavily on land, water, and other natural resources that climate affects. While climate changes (such as in temperature, precipitation, and frost timing) could lengthen the growing season or allow different crops to be grown in some regions, it will also make agricultural practices more difficult in others. The effects of climate change on agriculture will depend on the rate and severity of the change, as well as the degree to which farmers and ranchers can adapt.

Wildfires

Extent

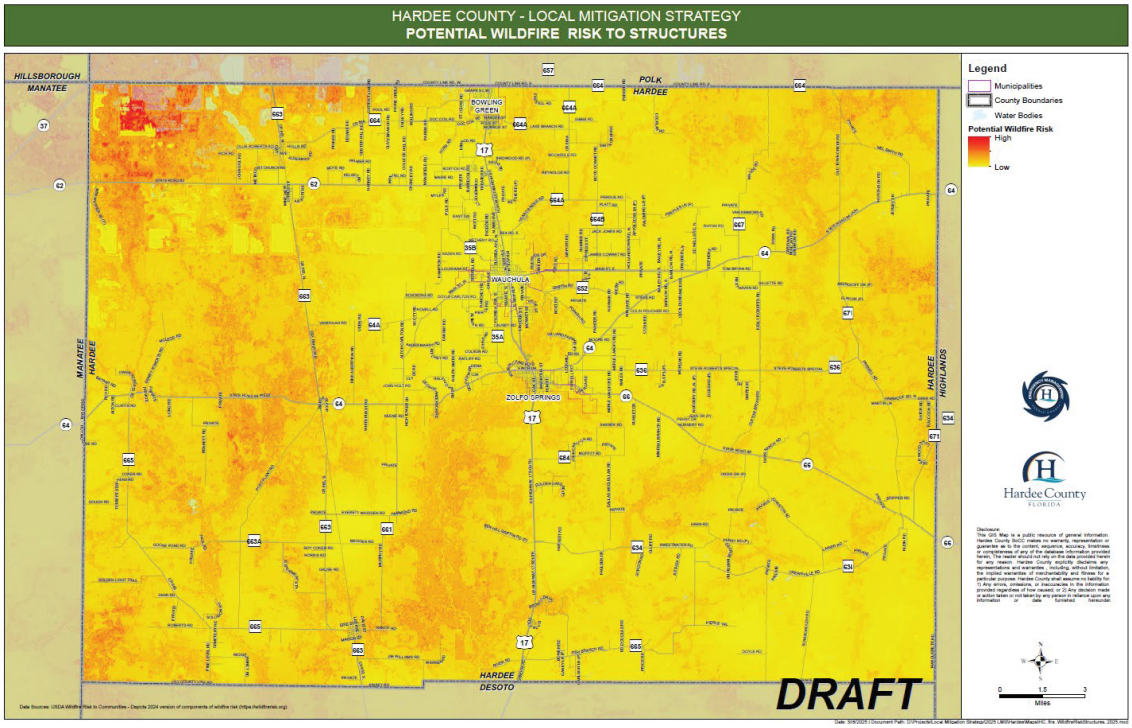
Hardee County is susceptible to wildfires throughout the year, particularly during the months with minimal rainfall amounts. The major cause of brush fires and forest fires is due to residents not conforming to the burning regulations in effect and not considering the conditions, as they exist (dry or windy conditions). There are three advisories the National Weather Service (NWS) may issue for wildfires:

- Fire Watch Weather – indicates weather conditions could result in critical fire weather conditions in the next 72 hours.
- Red Flag Warning – indicates ongoing or imminent critical fire weather in the next 24 hours.
- Extreme Fire Behavior – implies that a wildfire is either moving fast, has prolific crowning or spotting, has fire whirls, or has a strong convection column.

Hardee County experiences brush fires and wildland fires annually. The peak time for forest fires is usually during our dry season from January through May of each year. During these months, grass, leaves, pine needles, and underbrush provide optimal conditions that fuel wildfires. Caused by any number of natural and man-made events, wildfires can result in extensive damage to public and private property. Wildfires also threaten the health and safety of citizens in or around the hazard (CEMP). The Center for Disease Control warns that smoke from wildfires can cause eye and respiratory system irritation and can worsen chronic heart and lung diseases.

Because Hardee County is rural with much open space, wildfires are possible virtually anywhere within the county that has adequate fuels. Using data from the Florida Forest Service, areas within the county were assigned a wildland fire potential risk of “high,” “medium,” or “low” based on the fire spreading potential during a climatologically dry year. Wildfires can affect our jurisdictions in Wauchula, Bowling Green, Town of Zolfo and unincorporated portions of the county. Wildfires on agricultural property are not generally a concern for structures, but due to the size of the area impacted, fires tend to burn for longer periods. Emergency response is limited due to the scale of the fires and focus is generally on containing these wildfires. The overall vulnerability to the rural areas

of Hardee County are destruction of forest areas, closing of highways due to smoke, loss of wages if crops are destroyed, disruption of utilities, risk to homes in the urban/rural county interface. There are numerous homes scattered throughout the countryside with various degrees of risk depending on fuel source and how well maintained a buffer zone is around each structure.



Vulnerability Summary

Wildfires in Hardee County and most of its municipalities impact wooded areas with low population density. Wildfires generally do not pose a high risk to major population areas. Smoke from wildfires may impact traffic and cause medical problems with those with breathing difficulties.

Certain weather conditions can also increase the potential for wildfires and alter fire behavior. Wind speed, direction, and low relative humidity (a measure of moisture in the air) can cause wildfires to spread more quickly (South Carolina Forestry Commission). Wildfires are a natural, often beneficial process, but can cause serious impacts to life and property when not properly managed.

Risk Assessment

Wildfires impact residents and businesses by threatening physical structures and infrastructure. However, smoke can also have widespread impacts. This represents personal as well as economic loss, depending on the impact area. Uncontrolled wildfires can cause severe economic impact to the agricultural industry depending on their location.

As the population continues to grow, the number of residents living in or near wildland areas will also continue to increase. The threat of wildfire will increase as the urban areas extend into previously forested areas, or into or adjacent to forested areas not prescriptively burned on a regular basis. The number of human-caused fires will likely increase as the population living in WUI areas continues to grow, and as management of natural areas within the urban area with prescribed fire or other vegetation management does not occur.

As shown on the Figures below, the FEMA National Risk Index identifies lightning at a risk from Relatively Moderate through Relatively High. The Census tracts including Wauchula and Bowling Green have a Relatively Moderate Risk. The Census Tract containing Bowling Green has a Relatively High-Risk Index. Zolfo Springs has a Relatively Moderate and Relatively High-Risk Index. The County as a whole has a Relatively Low Risk Index. The expected annual loss is 798,000 dollars with an exposure of 29 billion dollars.

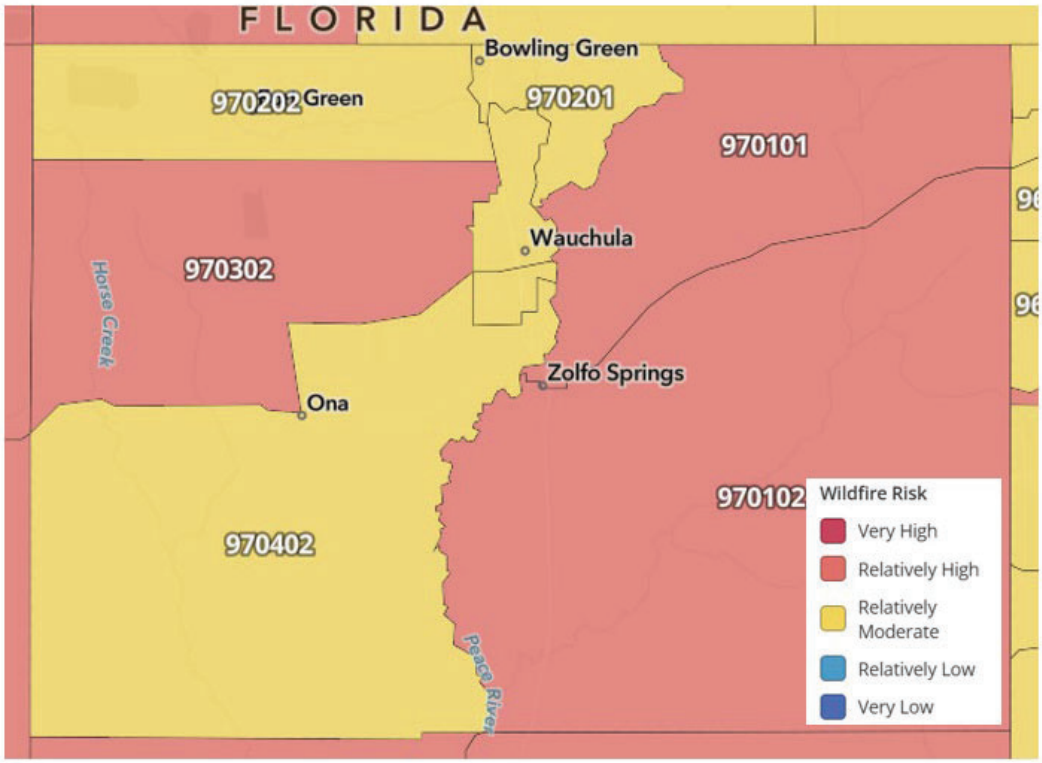


Figure IV.16: Wildfire Risk Map; Source: *https://hazards.fema.gov/nri*

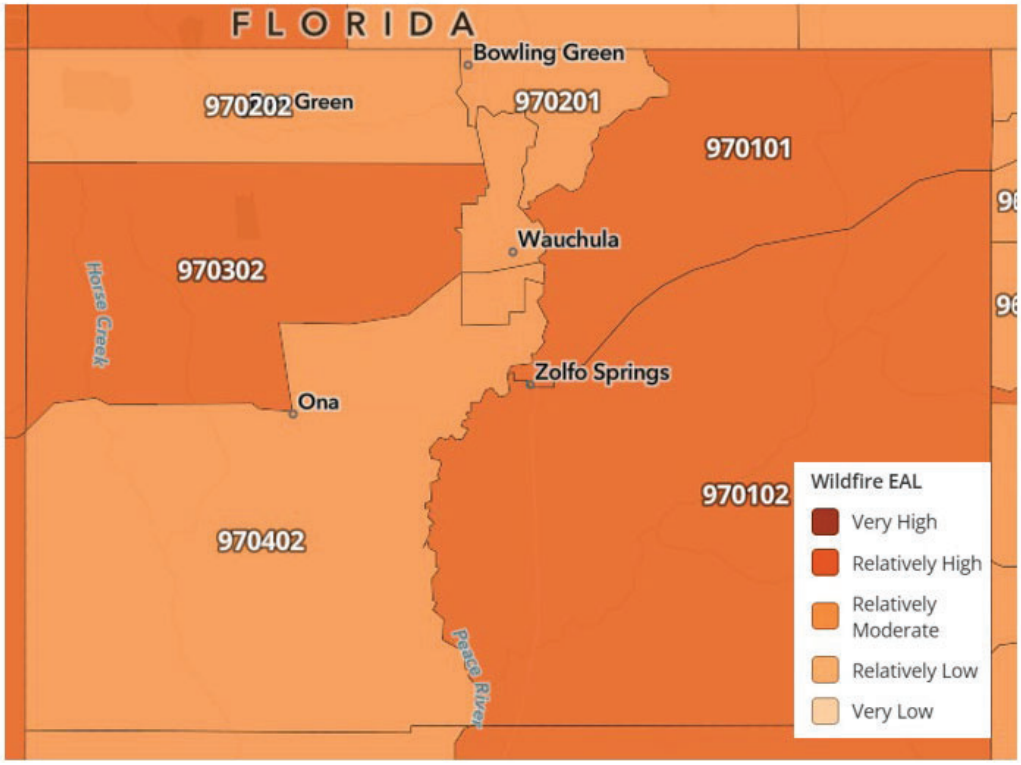


Figure IV.17: Wildfire Expected Annual Loss Map; Source: *https://hazards.fema.gov/nri*

Human-Caused Hazard Vulnerability and Risk

Domestic Security Incident/Civil Disturbance

Extent

According to the US Army Civil Disturbance Operations Manual, civil disturbances and riots can arise from crowds. Crowds are gatherings of a multitude of individuals and small groups that have temporarily assembled in the same place, usually representing a group belief or cause. Under certain circumstances, crowds can become a riot or a violent mob very quickly. These are the types of civil disturbances that are of primary concern to the state of Florida. Violent crowds may strike out physically at bystanders and others in the crowd or destroy private and government property (Source: 2023 Enhanced State hazard Mitigation Plan).

The possibility exists in Harde County for domestic security incidents and civil disturbances. The County's vulnerability to this hazard is medium, and the LMS Working Group considers this hazard a threat to the County. The City of Wauchula has a slightly higher vulnerability since it is the County seat. Civil Disturbances can occur anywhere but tend to occur most often in urban areas. Due to the nature of crowd building, civil disturbances most often occur in open, public spaces or venues. Sites that are attractive for political or other rallies should be considered as probable locations for the epicenter; arenas and stadiums are another type of venue where civil disturbance can occur. Civil disturbances can also occur in proximity to locations where a "trigger event" occurred.

Vulnerability Summary

Populations in urban areas may face a greater risk. Vulnerable populations may face a greater risk due to possible discrimination. Individuals and populations whose jobs involve public safety, such as law enforcement officers, may face a greater risk. People who need services from public safety may also be at risk if the public services staff are occupied with incidents. Civil disturbances may result in damage or destruction of buildings, such as government property. Civil disturbances may result in traffic congestion or temporary closure of major roadway. Businesses may be impacted from loss of function or loss of inventory.

Risk Assessment

Although the LMS Working Group recognizes jurisdictions are vulnerable to cyber-incidents, there is a lack of data to quantify the vulnerability. Climate change does not have a direct effect on civil disturbances, but it does indirectly affect them. Although civil disturbances may not directly impact the environment, environmental issues can inspire the formation of organized gatherings in protest of a jurisdiction's environmental policy.

Cyber Incident

Extent

The possibility exists in Harde County for cyber incidents. The County's vulnerability to this hazard is medium, and the LMS Working Group considers this hazard a threat to the County. The City of Wauchula has a slightly higher vulnerability to terrorism since it is the County seat.

According to ISPReports.Org, approximately 75 percent of Hardee County households have an internet connection despite having 97.45 percent availability. Approximately 54 percent of households have fiber, cable, or DSL, 8 percent have satellite, 0 percent are still on dial-up, and 4 percent of households have internet but do not pay for a subscription because it is subsidized by the Affordable Connectivity Program. Speeds and coverage vary within the county, and sometimes even from block to block. As connections to the internet increase, the opportunities for impacts from cyber incidents will increase.

Vulnerability Summary

Crime through cyber incidents can damage or impair the County's infrastructure, disrupt commerce, and possibly result in large-scale health emergencies, disease outbreaks, and/or epidemics. Government buildings, large market sectors, critical infrastructure, tourist attractions, and large-scale events are all prime targets for cyber criminals.

Risk Assessment

Although the LMS Working Group recognizes jurisdictions and residents are vulnerable to cyber incidents, there is a lack of data to quantify the vulnerability.

Dam/Levee Failures

Extent

Mining Operations that have dams in Hardee County are located in the Northwest and Northeast portions of the County in the unincorporated areas of Bowling Green.

The extent of damage the County would suffer depends on the exact location of a dam breach and the degree of the failure. Due to their isolated locations, there is little likelihood that the failure of a clay-settling pond would adversely impact county residents based on the general location map in Section III, and information from the Statewide Critical Facilities Inventory. Failure of a dam/levee could impact water quality issues in the surrounding area, which could impact the drinking water of the surrounding population. There are plans in place to minimize any risk if a failure was to occur.

The National Inventory of Dams includes a determination as to the downstream hazard potential for 24 structures in Hardee County, all of which are located in unincorporated Hardee County. Of the 24 dams, 14 are Significant Hazard and 10 are Undetermined. There are no high hazard dams located in Hardee County. The National Inventory of Dams identifies dams by their hazard risk of low, significant, and high.

- Low hazard: A dam where failure or mis-operation results in no probable loss of human life and low economic and/or environmental loss. Losses are principally limited to the owner's property.

- Significant hazard: A dam where failure or mis-operation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities or impact other concerns. These dams are often located in predominantly rural or agricultural area but could be located in areas with population and significant infrastructure.

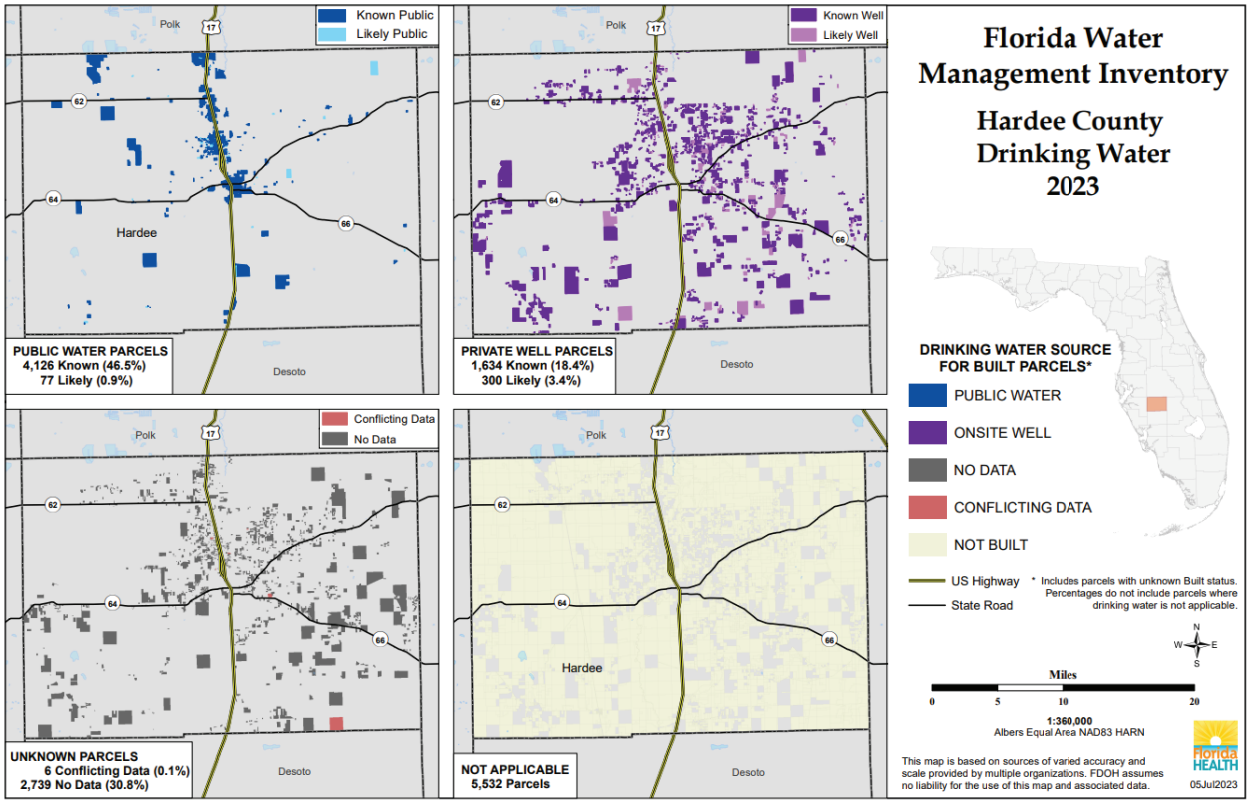
- High hazard: A dam where failure or mis-operation will probably cause loss of human life.

Trained Mosaic Company staff inspect all dams daily, and the daily inspection reports are submitted to the Hardee County Mining Department on a monthly basis, and annually submitted to a Licensed Third-Party Engineer. The Mosaic Company provides annual updates of their emergency response plan to the BoCC. If a dam breach occurs, the Mosaic Company works with the Hardee County Sheriff's Office to issue emergency alerts to all downstream residents.

Vulnerability Summary

The frequency of failure for dams in Hardee County is unknown. Life spans for earthen dams generally exceed 50 years. The average dam age is 30 years. Climate change is intensifying extreme weather including rainfall, floods and melting glaciers. Most dams, large and small, were constructed to withstand a range of weather events that may no longer be the norm. Further, dams need an increasing amount of maintenance and repairs to withstand extreme floods. As explained in the Potential Impacts Section (Section III),

As shown on the map in Section III, the dams in Hardee County are all located in unincorporated Hardee County. The figure below shows Hardee County drinking water locations. Contamination of water supplies is one of the potential impacts from dam breaches. Harmful algal blooms may also result.



Risk Assessment

Section 62-672 Florida Administrative Code and Section 373, Florida Statutes, govern the construction and safety of dams and levees in Florida. According to the Florida Department of Environmental Protection (FDEP), agency personnel at the State, regional, and local levels, as related to their respective regulatory programs, and private dam owners, conduct dam inspections in Florida. Oversight for phosphate mining and similar industrial impoundments is primarily the responsibility of FDEP. Other dams generally fall within the purview of the US Army Corps of Engineers, the State's five regional water management districts, or local government agencies.

Although the LMS Working Group recognizes that jurisdictions are vulnerable to human-caused hazards, there is a lack of data to quantify the vulnerability. Trained Mosaic Company staff inspect all dams daily, and the daily inspection reports are submitted to the Hardee County Mining Department on a monthly basis and annually submitted to a licensed third-party engineer. The Mosaic Company provides annual updates of their emergency response plan to Hardee County Board of County Commissioners. If a dam breach occurs, the Mosaic Company works with the Hardee County Sheriff's Office to issue emergency alerts to all downstream residents.

Harmful Algal Blooms

Extent

Harmful Algal Blooms may last from days to several months or even years. A significant concern is that many freshwater sources used for drinking water can be affected by HABs, potentially contaminating the water supply if not properly treated.

Vulnerability Summary

HABs harm human and animal health, fishing and aquaculture, and long-term ecosystem health. Some HABs are toxic, can poison animals, and make the surrounding air hard to breathe. The toxins produced by algae vary by species and region, and impact wildlife and people in different ways.

Risk Assessment

Although the LMS Working Group recognizes jurisdictions are experiencing an increasing number of HABs, there is a lack of data to quantify the vulnerability.

According to NRDC.org, climate change is both increasing the frequency and duration of droughts in many parts of the country and intensifying extreme storms. Periods of drought interspersed with strong precipitation increase runoff from agricultural lands, lawns, and other sources, leading to higher nitrogen levels in rivers—and therefore harmful algal blooms.

Burning fossil fuels, deforestation, and land development are increasing the amount of carbon dioxide in the atmosphere. This fuels harmful algal blooms because cyanobacteria can feed on the carbon dioxide not only present at the surface of a water body but also dissolved in the water. And when algae die and sink to the bottom of a freshwater body, they decompose and release carbon that was once sequestered, providing more fuel for cyanobacteria growth.

Hazardous Material Incident/Radiological

Extent

There are numerous hazardous materials facilities and plants throughout Hardee County. There are hazardous materials located in minor quantities at schools, hospitals, and some of the telecommunication facilities throughout the county. The Local Emergency Planning Committee (LEPC) has an aggressive hazardous materials inspection and cataloging program. The LEPC places the information collected from the facilities into a statewide system for easy access by emergency responders. The Hardee County Emergency Operations Center monitors planning and training activities, spills, chemical releases, and hazardous materials events. Of the numerous hazardous materials incidents reported statewide each year, fewer than one percent have resulted in fatalities, fewer than four percent have resulted in injuries, and fewer than six percent have resulted in evacuation. Hazardous materials incidents can occur anywhere there is a road, railroad, or fixed facility storing hazardous materials. The entire County is at risk to an unpredictable incident of some type. Most incidents are small and confined to a relatively localized area.

Vulnerability Summary

Vulnerability to hazardous materials releases (including wastes), whether onsite or in route, is difficult to determine due to the type and amount of materials released, location, weather, and other variables. To determine the vulnerability of the County to potential hazardous material incidents, it is necessary to determine the "vulnerable zone" or the area of each facility using or storing extremely hazardous substances. Due to the specificity of each hazardous material release, it was not possible to determine a comprehensive vulnerable zone or population exposure for Hardee County.

Nationwide, there are more transportation accidents involving hazardous materials and wastes than those that occur at fixed facilities. Transportation accidents can occur on roadways, railways, waterways, in the air, and within pipelines. In addition, the numbers of large and small quantity generators are significant, and they correlate with the ranges of services and manufacturing within the County's economy. These generators register with FDEP and have control plans in place in accordance with permit procedures. The County can address spills and accidental releases. Officials expect the number of generators and the quantity and types of materials handled to increase proportionately with population and economic growth.

Risk Assessment

Hazardous materials incidents have the potential for loss of life, injury, damage to physical structures, and damage to the environment including drinking water. Businesses and individuals incur financial losses when officials close roads due to hazardous materials incidents.

Human Health Incidents

Extent

A disease outbreak takes place when a disease occurs in greater numbers than expected in a community or region or during a season. An outbreak may occur in one community or even extend to several countries. It can last from days to years.

Pandemics are large-scale outbreaks of infectious disease that can greatly increase morbidity and mortality over a wide geographic area and cause significant economic, social, and political disruption. Evidence suggests that the likelihood of pandemics has increased over the past century because of increased global travel and integration, urbanization, changes in land use, and greater exploitation of the natural environment (Jones and others 2008; Morse 1995). Pandemics can cause economic damage through multiple channels, including short-term fiscal shocks and longer-term negative shocks to economic growth. Individual behavioral changes, such as fear-induced aversion to workplaces and other public gathering places, are a primary cause of negative shocks to economic growth during pandemics. Pandemic mitigation measures can cause significant social and economic disruption.

Drug overdose deaths continue to impact communities in the United States and Hardee County. The figures below shoe the drug overdose deaths and the non-fatal overdose hospitalizations in Hardee County.

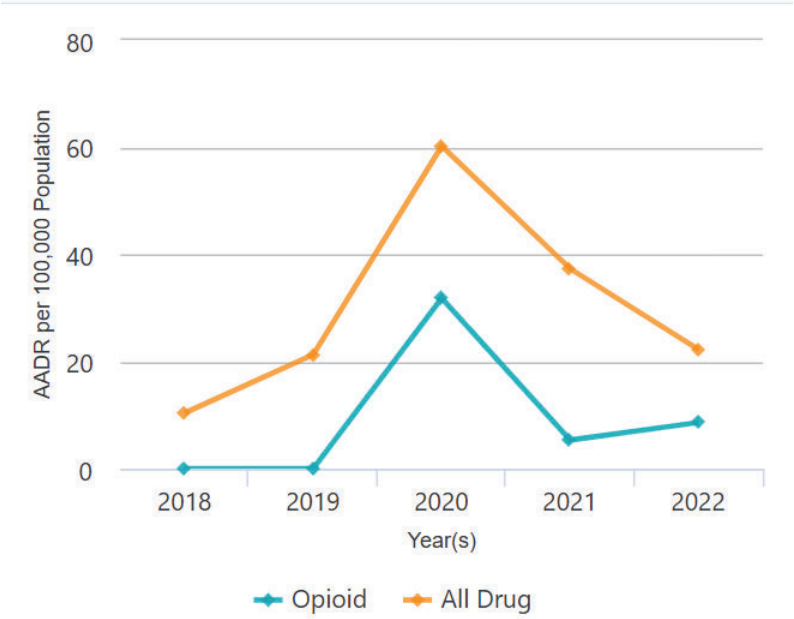


Figure IV.19: Drug Overdose Deaths Hardee County;
Source: Flhealthcarts.gov

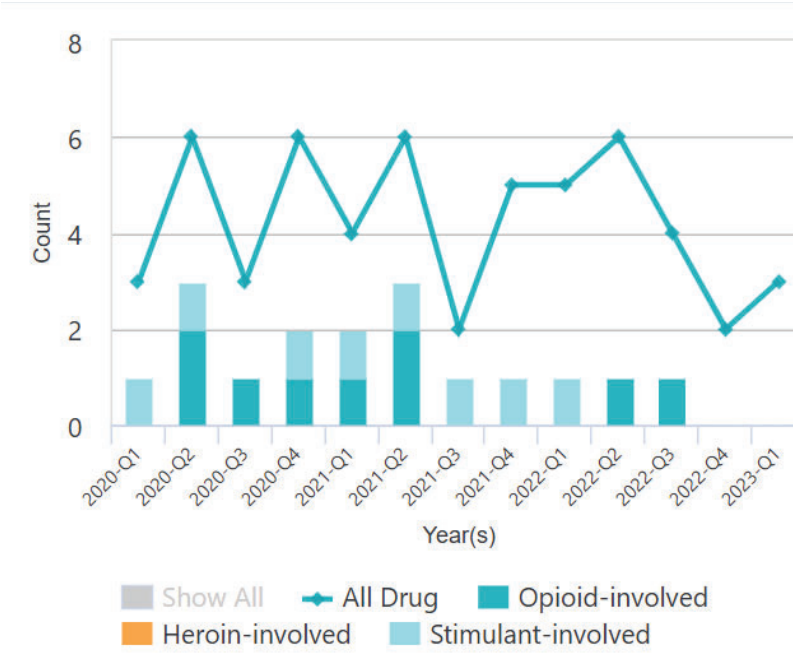


Figure IV.20: Total Non-fatal Overdose Hospitalizations Hardee County;
Source: Flhealthcarts.gov

Vulnerability Summary

Populations located in urban areas may face a greater risk. Vulnerable populations in the same areas may face a greater risk. Hardee County would have extra vulnerability as there is currently one hospital in the County. As experienced with the COVID-19 incidents, there may be loss of function and/or inventory to businesses. Costs may be incurred for decontamination. Social activities such as drug use can lead to increased crime.

It is impossible to determine a jurisdiction's vulnerability; however, it is reasonable to claim that every jurisdiction is somewhat vulnerable to epidemic outbreaks and drug use.

Risk Assessment

A loss estimation is difficult to determine because of many unknown variables, but it is reasonable to claim that losses could range from minimal to extreme, depending on the epidemic and the magnitude.

Climate change has forced some animal species into new habitats as their natural habitats disappear, and it has expanded the habitats of other animals. This movement of animals into new areas increases opportunities for contact between humans and animals and the potential spread of zoonotic diseases. Rising temperatures allow certain disease-causing fungi to spread to new areas that previously were too cold for them to survive. The risk for natural disasters and flooding have increased, therefore the risk for mold to grow in homes increases.

Transportation Incidents

Extent

Transportation incidents include interactions between vehicles, bicyclists, pedestrians, trains, and airplanes. The Florida Highway Safety and Motor Vehicles department reports on crashes within the State. According to their information from January 1, 2024 through December 7, 2024, Hardee County experienced 444 crashes, which resulted in 340 injuries and 13 fatalities.

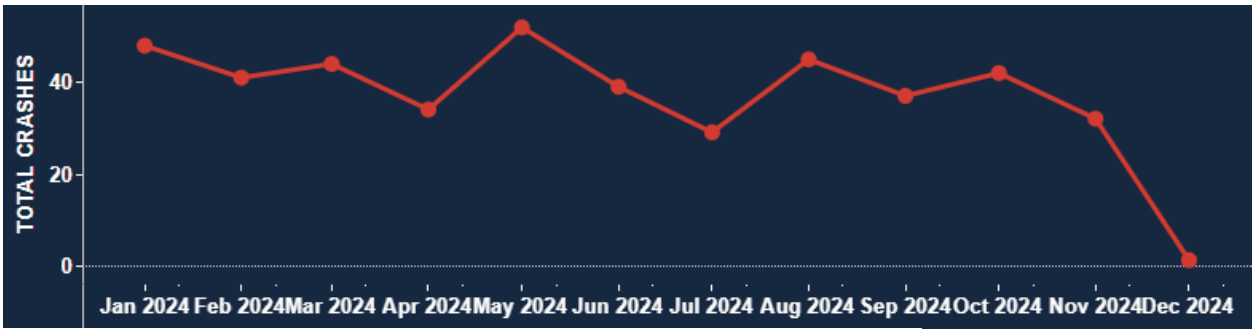


Figure IV.21: Total Crashes January 2024 through December 7, 2024;
Source: Florida Highway Safety and Motor Vehicles

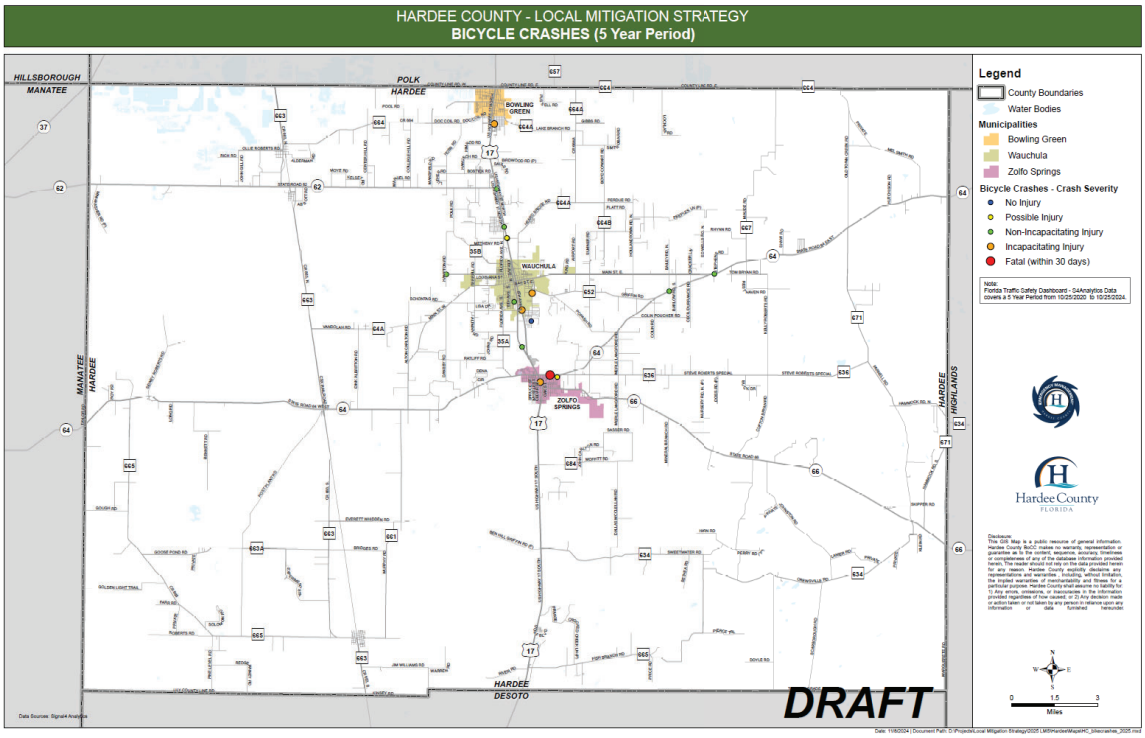


Figure IV.22: Bicycle Crashes (5-Year Period); Source: HRTPO

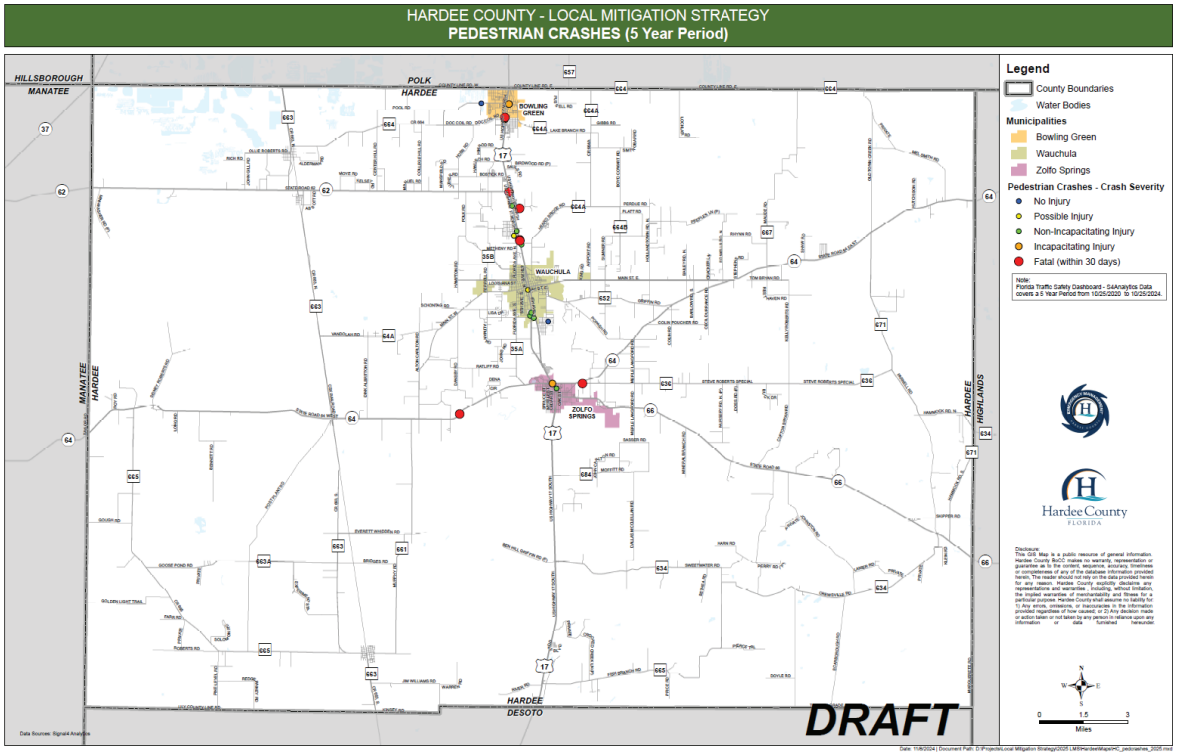


Figure IV.23: Pedestrian Crashes (5-Year Period); Source: HRTPO

Vulnerability Summary

Vulnerability to transportation system accidents is associated with the highway and rail systems that run through Hardee County (see maps Appendix B). According to Smart Growth America, fatal crashes involving pedestrians disproportionately represent older adults, people of color, and people walking in low-income communities. Individual community and population center vulnerabilities to this hazard are dependent upon location. Maps in Appendix B illustrate the locations of pedestrian and bicycle injuries and fatalities.

According to the US EPA's Climate Change on Transportation, the impacts of climate change on precipitation, extreme weather, and heat pose risks to the transportation system. These hazards may affect system performance, safety, and reliability. In coastal regions, rising sea levels and more extreme storms can lead to more storm surge and flooding, which can damage roads, bridges, railways, ports, and coastal airports. Increased local flooding can affect roadways and tunnels, weaken roadway materials, and cause traffic congestion. As a result, people may have trouble getting to their homes, schools, stores, and medical appointments.

Across inland regions, heavy rains can cause flooding and mudslides, affecting highways, railways, and bridges. Lack of rain can also be a concern. Drought combined with extreme heat increases wildfire risk. Wildfires can damage transportation networks and impair drivers' visibility.

Rising temperatures can affect transportation in many regions. These impacts can be both immediate and long-lasting. For example, heat affects runways, and hotter air can make it more difficult for airplanes to take flight. Heat can also damage rail tracks and cause cracks in roads. In addition, heat can pose safety risks to transportation workers and travelers. For example, vehicles can overheat and roadway joints can buckle, leading to accidents.

Risk Assessment

Transportation incidents impact residents and business by potential loss of life and injury and damage to physical structures. There is a financial loss to businesses and individuals as transportation incidents close roads. The risk of transportation incidents is increasing as people are more distracted by their phones and digital devices and paying less attention.

Land Use Trends and Potential Loss

The LMS Working Group recognizes the way people utilize land, especially land within known hazard-prone areas, has a significant effect on community vulnerability. Residential or industrial development areas may be more susceptible to disaster-related damages than others. The LMS includes a municipal-specific analysis because individual municipalities have the planning and legal control over land use policy.

All jurisdictions in Hardee County are participants in the NFIP. Pressure for development to locate in wetland areas continues to be an ongoing issue in the County. The LMS Working Group recognizes that its efforts to identify the areas at risk from various hazards is essential to guide the use of land to minimize future vulnerabilities to disaster. When needed and desired, a participant may propose

modifications to the plans, ordinances, codes, and similar policies as mitigation initiatives for incorporation into the LMS.

Changes in future development influence the peak discharge of floods by modifying how rainfall is stored on and/or run off the land into tributaries. In undeveloped areas such as forests and grasslands, rainfall is collected and stored on vegetation, in the soil column, and in surface depressions. When this storage capacity is filled, runoff flows slowly over land or as subsurface flow. In contrast, urban areas have less capacity to store rainfall, since development covers much of the urban land surface by roads and buildings. Construction of these roads and buildings often involves removing vegetation, soil, and depressions from the land surface. Development replaces the permeable soil by impermeable surfaces such as roads, roofs, parking lots, and sidewalks that store little water, reduce infiltration of water into the ground, and accelerate runoff to ditches and streams. Even in suburban areas, where lawns and other permeable landscaping may be common, rainfall can saturate thin, compressed soils and produce overland flow, which runs off quickly. Dense networks of ditches and culverts in cities reduce the distance that runoff must travel overland or through subsurface flow paths to reach streams and rivers.

Changes in the future development as described above, in conjunction with the projected increase in population, have the potential to put more homes and lives at risk due to flooding. Some of these areas are in existing Special Flood Hazard Areas. Future land use planning considers existing Special Flood Hazard Areas, as well as areas known to exhibit flooding not identified on the FEMA maps, which preserves many areas that provide natural floodplain functions, including existing Special Flood Hazard Areas.

County and municipal staff work with developers to avoid and minimize impacts to wetlands and preserve wetlands and wetland buffers as much as possible. In most cases where minimal impacts to wetlands are allowed, on-site mitigation is preferred. These natural wetlands or mitigated features provide valuable stormwater attenuation, among other values to our developed spaces.

Life and Safety

In Florida, common hazards to life safety include coastal and inland flooding, tropical storms, hurricanes, and lightning. Deep, fast flowing, or rapidly rising floodwaters can cause physical injury and loss of life. A mere 6 inches of moving water can sweep a person away. The risk for drowning and physical injury increases when floodwaters carry debris. Floodwaters can also hide other hazards for wading pedestrians, such as manhole openings where flood flow has lifted the covers. Approximately 6 inches of flowing water can move vehicles and wash away roads. Downed power lines or other energized systems in the water can cause electrocution. In addition, stresses to gas lines can lead to a natural gas leak, further putting lives at risk. Flooding from rainfall itself will not warrant an emergency evacuation of many residents and visitors. However, residents may evacuate as result of rising floodwater overflow.

Flooding is one of the most devastating natural disasters in the world. Having a warning system and evacuation plan will reduce injuries and loss of life. A specific evacuation procedure, including zones, routes, shelters, and means of communication helps reduce confusion for residents and visitors, and provide a smooth evacuation out of high-risk areas. Hardee County is a StormReady community

and has several programs to better prepare the community for these events. A Storm Ready community must:

- Establish a 24-hour warning point and emergency operations center;
- Have more than one way to receive severe weather warnings and forecasts and to alert the public;
- Create a system that monitors weather conditions locally;
- Promote the importance of public readiness through community seminars; and
- Develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises.

In addition, Hardee County utilizes AlertHardee, which is a critical communications system shared with most public safety operations across the State of Florida to inform county residents about public safety threats and concerns. During situations which may affect the health, safety and welfare of Hardee County residents, designated officials send out messages to telephone numbers and email addresses within the affected geographic area. When AlertHardee sends a message, it provides specific information about the current announcement. Topics of emergency notifications include:

- Tornadoes/Severe Weather;
- Mandatory Evacuations;
- Boil Water Orders;
- Gas Leaks;
- Sexual Predator Relocation Notices;
- Critical Law Enforcement Notifications;
- Hurricanes; and
- Hurricane Recovery Information.

Table IV-4 describes the potential impacts to life safety of these and the identified hazards from Section III.

TABLE IV-4:
POTENTIAL IMPACTS TO LIFE SAFETY

Hazard	Potential Impact
Extreme Temperatures (Heat and Freezes)	Extreme heat can cause discomfort and may increase the risk of accidents due to muscle cramps, heat exhaustion, and the worst is death. Temperatures that are too low can increase the risk of accidents due to health problems arising from the cold including frostbite and hypothermia.
Hurricanes/Tropical Storms	Hurricanes and tropical storms may damage or destroy residential, commercial, and public buildings, as well as critical infrastructure such as transportation, water, energy, and communication.
Severe Weather (Tornadoes, Hail, Lightning, and Thunderstorms)	All thunderstorms are dangerous and can be associated with several hazards. Heavy rains can lead to flash flooding events – one of the primary causes of death associated with thunderstorms. Lightning, causes fatalities and injuries each year. Lightning can also start

Hazard	Potential Impact
	building fires, damage electrical equipment, and electrocute humans and livestock. High winds generated by thunderstorm can cause damage to homes, overturn vehicles, uproot or damage trees, or blow down utility poles causing wide spread power outages. Hail causes damage to crops and property each year and can injure people or animals left outdoors.
Land Subsidence (Sinkholes)	Sinkholes can cause significant damage and pose a threat to safety when they occur along a highway or near homes and other buildings. If sinkholes are under or near a structure, they can destroy the structure's integrity. Formation of the sinkhole can also result in the plugging of underground drainage patterns and a lake can form in the newly formed depression area. One hazard associated with sinkholes is the possibility of health problems caused by chemicals and other materials contaminating the drinking water supply. Open sinkholes provide a direct connection between ground water surface water and any contaminants it carries.
Drought	Drought impacts come in a variety of forms. Examples of economic impacts include farmers who lose money because drought destroyed their crops or ranchers who may have to spend more money to feed and water their animals. Drought also affects the environment and society. Plants and animals depend on water, just as people do. Drought can shrink their food supplies and damage their habitats. Drought can also affect people's health and safety. Drought conditions can also provide a substantial increase in wildfire risk. Long periods of drought can equate to more wildfires and more intense wildfires, which affect the economy, the environment, and society in many ways such as by destroying neighborhoods, crops, and habitats.
Flood	Floodwaters have the potential to cause drowning. Floodwater carrying debris increases the risk for drowning and physical injury. Floodwaters can also hide other hazards for wading pedestrians, such as manhole openings where the flood flow lifts the covers.
Agricultural Disruptions	Agricultural disruption from either natural or human caused hazards may lead to reduced production, which results in direct economic loss to farmers, which can cascade along the entire value chain, affecting

Hazard	Potential Impact
	agricultural growth and rural livelihoods. Disasters impact agriculture beyond the short-term. The sector often endures long-lasting and multi-pronged consequences such as loss of harvest and livestock, outbreaks of disease, and destruction of rural infrastructure and irrigation systems. The resulting losses may cause impacts to the gernal population, especially low-income households that may have a harder time procuring food.
Wildfires	In some cases, the resulting losses are extraordinary, causing hundreds of deaths, widespread damage to property and contents and significant impacts on the environment. More often, fires may cause a single casualty or affect a single home, though the effects are still highly significant to those affected and collectively are substantial.
Domestic Security Incidents/Civil Disturbances	Domestic Security Incidents/Civil Disturbances can result in the loss of life, the destruction of property, excessive costs to law enforcement and emergency management services, and increased uncertainty in the markets.
Cyber Incidents	Researchers have identified 57 different negative impacts that can result from cyber-attacks. They are split into the following categories: Physical/Digital; Economic; Psychological; Reputational; and Social/societal.
Dam/Levee Failure	Dam failures and other incidents that have the potential to harm downstream populations and/or infrastructure. Leaking and collapsing tailings dams can result in long term environmental damage.
Harmful Algal Blooms	According to the National Centers for Coastal Ocean Science, harmful algal blooms can cause serious health effects and even death. Toxins can cause liver damage under chronic exposure to water. Humans, dogs, and livestock drinking untreated water can get sick or die. Blooms clog canals, look and smell foul. Impacts real estate values and recreation.
Hazardous Materials Incident/Radiological	Hazardous material spills or releases can pose a risk to life, health, and property. An incident can force the evacuation of few people, a section of a facility, or an entire neighborhood or community, resulting in

Hazard	Potential Impact
	significant economic impact and possible property damage and loss of life. There is also the possibility of health problems caused by chemicals and other materials contaminating the drinking water supply.
Human Health Incidents	Infectious diseases can spread with extreme rapidity, threatening the health and life safety of regional communities or global populations. Outbreaks of epidemics can lead to costs on the health system, disruption of economic and other socially valuable activities, and decreases in trade.
Transportation Incidents	Transportation incidents can result in property damages; costs to emergency services; traffic delays; medical and rehabilitation care; lost productivity and disability compensation costs; and pain, suffering and grief.

Public Health

Of all hazards, flooding presents the most prevalent risk to public health. Floodwater is generally contaminated by various pollutants such as sewage, human and animal feces, pesticides and insecticides, fertilizers, oil, asbestos, rusting building material, and others. Prolonged flooding also provides breeding grounds for mosquitoes. Flooding exposes homes to mold and mildew and can cause flood victims to contract upper respiratory diseases and trigger cold-like symptoms. Molds can grow in as little as 24 to 48 hours in wet and damp areas of buildings and homes not cleaned after flooding. Water infiltrating through walls, floors, carpets, toilets, and bathrooms can cause mold. Floodwaters can also contain dangerous animals such as alligators or snakes. Flooding can bring these animals typically found in rivers, creeks, and ponds onto normally dry land. Residences and visitors need to be careful, as these animals may be hard to see in the floodwaters. Flooding resulting from a tropical storm or hurricane can compromise the safety of water supplies and the integrity of sewage disposal, leading to threats of food borne and waterborne illness. Power line damage and power outages increase the risk of foodborne illness and electrocution. Storms can disrupt medical care; a major storm can leave victims isolated without water and medicines. Restoring medical care for individuals injured in the storm or whose care for chronic conditions lapsed when storms cut them off from services is a public health priority. A flood can also cause both emotional and physical stress. Exposure to extreme disaster events, including loss or injury of loved ones, home damage, or home destruction can pose a long-term psychological impact on victims. Vulnerable populations such as seniors, the disabled, or those with long-term illnesses are less able than others to cope with floods.