4. Flood Risk Assessment

44 CFR Subsection D §201.6(c)(2): [The plan shall include] A risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.

This section describes the Risk Assessment process for the development of the Collier County Floodplain Management Plan. It describes how the County met the following requirements from the 10-step planning process:

- Planning Step 4: Assess the Hazard
- Planning Step 5: Assess the Problem

As defined by FEMA, risk is a combination of hazard, vulnerability, and exposure. “It is the impact that a hazard would have on people, services, facilities, and structures in a community and refers to the likelihood of a hazard event resulting in an adverse condition that causes injury or damage.”

This flood risk assessment covers the entire geographical area of unincorporated Collier County, FL. The risk assessment process identifies and profiles relevant hazards and assesses the exposure of lives, property, and infrastructure to these hazards. The process allows for a better understanding of a jurisdiction’s potential risk to natural hazards and provides a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events. This risk assessment followed the methodology described in the FEMA publication Understanding Your Risks—Identifying Hazards and Estimating Losses (FEMA 386-2, 2002), which breaks the assessment down to a four-step process:

Data collected through this process has been incorporated into the following sections of this chapter:

- **Section 4.1 Hazard Identification** identifies the flood hazards that threaten the planning area.
- **Section 4.2 Risk Assessment Methodology** reviews the methodology for evaluating risk and outlines the organization of each hazard profile.
- **Section 4.3 Asset Inventory** summarizes overall asset exposure, including people; buildings; critical facilities; and future growth and development. Cultural, historic, and natural resources and the local economy are detailed in Section 3.
- **Section 4.4 Hazard Profiles, Analysis, and Vulnerability** discusses the threat to the planning area, describes previous occurrences of flood hazard events, and estimates the likelihood of future occurrences. For all moderate and high priority flood hazards, this section assesses the planning area’s exposure and potential losses that may occur.
- **Section 4.5 Risk and Vulnerability Conclusions** summarize areas likely to flood, discusses the potential impact of future flooding conditions, and evaluates the health and safety consequences of the flood hazards.

4.1 Hazard Identification

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

Collier County's FMP Working Group reviewed the natural flood hazards presented in this document to identify those that pose a threat to the planning area.

4.1.1 Methodology

To identify flood hazards relevant to the planning area, the FMP Working Group reviewed existing state and local plans, disaster declarations and past flood occurrences, flood hazard data, and input from committee members and the public. Observations and projections of climate change were also evaluated to better identify and understand potential future hazards.

Table 4.1 below provides a list of flood-related hazards from the State Hazard Mitigation Plan, the 2015 Collier County Floodplain Management Plan, and the Collier County Local Mitigation Strategy, which provided a starting point for a review of local hazards and ensured consistency across these planning efforts.

Table 4-1 – Summary of Flood Hazard Evaluation

Flood Hazard	Included in 2023 State Plan?	Included in 2015 Collier County FMP?	Included in 2025 Local Mitigation Strategy?
Sea Level Rise	Discussed with Flood	✓	✓
Coastal/Canal Bank Erosion	✓	✓	✓
Dam/Levee Failure	✓	✓	-
Coastal and Inland Flooding	✓	✓	✓
Stormwater/Localized Flooding	-	✓	Discussed with Flood
Hurricane/Tropical Storm	✓	✓	✓

All hazards listed above were evaluated for this plan. Flood hazard data from the 2015 Collier County Floodplain Management Plan, the State of Florida Hazard Mitigation Plan, the 2025 Local Mitigation Strategy, the Florida Department of Emergency Management (FDEM), FEMA, NOAA's National Centers for Environmental Information (NCEI), and other sources were examined to assess the significance of these hazards to the planning area. For the purpose of hazard identification, significance was measured in general terms and focused on key criteria such as frequency and resulting damage, which includes deaths and injuries, as well as property and economic damage.

4.1.2 Disaster Declaration History

The FMP Working Group researched past events that resulted in a federal emergency or disaster declaration for the planning area in order to identify known flood hazards. Federal and/or state disaster declarations may be granted when the Governor certifies that the combined local, county and state resources are insufficient and that the situation is beyond their recovery capabilities. When the local government's capacity has been surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. If the disaster is so severe that both the local and state government capacities are exceeded, a federal emergency or disaster declaration may be issued allowing for the provision of federal assistance.

Details on flood-related federal disaster declarations were obtained from FEMA and are summarized in Table 4-2. This list contains all emergency and major disaster declarations that included Collier County as a designated area. This table reflects the historic patterns of flood hazards for the planning area. Since 1965, Collier County has received 23 major disaster declarations and 14 emergency declarations related to hurricanes, tropical storms, and severe storms. While all of these events had the potential to cause flooding, only three declarations were specifically flood-related.

Table 4-2 – FEMA Emergency and Major Disaster Declarations for Collier County, 1965-2025

Hazard Type	Disaster #	Date
Hurricane Betsy	DR-209	9-14-1965
Hurricane Andrew	DR-955	8-24-1992
Hurricane Opal	DR-1069	4-10-1995
Severe Storms, High Winds, Tornadoes, and Flooding	DR-1195	1-6-1998
Hurricane Irene	DR-1306	10-20-1999
Severe Storms and Flooding	DR-1345	10-4-2000
Severe storms, tornadoes and flooding associated with Tropical Storm Gabrielle	DR-1393	9-28-2001
Tropical Storm Bonnie and Hurricane Charley	DR-1539	8-13-2004
Hurricane Frances	DR-1545	9-4-2004
Hurricane Ivan	DR-1551	9-16-2004
Hurricane Jeanne	DR-1561	9-26-2004
Hurricane Katrina	DR-1602	8-28-2005
Hurricane Wilma	DR-1609	10-24-2005
Tropical Storm Fay	DR-1785	8-21-2008
Tropical Storm Debby	DR-4068	7-3-2012
Hurricane Isaac	DR-4084	10-18-2012
Hurricane Irma	DR-4337	9-5-2017
Hurricane Ian	DR-4673	9-24-2022
Hurricane Nicole	DR-4680	12-13-2022
Hurricane Idalia	DR-4734	8-31-2023
Hurricane Debby	DR-4806	8-3-2024
Hurricane Helene	DR-4828	9-24-2024
Hurricane Milton	DR-4834	10-7-2024
Emergency Declarations		
Hurricane Georges	EM-3131	9-25-1998
Tropical Storm Irene	EM-3150	10-15-1999
Hurricane Katrina Evacuation	EM-3220	9-5-2005
Tropical Storm Rita	EM-3259	9-20-2005
Tropical Storm Fay	EM-3288	8-21-2008
Hurricane Irma	EM-3385	9-5-2017
Hurricane Dorian	EM-3419	8-30-2019
Tropical Storm Elsa	EM-3561	7-4-2021
Hurricane Ian	EM-3584	9-24-2022
Hurricane Nicole	EM-3587	11-8-2022

Hazard Type	Disaster #	Date
Tropical Storm Idalia	EM-3596	8-28-2023
Tropical Storm Debby	EM-3605	8-3-2024
Tropical Storm Helene	EM-3615	9-24-2024
Hurricane Milton	EM-3622	10-7-2024

Source: FEMA, April 2026

4.1.3 Flood Event History

The National Oceanic and Atmospheric Administration's (NOAA) National Center for Environmental Information (NCEI) has been tracking various types of severe weather since 1950. Flood-related events have been tracked since 1996. The NCEI Storm Events Database contains an archive of destructive storm or weather data and information which includes local, intense and damaging events. NCEI receives storm data from the National Weather Service (NWS), which compiles information from a variety of sources, including but not limited to: county, state and federal emergency management officials, local law enforcement officials, SkyWarn spotters, NWS damage surveys, newspaper clipping services, the insurance industry and the general public. This database contains 103 flood related severe weather events that occurred in Collier County between January 1996 and December 2025. Table 4-3 summarizes these events. While the NCEI Storm Events Database does not represent a comprehensive record of every flood event that has occurred in Collier County, it provides valuable insight into the frequency, characteristics, and impacts of documented flood-related incidents over time.

Table 4-3 – NCEI Severe Weather Reports for Collier County, January 1996 – December 2025

Type	# of Events	Property Damage	Crop Damage	Deaths	Injuries
Coastal Flood	11	$71,000	$0	0	0
Flash Flood	12	$565,000	$0	0	0
Flood	29	$43,500	$0	0	0
Heavy Rain	6	$60,000	$0	0	0
High Surf	0	$0	$0	0	0
Hurricane (Typhoon)	10	$2,425,000,000	$0	1	0
Storm Surge/Tide	11	$8,138,000	$0	3	0
Tropical Depression	10	$0	$0	0	0
Tropical Storm	14	$560,415,000	$0	0	0
Total	**103**	**$2,994,292,500**	**$0**	**4**	**0**

Source: NCEI Storm Events Database, April 2026
Note: Losses reflect totals for all areas impacted within Collier County.

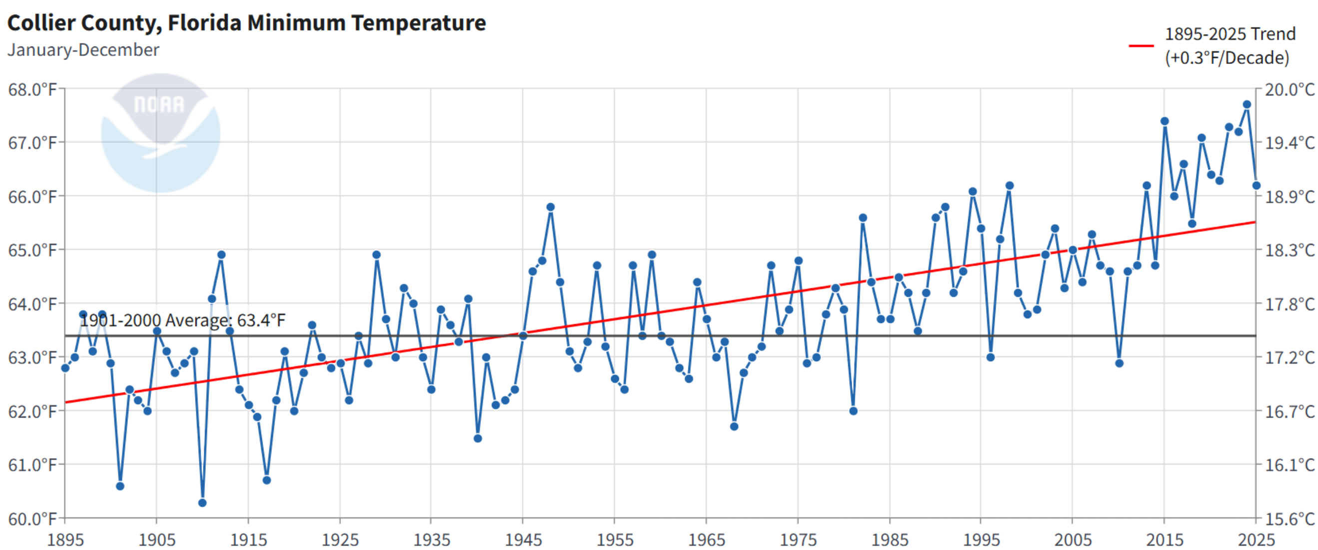
4.1.4 Climate Change

Climate change refers to long-term changes in temperature, precipitation, and other aspects of the Earth's climate system. According to the 2023 Intergovernmental Panel on Climate Change (IPCC) Synthesis Report, human activities, primarily through the emission of greenhouse gases, have unequivocally caused global warming, with global surface temperatures reaching approximately 1.1°C above pre-industrial (1850–1900) levels during 2011–2020. Observed increases in atmospheric greenhouse gas concentrations, including carbon dioxide (CO_2), are attributed to human activities and are the primary driver of recent warming. The IPCC reports that widespread and rapid changes have occurred in the atmosphere, oceans, cryosphere, and biosphere, and that climate change is already affecting weather and climate extremes in every region of the world. These changes have contributed to increased risks from hazards such as extreme heat, heavy precipitation, drought, flooding, sea level rise, and tropical cyclones. The extent of climate change impacts will continue to vary across regions based on local exposure, vulnerability, and the capacity of human and natural systems to adapt.

Temperature

Records of minimum annual temperature show an increasing annual trend. In Collier County, average minimum annual temperature has increased at a rate of 0.3 degrees Fahrenheit per decade, as shown in Figure 4-1.

Figure 4-1 – Collier County Minimum Annual Temperature, 1895-2025



Source: NOAA Climate at a Glance

High temperatures are also expected to increase, with an estimated 40-50 more days with temperatures above 95 degrees Fahrenheit by 2041-2070 compared to 1971-2000. Warm nights, with minimum temperatures above 75 degrees Fahrenheit, only occur a few times a year now but are projected to increase in frequency to 100 or more nights per year by mid-century under lower emissions scenarios.

Precipitation

According to the Southeast Florida Regional Climate Change Compact, South Florida averages 52 to 53 inches of rainfall annually, with three-quarters falling during the wet season, from May to October. A review of precipitation data from 1895 to 2025 shows no observable systematic trend in precipitation. Throughout the Southeast U.S. there has been a trend toward more days with heavy rainfall, but it remains to be seen whether these changes are occurring in South Florida (IPCC, 2023).

Sea Level Rise

Sea level rise is a direct result of global climate change. Estimates for sea level rise are based on projected greenhouse gas emission levels and their associated impacts on global temperature change. Most sea level rise models do not fully account for ice melt, and therefore actual sea level rise may be significantly higher than current estimates suggest. As such, these projections contain substantial variability but are nonetheless important to consider when planning for coastal areas because they indicate where flooding can be expected should actual sea level rise meet estimated levels.

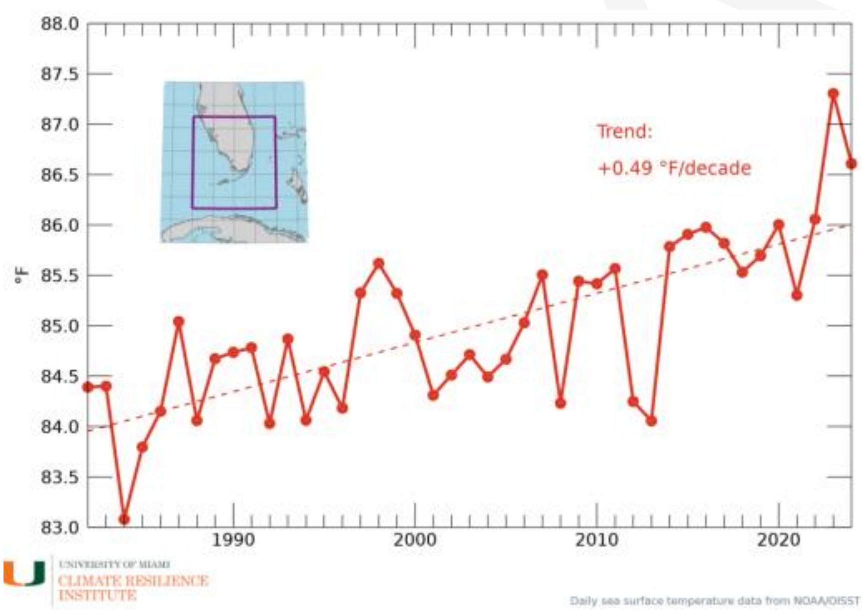
Saltwater Intrusion

Saltwater intrusion is caused by increasing sea levels and/or a reduction in inland freshwater levels and can compromise well fields and lead to contamination of drinking water supplies. Salinity barriers in canals and control of groundwater levels have served to mitigate this risk and limit the inland progression of saltwater intrusion.

Sea Surface Temperature

Sea surface temperature around South Florida has increased. According to the Southeast Florida Climate Indicators 2025 update, the warmest ever sea surface temperature was recorded in 2023 in Manatee Bay near Everglades National Park recording 101.1 degrees Fahrenheit. The chart below in Figure 4-2 shows the summertime (July, August, September) average sea surface temperature for the south Florida region, encompassing the tip of the Florida peninsula from 1982 to 2024. Over this period, we see an increase in summertime sea surface temperature in the region of nearly half a degree (0.49 °F) per decade.

Figure 4-2 – Summertime Average Sea Surface Temperature for South Florida



Source: Southeast Florida Regional Climate Change Compact, Southeast Florida Climate Indicators 2025 Update

4.1.5 Identified Hazards

Based on preliminary review of disaster declaration history, flood event history, and discussion by the FMP Working Group, the following hazards were identified for full risk and vulnerability analysis in this plan:

- Sea Level Rise
- Coastal/Canal Bank Erosion
- Dam/Levee Failure

- Flood: Coastal and Inland
- Flood: Stormwater/Localized Flooding
- Hurricane and Tropical Storm

4.2 Risk Assessment Methodology

The hazards identified in Section 4.1 Hazard Identification, are profiled individually in Section 4.4. Information provided by members of the FMP Working Group has been integrated into this section with information from other data sources.

Each hazard is profiled in the following format:

Hazard Description

This section provides a description of the hazard including any applicable details specific to the planning area. Where available, this section also includes information on seasonal patterns, speed of onset/duration, and any secondary effects.

Location

This section describes or visualizes where the hazard may occur within the planning area.

Extent

This section provides information on the magnitude of the hazard and describes how the severity of the hazard can be measured. If known, the most severe event on record is noted.

Past Occurrences

This section contains information on historical events, including the date, extent, and/or location of past hazard events within or near the Collier County planning area.

Probability of Future Occurrence

This section gauges the likelihood of future occurrences based on past events and existing data. The frequency is determined by dividing the number of events observed by the number of years on record and multiplying by 100. This provides the percent chance of the event happening in any given year (e.g. 10 hurricanes or tropical storms over a 30-year period equates to a 33 percent chance of experiencing a hurricane or tropical storm in any given year).

Climate Change and Future Conditions

This section discusses the potential impacts of any changes in future conditions, including climate change, future development, or other changes.

Priority Risk Index

The findings from the above sections of the hazard profiles are summarized using the Priority Risk Index (PRI) to score and rank each hazard's significance to the planning area. The PRI provides a standardized numerical value so that hazards can be compared against one another (the higher the

PRI value, the greater the hazard risk). PRI values are obtained by assigning varying degrees of risk in five categories (probability, impact, spatial extent, warning time, and duration). Each degree of risk is assigned a value (1 to 4) and a weighting factor as summarized in Table 4.4.

Table 4-4 – Priority Risk Index

RISK ASSESSMENT CATEGORY	LEVEL	DEGREE OF RISK CRITERIA	INDEX	WEIGHT
PROBABILITY What is the likelihood of a hazard event occurring in a given year?	UNLIKELY	LESS THAN 1% ANNUAL PROBABILITY	1	30%
	POSSIBLE	BETWEEN 1 & 10% ANNUAL PROBABILITY	2	
	LIKELY	BETWEEN 10 &100% ANNUAL PROBABILITY	3	
	HIGHLY LIKELY	100% ANNUAL PROBABILTY	4	
IMPACT In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?	MINOR	VERY FEW INJURIES, IF ANY. ONLY MINOR PROPERTY DAMAGE & MINIMAL DISRUPTION ON QUALITY OF LIFE. TEMPORARY SHUTDOWN OF CRITICAL FACILITIES.	1	30%
	LIMITED	MINOR INJURIES ONLY. MORE THAN 10% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR > 1 DAY	2	
	CRITICAL	MULTIPLE DEATHS/INJURIES POSSIBLE. MORE THAN 25% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR > 1 WEEK.	3	
	CATASTROPHIC	HIGH NUMBER OF DEATHS/INJURIES POSSIBLE. MORE THAN 50% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES > 30 DAYS.	4	
SPATIAL EXTENT How large of an area could be impacted by a hazard event? Are impacts localized or regional?	NEGLIGIBLE	LESS THAN 1% OF AREA AFFECTED	1	20%
	SMALL	BETWEEN 1 & 10% OF AREA AFFECTED	2	
	MODERATE	BETWEEN 10 & 50% OF AREA AFFECTED	3	
	LARGE	BETWEEN 50 & 100% OF AREA AFFECTED	4	
WARNING TIME Is there usually some lead time associated with the hazard event? Have warning measures been implemented?	MORE THAN 24 HRS	SELF DEFINED	1	10%
	12 TO 24 HRS	SELF DEFINED	2	
	6 TO 12 HRS	SELF DEFINED	3	
	LESS THAN 6 HRS	SELF DEFINED	4	
DURATION How long does the hazard event usually last?	LESS THAN 6 HRS	SELF DEFINED	1	10%
	LESS THAN 24 HRS	SELF DEFINED	2	
	LESS THAN 1 WEEK	SELF DEFINED	3	
	MORE THAN 1 WEEK	SELF DEFINED	4	

The sum of all five risk assessment categories equals the final PRI value, demonstrated in the equation below (the lowest possible PRI value is a 1.0 and the highest possible PRI value is 4.0).

$$PRI = [(Probability \times .30) + (Impact \times .30) + (Spatial\ Extent \times .20) + (Warning\ Time \times .10) + (Duration \times .10)]$$

The purpose of the PRI is to categorize and prioritize all flood hazards as high, moderate, or low risk. This process and these criteria allowed the FMP Working Group to focus on the hazards of greatest significance and to prioritize mitigation actions appropriately, allowing Collier County to focus resources where they are most needed.

PRI ratings are provided by category throughout each hazard profile, and a summary of each hazard's PRI score is provided at the beginning of each hazard profile. The results of the risk assessment and overall PRI scoring are provided in Section 4.5.

Vulnerability Assessment

The FMP Working Group conducted a vulnerability assessment to assess the impact that each hazard would have on the County. The vulnerability assessment quantifies assets at risk and estimates potential losses to the extent feasible using best available data.

Vulnerability assessments followed the methodology described in the FEMA publication *Understanding Your Risks—Identifying Hazards and Estimating Losses*. Total exposure and values at risk are summarized in the Asset Inventory in Section 4.3. An evaluation of vulnerability by hazard, based on this asset inventory, is provided in each relevant hazard profile.

Data used to support this assessment included the following:

- Geographic Information System (GIS) datasets, including building footprints, topography, aerial photography, and transportation layers;
- Hazard layer GIS datasets from state and federal agencies;
- Written descriptions of inventory and risks provided by the 2023 Florida Enhanced State Hazard Mitigation Plan;
- Written descriptions of inventory and risks provided by the 2020 Collier County Local Mitigation Strategy and the 2015 Collier County Floodplain Management Plan; and
- Exposure and vulnerability estimates derived using local parcel and building data, and data from the South Florida Water Management District

Vulnerability is summarized in general, qualitative terms and encompasses the potential impact based on past occurrences, spatial extent, and damage and casualty potential. It is categorized into the following classifications:

- **Extremely Low** – The occurrence and potential cost of damage to life and property is very minimal to non-existent.
- **Low** – Minimal potential impact. The occurrence and potential cost of damage to life and property is minimal.
- **Medium** – Moderate potential impact. This ranking carries a moderate threat level to the general population and/or built environment. Here the potential damage is more isolated and less costly than a more widespread disaster.
- **High** – Widespread potential impact. This ranking carries a high threat to the general population and/or built environment. The potential for damage is widespread. Hazards in this category may have occurred in the past.
- **Extremely High** – Very widespread with catastrophic impact.

Vulnerability was also quantified in instances where there is a known, defined hazard area, such as a mapped floodplain. In these instances, the number and types of buildings subject to the identified hazard were counted and their values tabulated. Additional information, such as the location of critical community facilities (e.g., a fire station), historic structures, and valued natural resources (e.g., an identified wetland or endangered species habitat) can also be evaluated in relation to known hazard areas. Together, this information conveys the exposure and vulnerability of the planning area to that hazard.

4.3 Asset Inventory

An inventory of assets within Collier County was compiled to identify structures and, as a result, people, potentially at risk to the identified hazards. This asset inventory is divided into property, people, critical facilities and infrastructure, and future land use. By understanding the type and number of assets that exist and where they are located relative to known hazard areas, the risk and vulnerability for such assets can be assessed.

4.3.1 Property

Collier County building footprint data, last updated in 2021, and parcel data, last updated in 2025-2026, were used to identify all improved properties in Collier County. The original building footprint layer was refined by removing accessory structures smaller than 600 square feet and invalid records, and then spatially joined to parcel data. Parcel data was obtained from the Collier County Property Appraiser. Property exposure is summarized by occupancy in Table 4.5.

Table 4-5 – Summary of Improved Property

Occupancy Type	Building Count	Total Building Value	Estimated Content Value	Total Value
Agriculture	579	$79,809,392	$79,809,392	$159,618,784
Commercial	5,301	$9,400,647,214	$9,400,647,214	$18,801,294,428
Education	350	$1,193,660,082	$1,193,660,082	$2,387,320,164
Government	80	$360,862,629	$360,862,629	$721,725,258
Industrial	356	$415,552,605	$623,328,908	$1,038,881,513
Religious	241	$424,220,453	$424,220,453	$848,440,905
Residential	121,977	$72,523,316,298	$36,261,658,149	$108,784,974,447
Total	**128,884**	**$84,398,068,673**	**$48,344,186,827**	**$132,742,255,500**

Source: Collier County Property Appraiser parcel data, 2025-2026

Note that content value estimates are based on the FEMA Hazus program which provides software, data, methods, and guidance for estimating risk from natural hazards. The content value estimates were based on Hazus methodology of estimating value as a percent of improved structure values by property type. The residential property type assumes a content replacement value equal to 50% of the building's value. Agricultural, commercial, education, government, and religious property types assume a content replacement value equal to 100% of the building value. The industrial property type assumes a content replacement value equal to 150% of the building value.

4.3.2 People

An estimate of people at risk by location was derived using residential property data and the average household size in Collier County as estimated by the U.S. Census. Table 4.6 shows the total population at risk according to this methodology.

Table 4-6 – Estimated People at Risk

Residential Property Count	Average Household Size	People at Risk
121,977	2.3	280,547

Source: American Community Survey 2020-2024 5-Year Estimates; Collier County parcel data, 2025-2026

4.3.3 Critical Facilities and Infrastructure

Of significant concern with respect to any disaster event is the location of critical facilities and infrastructure in the planning area. Critical facilities are often defined as those essential services and facilities in a major emergency which, if damaged, would result in severe consequences for public health and safety or a facility which, if unusable or unreachable because of a major emergency, would seriously and adversely affect the health, safety, and welfare of the public. Critical facilities were identified by Collier County Emergency Management and are summarized by FEMA Lifeline and total structure value in Table 4-7. The locations of identified critical facilities and infrastructure are shown in Figure 4-3.

Table 4-7 – Summary of Critical Facilities and Infrastructure

FEMA Lifeline	Count	Structure Value
Communications	24	$20,359,875
Energy	111	$81,022,650
Food, Hydration, Shelter	36	$380,428,268
Hazardous Materials	74	$140,952,505
Health and Medical	42	$398,731,152
Safety and Security	54	$295,403,611
Transportation	19	$25,943,785
Water Systems	41	$63,573,934
Total	**401**	**$1,406,415,782**

Source: Collier County, 2024

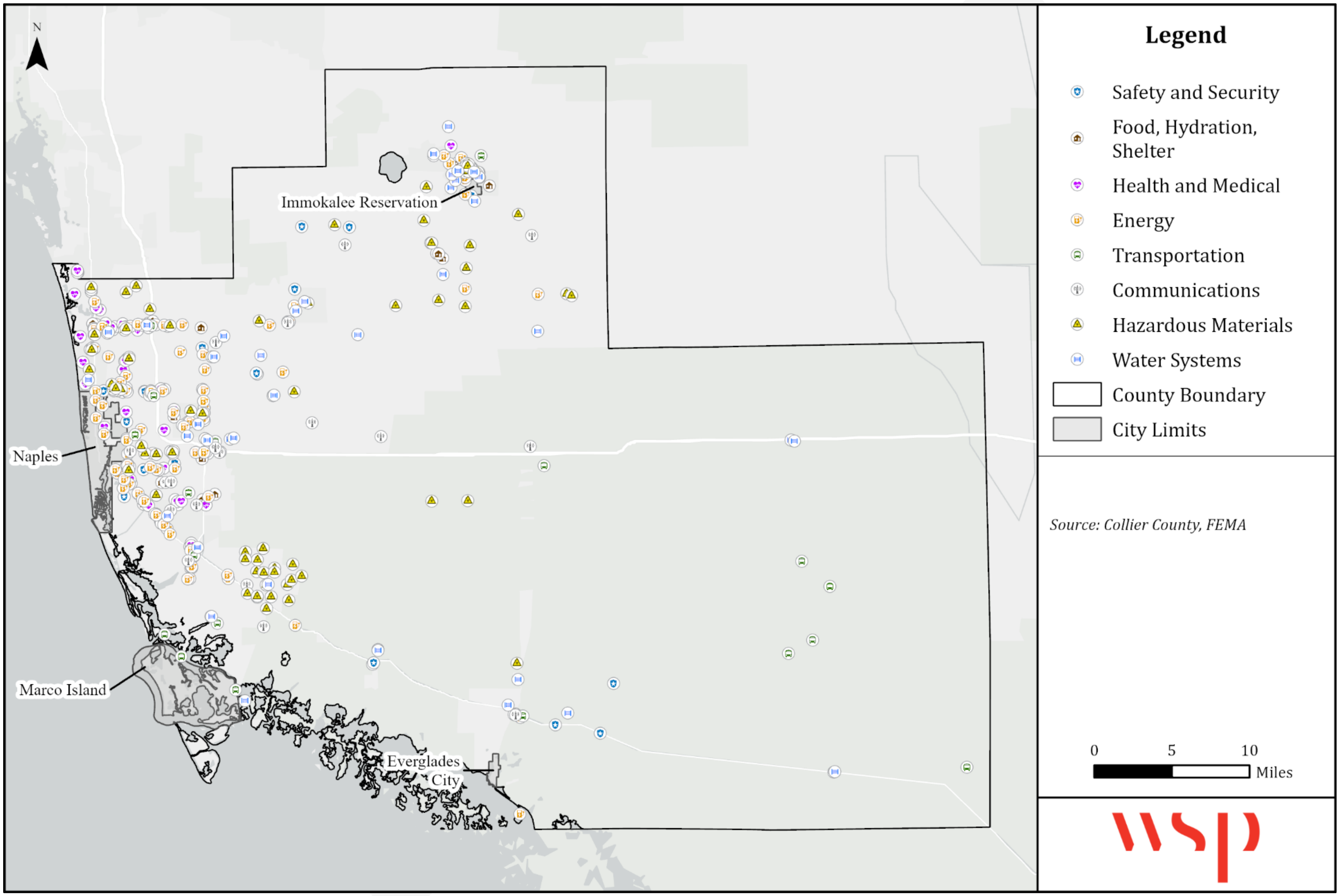
Critical facilities were categorized into different facility types that correlate to FEMA Lifelines. Table 4-8 shows Collier County's classification system for critical facilities organized by FEMA Lifeline sectors, which group essential services based on their role in supporting community functionality during and after a major emergency.

Table 4-8 – Critical Facilities Classification System

FEMA Lifeline	Facility Type
Communications	Communications Tower, Dipatch Center, Radio Communications Tower
Energy	Electric Substation, Fuel Facility – Along Evatuation Route
Food, Hydration, Shelter	College, Faith-Based, Grocery Store, Immokalee Recovery Coord Ctr, Local Government Facility, Point of Distribution, Private Catholic University, Public School, Relief Agency, Stadium
Hazardous Materials	Hazardous Material Facility/Site
Health and Medical	Ambulatory Surgical Center, Assisted Living Facility, Clinical Laboratory, End-Stage Renal Disease, Hospice, Hospital, Skilled Nursing Facility
Safety and Security	Call Center, Correctional Facility, EMS, EOC, Fire Station, Law Enforcement
Transportation	Airport, Heliport/Helipad, Major Intersection
Water Systems	Public Water Supply, Solid Waste Facility, Waste Water Facility

Source: FEMA

Figure 4-3 – Collier County Critical Facilities



4.4 Hazard Profiles, Analysis, Vulnerability

Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the...location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

44 CFR Subsection D §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community. 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)(ii)(A) of this section and a description of the methodology used to prepare the estimate; and
(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.

The following sections, detailed in the table below, provide profiles of the flood hazards that the FMP Working Group identified for inclusion in this plan.

Table 4-9 – Flood Hazard Profile Organization and PRI Summary

Section	Hazard	PRI Score	PRI Rating
4.4.1	Coastal/Canal Bank Erosion	2.2	Medium
4.4.2	Dam/Levee Failure	1.8	Low
4.4.3	Flood: Coastal and Inland	3.5	High
4.4.4	Flood: Stormwater/Localized Flooding	2.8	Medium
4.4.5	Hurricane and Tropical Storm	3.3	High
4.4.6	Sea Level Rise	2.9	Medium

4.4.1 Coastal/Canal Bank Erosion

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Coastal/Canal Bank Erosion	Highly Likely	Minor	Negligible	More than 24 hrs	More than 1 week	2.2

Hazard Description

Coastal Erosion

Coastal erosion is a process whereby large storms, flooding, strong wave action, sea level rise, and human activities, such as inappropriate land use, alterations, and shore protection structures, wear away the beaches and bluffs along the coast. Erosion undermines and can destroy buildings and public infrastructure and can have long-term economic and social consequences. According to NOAA, coastal erosion is responsible for approximately $500 million per year in coastal property loss in the United States, including damage to structures and loss of land. To mitigate coastal erosion, the federal government spends an average of $150 million every year on beach nourishment and other shoreline erosion control measures.

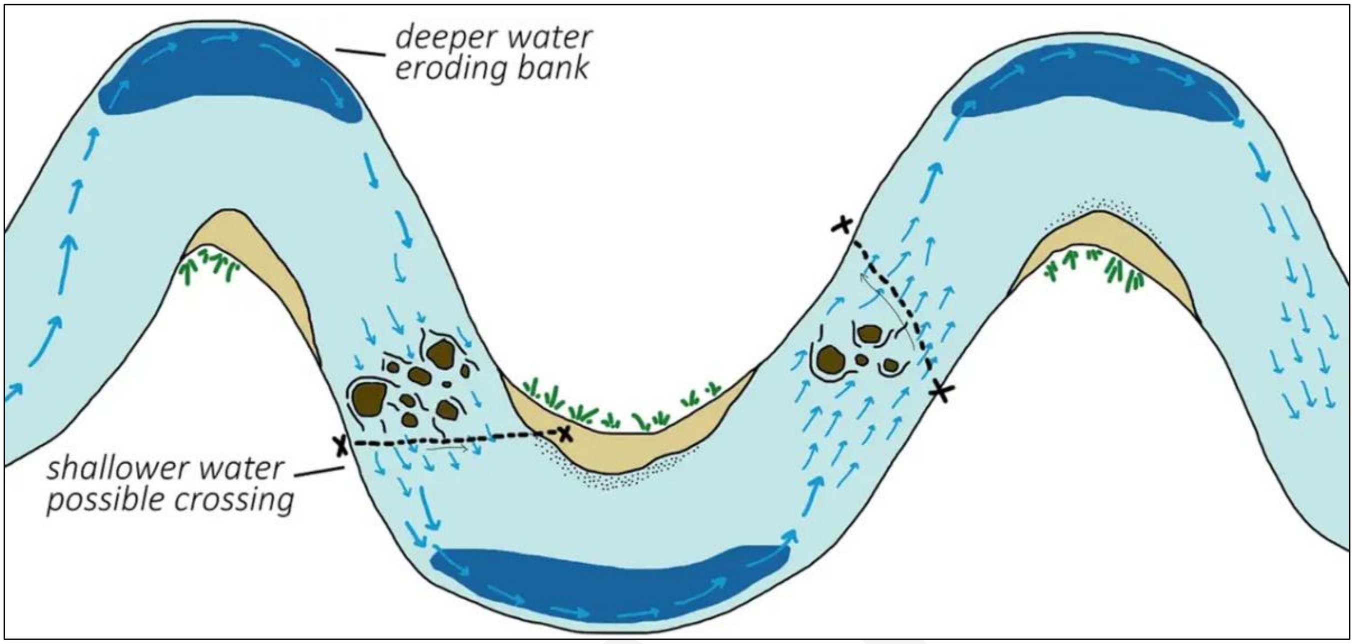
Coastal erosion has both natural causes and causes related to human activities. Gradual coastal erosion/replenishment results naturally from the impacts of tidal longshore currents. Severe coastal erosion can occur over a very short period of time when the state is impacted by hurricanes, tropical storms and other weather systems. Sand is continually removed by longshore currents in some areas, but it is also continually replaced by sand carried in by the same type of currents. Structures such as piers or sea walls, jetties, and navigational inlets may interrupt the movement of sand. Sand can become “trapped” in one place by these types of structures. The currents will continue to flow, though depleted of sand trapped elsewhere. With significant amounts of sand trapped in the system, the continuing motion of currents (now deficient in sand) results in erosion. In this way, human construction activities that result in the unnatural trapping of sand have the potential to result in significant coastal erosion.

Estuaries are partially enclosed coastal water bodies where freshwater meets saltwater from the ocean. They are influenced by tides but still protected from the full force of ocean waves. Estuaries are often referred to as bays or sounds. Estuarine coastlines can experience erosion through short-term processes, such as tides, storms, wind, and boat wakes, as well as long-term processes, such as sea level rise. Many variables determine the rate of estuarine erosion including shoreline type, geographic location and size of the associated estuary, the type and abundance of vegetation, and the frequency and intensity of storms.

Canal Bank Erosion

Streams/canals erode by a combination of direct stream processes, such as down cutting and lateral erosion, and indirect processes, such as mass-wasting accompanied by transportation. When the channel bends, water on the outside of the bend (the cut-bank) flows faster and water on the inside of the bend (the point) flows slower as shown in Figure 4-4. This distribution of velocity results in erosion occurring on the outside of the bend and deposition occurring on the inside of the bend. Per the South Florida Water Management District (SFWMD), given the characteristics of South Florida the slopes of the canals are nearly flat, and flows have low velocities and high flow depths.

Figure 4-4 – Stream Meanders



Source: U.S. Fish and Wildlife Service

Stream bank erosion is a natural process, but acceleration of this natural process leads to a disproportionate sediment supply, stream channel instability, land loss, habitat loss and other adverse effects. Stream bank erosion processes, although complex, are driven by two major components: stream bank characteristics (erodibility) and hydraulic/gravitational forces. Many land use activities can affect both of these components and lead to accelerated bank erosion. The vegetation rooting characteristics can protect banks from fluvial entrainment and collapse and also provide internal bank strength. When riparian vegetation is changed from woody species to annual grasses and/or flowering plants, the internal strength is weakened, causing acceleration of mass wasting processes. Stream bank aggradation or degradation is often a response to stream channel instability. Since bank erosion is often a symptom of a larger, more complex problem, the long-term solutions often involve much more than just bank stabilization. Numerous studies have demonstrated that stream bank erosion contributes a large portion of the annual sediment yield.

Determining the cause of accelerated streambank erosion is the first step in solving the problem. When a stream is straightened or widened, streambank erosion increases. Accelerated streambank erosion is part of the process as the stream seeks to re-establish a stable size and pattern. Damaging or removing streamside vegetation to the point where it no longer provides for bank stability can cause a dramatic increase in bank erosion. A degrading streambed results in higher and often unstable, eroding banks. When land use changes occur in a watershed, such as clearing land for agriculture or development, runoff increases. With this increase in runoff the stream channel will adjust to accommodate the additional flow, increasing streambank erosion if appropriate erosion protection methods are not installed. Addressing the problem of streambank erosion requires an understanding of both stream dynamics and the management of streamside vegetation.

Warning Time: 1 – More than 24 hours

Duration: 4 – More than 1 week

Location

Erosion can occur anywhere along the western coastline or along any of the County's canals. It is important to note that due to limited available data on the extent, location, and historical impacts of canal bank erosion, a full risk and vulnerability assessment was not conducted for this hazard profile.

Spatial Extent: 1 – Negligible

Extent

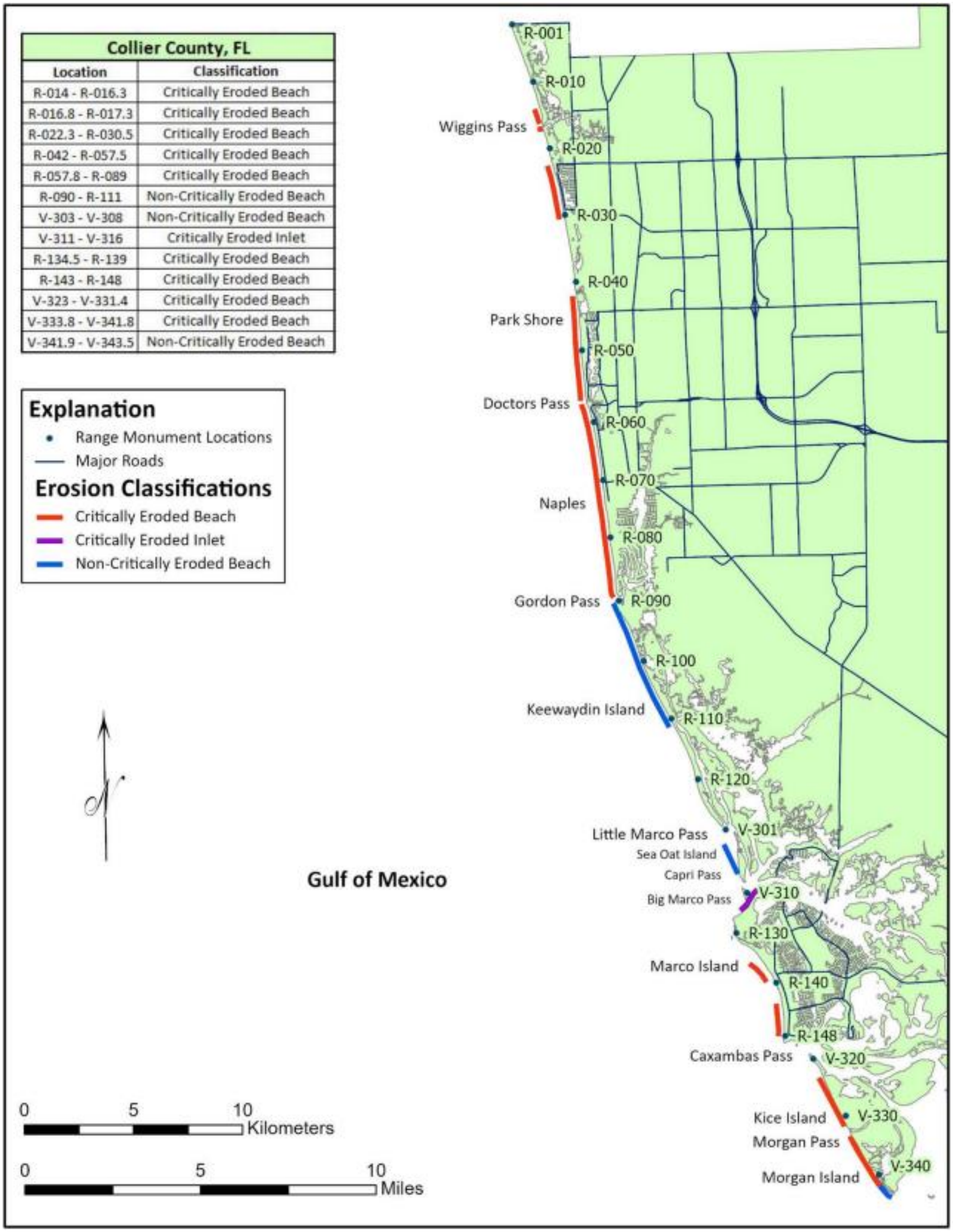
Erosion rates and potential impacts are highly localized. Severe storms can remove wide beaches, along with substantial dunes, in a single event. In undeveloped areas, these high recession rates are not likely to cause significant concern, but in some heavily populated locations, one or two feet of erosion may be considered catastrophic.

The severity of coastal erosion is typically measured through a quantitative assessment of annual shoreline change for a given beach cross-section profile (feet or meters per year) over a long period of time. Erosion rates vary as a function of shoreline type and are influenced primarily by episodic events but can be used in land use and hazard management to define areas of critical concern. The 2024 update of the Florida Department of Environmental Protection (FDEP), Office of Resilience and Coastal Protection's "Critically Eroded Beaches in Florida" report, which inventoried critically eroded areas along the Atlantic and Gulf coasts. According to the FDEP report, there are nine critically eroded beach areas (15.5 miles), three non-critically eroded beach areas (5.1 miles), and one critically eroded inlet shoreline area (0.8 mile) in Collier County. Figure 4-5 details the locations of all critically eroded beach areas in Collier County.

On canals, erosion may be measured by mass wasting events or decreased capacity due to sedimentation. The South Florida Water Management District (SFWMD) reports that the Big Cypress Basin contains a network of 134.1 miles of primary canals that span across all of Collier County and part of Monroe County. The Golden Gate Canal was recently identified as a priority within the Big Cypress Basin due to excessive vegetation, trees, and debris found within the channel that may cause blockages and increase the risk of flooding and erosion from higher water levels.

Impact: 1 – Minor

Figure 4-5 – Critically Eroded Shoreline within Collier County



Source: FDEP Critically Eroded Beaches of Florida, 2024

Past Occurrences

Collier County has a significant number of canals and coastal shorelines that are susceptible to erosion. The most severe coastal erosion can occur over a very short period of time when the state is impacted by storms or tropical systems. Sea-level rise can also have longer term impacts on coastal flooding and erosion. Data is not widely available for rates of estuarine shoreline erosion, but it can and does occur. Long-term erosion rates alone are not sufficient to project future erosion, as future erosion rates will likely increase due to sea level rise.

Though shoreline erosion is typically an ongoing process, it can intensify during storm events, particularly with hurricane storm tides. The following event narratives from NCEI's Storm Events Database were noted for causing significant erosion in or near Collier County.

September 14, 2001 – Tropical storm Gabrielle formed in the eastern Gulf of Mexico from a trough of low pressure that had lingered over Florida since September 8. Gabrielle moved east northeast at 7 to 12 mph with the center crossing the Florida west coast near Venice at noon on September 14. The minimum central pressure in Collier County was 999.4 mb at Naples. Maximum winds in Collier County were at Everglades City with sustained winds of 44 knots and peak gusts of 61 knots. Storm surge values of 3 to 5 feet were observed along much of the Collier County coast, which caused some coastal flooding and minor to moderate beach erosion. The estimate to repair the beach erosion is $3 million. Flooding by rainfall of 2 to 5 inches along with the storm surge damaged 60 to 70 residences and 12,500 customers lost electrical power.

October 24, 2005 – Hurricane Wilma produced a maximum measured storm tide of 8 feet at the USGS tide gauge at the Turner River near Chokoloskee in southern Collier County, with a storm surge of 7 feet after subtracting a 1-foot astronomical tide. Significant damage to structures close to the water was observed in Chokoloskee, along with some washing out of part of the road leading to the town. A storm tide of 7 feet was estimated in Marco Island by Collier County Emergency Management, along with significant beach erosion. An NWS survey team estimated a storm tide of 4 feet in Everglades City based on debris line heights, with little structural damage. The NOS tide gauge in Naples recorded a maximum storm tide of 4.8 feet, with a storm surge of 3.8 feet after considering astronomical tide levels.

October 25, 2012 – Severe beach erosion and coastal flooding occurred on Monday, August 27th as the center of Tropical Storm Isaac moved into the Gulf of Mexico. A storm surge of 2.05 feet was measured at the Naples pier. Farther east along the coast, inundation depths as high as 3 feet were reported in Goodland and Everglades City. Inundation in the Naples area was about 1 foot. Most damage from coastal flooding was to infrastructure in the Goodland and Everglades City areas and was estimated at $400,000. Severe beach erosion in the Naples and Marco Island areas led to damage estimated at $5.6 million.

December 21, 2018 – West-southwest gales developed behind a strong cold front that moved through the region during the early morning hours of December 21st. These gusty winds brought down power poles and lines, leading to minor damage. The strong onshore flow along the Gulf coast also led to several areas of beach erosion and minor flooding along the Collier County coast.

Probability of Future Occurrence

Collier County has experienced canal bank erosion in the past. Canal bank erosion is a natural process, but acceleration of this natural process leads to a disproportionate sediment supply, stream channel instability, land loss, habitat loss, and other adverse effects. Erosion has occurred and will occur as a matter of course on an occasional basis in all canal bank areas. Several known localized instances of canal erosion indicate that this hazard should be considered a possible future occurrence.

Collier County is highly likely to continue experiencing coastal erosion because its low-elevation dunes along the Gulf of Mexico are highly vulnerable to wave-driven water levels that can cause erosion and overwash even during relatively weak storms. Long-term monitoring and national USGS assessments show that both frequent storms and non-hurricane events generate enough wave energy to repeatedly erode dunes and shorelines, a pattern that has already resulted in substantial annual erosion and is expected to persist.

Probability: 4 – Highly Likely

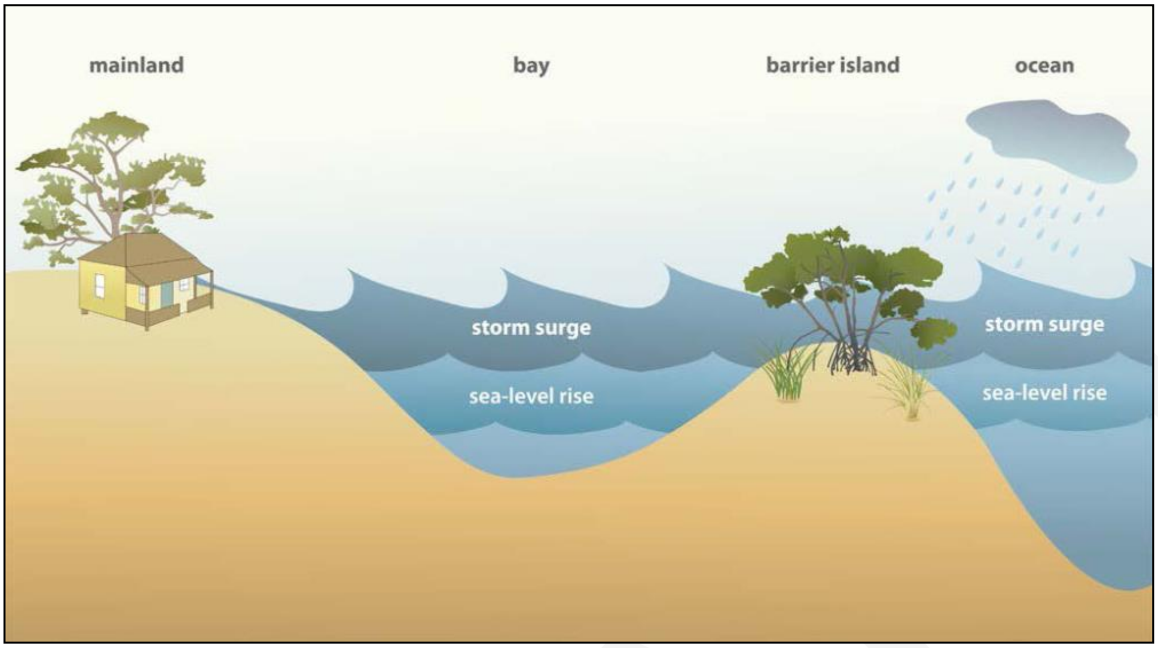
Climate Change and Future Conditions

Climate change is expected to make heavy rain events and tropical storms and hurricanes more frequent and intense. As a result, the erosion typically caused by these storms can be expected to occur more frequently. Coastal erosion is also expected to increase as a result of rising seas. Sea level rise will raise all tide levels, from low tide to storm surge (see Figure 4-6). The combined effects of wind and waves could damage natural protective features, leaving the shoreline more vulnerable (UF/IFAS Extension, 2013). The FMP Working Group noted research showing that sea level rise is also causing mangrove to die off, which may exacerbate erosion rates by removing these natural buffers.

According to the Center of Ocean Solutions, there has been a dramatic increase in coastal erosion over the last two decades, and this is expected to continue as sea level rises and storm frequency and severity increase. Rather than occurring over the same time scale with sea level rise, erosion of beaches and coastal cliffs is expected to occur in large bursts during storm events as a result of increased wave height and storm intensity. Because of these large events, scientific models predict that shoreline erosion may outpace sea level rise by 50- to 200-fold. Erosion will have significant effects on coastal habitats, which can lead to social and economic impacts on coastal communities. With the reduction of coastal habitats and the ecological services they provide, coastal communities will experience more frequent and destructive flooding, compromised water supplies, and smaller or fewer beaches.

According to the existing Flood Insurance Study for Collier County effective February 8, 2024, the existing dunes in many areas along the Collier County shoreline are insufficient to sustain wave attacks associated with the 1-percent-annual-chance flood.

Figure 4-6 – Sea Level Rise and Coastal Erosion of Dunes



Credits: Jane Hawkey, IAN Image Library (ian.umces.edu/imagelibrary/)

Vulnerability Assessment

Vulnerability – Medium

Erosion is a common, ongoing process along Collier County's canal banks and coastal shoreline. Given the lack of data on erosion rates and geographic extent, no property exposure analysis was conducted for this hazard. Flood risk and vulnerability from erosion is considered medium for Collier County. However, properties along canals are exposed to storm surges and high tides. Properties near canal locations in need of restoration also face temporarily heightened vulnerability to these associated flood risks.

4.4.2 Dam/Levee Failure

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Dam Failure	Unlikely	Limited	Negligible	Less than 6 hrs	Less than 1 week	1.8

Hazard Description

Dam Failure

A dam is a barrier constructed across a watercourse that stores, controls, or diverts water. Dams are usually constructed of earth, rock, or concrete. The water impounded behind a dam is referred to as the reservoir and is measured in acre-feet. One acre-foot is the volume of water that covers one acre of land to a depth of one foot. Dams can benefit farmland, provide recreation areas, generate electrical power, and help control erosion and flooding issues.

A dam failure is the collapse or breach of a dam that causes downstream flooding. Dam failures may be caused by natural events, human-caused events, or a combination. Due to the lack of advance warning, failures resulting from natural events, such as hurricanes, earthquakes, or landslides, may be particularly severe. Prolonged rainfall and subsequent flooding are the most common causes of dam failure.

Dam failures usually occur when the spillway capacity is inadequate, and water overtops the dam or when internal erosion in dam foundation occurs (also known as piping). If internal erosion or overtopping causes a full structural breach, a high-velocity, debris-laden wall of water is released and rushes downstream, damaging or destroying anything in its path. Overtopping is the primary cause of earthen dam failure in the United States.

Dam failures can result from any one or a combination of the following:

- Prolonged periods of rainfall and flooding;
- Inadequate spillway capacity, resulting in excess overtopping flows;
- Internal erosion caused by embankment or foundation leakage or piping;
- Improper maintenance, including failure to remove trees, repair internal seepage problems, replace lost material from the cross-section of the dam and abutments, or maintain gates, valves, and other operational components;
- Improper design, including the use of improper construction materials and construction practices;
- Negligent operation, including the failure to remove or open gates or valves during high flow periods;
- Failure of upstream dams on the same waterway; and
- High winds can cause significant wave action and result in substantial erosion.

Water released by a failed dam generates tremendous energy and can cause a flood that is catastrophic to life and property. A catastrophic dam failure could challenge local response capabilities and require evacuations to save lives. Impacts to life safety will depend on the warning time and the resources available to notify and evacuate the public. Major casualties and loss of life could result, as well as water quality and health issues. Potentially catastrophic effects on roads, bridges, and homes are also of major concern. Associated water quality and health concerns could also be issues. Factors that influence the potential severity of a full or partial dam failure are the amount of water impounded; the density, type, and value of development and infrastructure located downstream; and the speed of failure.

Dam failure can occur with little warning. Intense storms may produce flash flooding within a few hours or even minutes of the beginning of heavy rainfall, and dam failure may occur within hours of the first signs of breaching. Other failures and breaches can take much longer to occur, from days to weeks, as a result of debris jams or the accumulation of melting snow. The duration of the flood will vary but may last as long as a week.

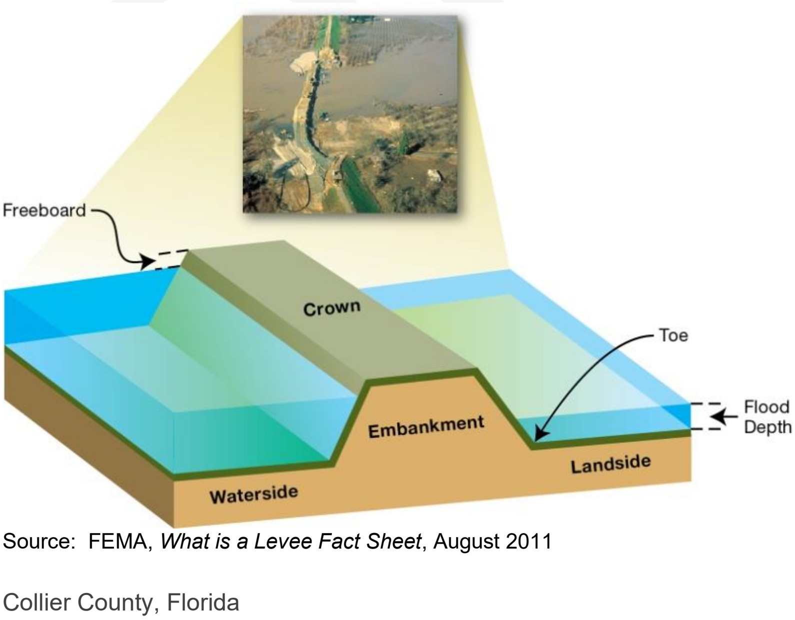
The National Inventory of Dams (NID) is a database of dams in the United States which was developed and is maintained by the USACE. Congress authorized the USACE to inventory dams as part of the 1972 National Dam Inspection Act. Several subsequent acts have authorized maintenance of the NID and provided funding. The USACE collaborates with FEMA and state regulatory offices to collect data on dams.

Levee Failure

FEMA defines a levee as “a man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water in order to reduce the risk from temporary flooding.” Levee systems consist of levees, floodwalls, and associated structures, such as closure and drainage devices, which are constructed and operated in accordance with sound engineering practices. Levees often have “interior drainage” systems that work in conjunction with the levees to take water from the landward side to the water side. An interior drainage system may include culverts, canals, ditches, storm sewers, and/or pumps.

Levees and floodwalls are constructed from the earth, compacted soil or artificial materials, such as concrete or steel. To protect against erosion and scouring, earthen levees can be covered with grass and gravel or hard surfaces like stone, asphalt, or concrete. Levees and floodwalls are typically built parallel to a waterway, most often a river, in order to reduce the risk of flooding to the area behind it. Figure 4-7 below shows the components of a typical levee.

Figure 4-7 – Components of a Typical Levee



Source: FEMA, *What is a Levee Fact Sheet*, August 2011

Levees provide strong flood protection, but they are not failsafe. Levees are designed to protect against a specific flood level and could be overtopped during severe weather events. Levees reduce, not eliminate, the risk to individuals and structures behind them. A levee system failure or overtopping can create severe flooding and high-water velocities. It is important to remember that no levee provides protection from events for which it was not designed, and proper operation and maintenance are necessary to reduce the probability of failure.

Warning Time: 4 – Less than 6 hours

Duration: 3 – Less than 1 week

Location

Figure 4-8 reflects all dams included in the NID that are located in Collier County. As shown, there is only one dam located within the jurisdictional boundaries of Collier County: the State Road 846 Land Trust earthen dam which is not classified as a high or significant hazard. Table 4-10 provides details for this dam as provided in the NID. The State Road 846 Land Trust earthen dam is located on private property, and a current aerial image identifies there is no water present. The earthen dam is agricultural in nature, and there are no residential properties within a mile.

Figure 4-9 below reflects all levees included in the U.S. Army Corps of Engineers National Levee Database (NLD) that are located in or around Collier County. There are three levees located in Collier County. Table 4-11 details all levees located in the Collier County planning area as included in the NLD.

Spatial Extent: 1 – Negligible

Table 4-10 – National Inventory of Dams, Collier County

Dam Name	NIDID	Owner	Height (Ft.)	NID Storage (acre-feet)	Dam Type	Hazard Classification	River
St. Road 846 Land Trust Imp	FL75010	Local Government	9	350	Earthen	Low	Cocohatchee

Source: U.S. Army Corps of Engineers, National Inventory of Dams

Table 4-11 – National Levee Database, Collier County Planning Area

Counties	System Name	Sponsor	Length (mi)	Height (ft)	Risk Class	Year of Construction	Last Assessment Date
Broward, Collier, Hendry	East Big Cypress Seminole IR	SFWMD	26.1	6	Low	1966	7/2/2019
Broward, Collier, Miami-Dade, Monroe	L-29	SFWMD	45.4	9	Low	1966	7/7/2016
Collier	Picayune Strand	SFWMD	9.4	13	Low	2018	9/3/2020

Source: U.S. Army Corps of Engineers National Levee Database

Figure 4-8 – National Inventory of Dams for Collier County

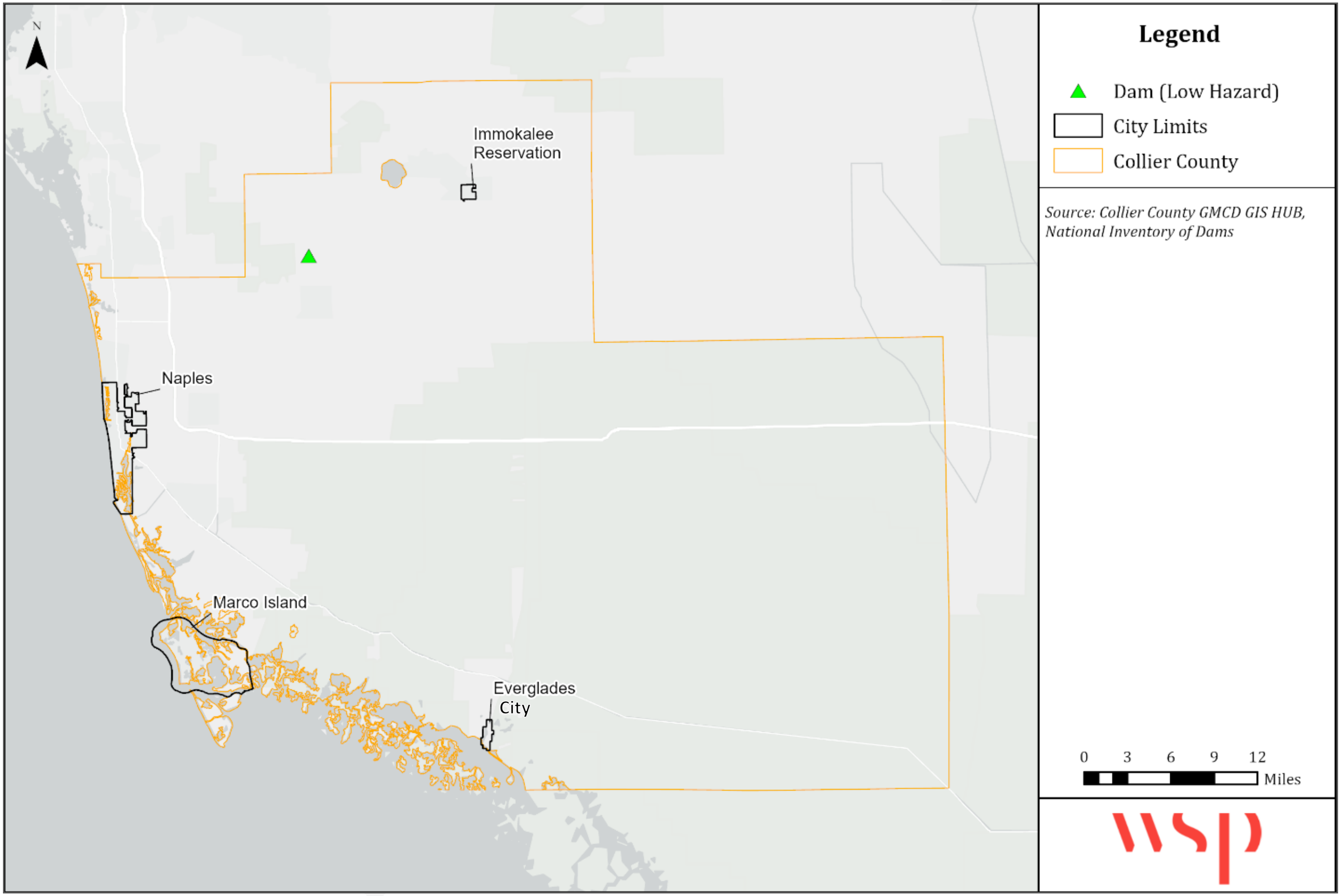
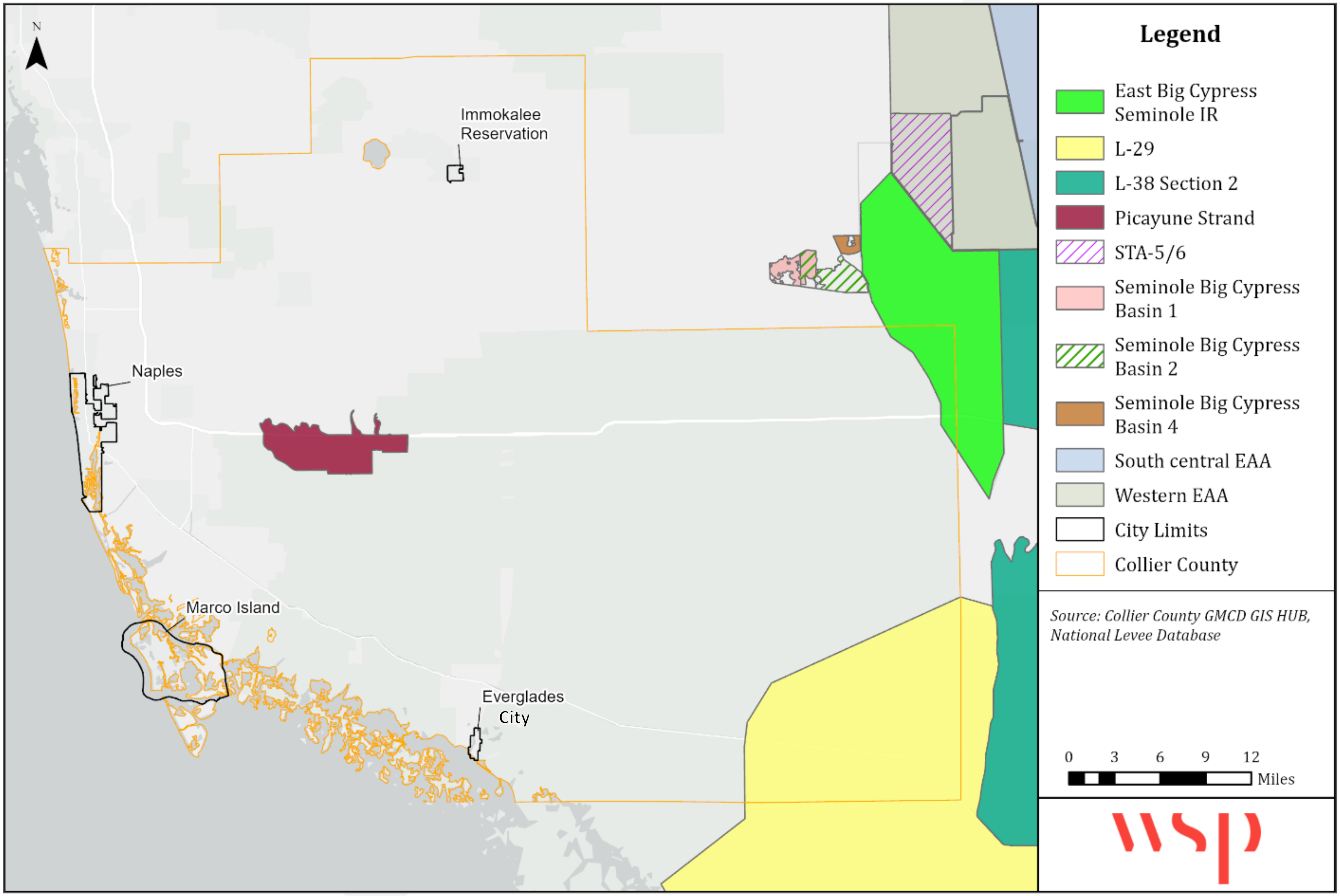


Figure 4-9 – National Levee Database for Collier County



Extent

Each state has definitions and methods to determine the Hazard Potential of a dam. In Florida, dams are regulated by the state if they are 25 feet or more in height and impound 50 acre-feet or more. Dams and impoundments smaller than that may fall under state regulation if it is determined that failure of the dam could result in loss of human life or significant damage to property below the dam. The height of a dam is from the maximum water storage elevation of the dam to the lowest point on the downstream toe, and the storage capacity is the volume impounded at the elevation of the highest point on the crest of the dam.

Dam Safety Program engineers determine the "hazard potential" of a dam, meaning the probable damage that would occur if the structure failed, in terms of loss of human life and economic loss or environmental damage. Dams are assigned one of three classes based on the nature of their hazard potential:

- Low Hazard: Dams where failure or mis-operation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.
- Significant Hazard: Includes dams where failure or mis-operation results in no probable loss of human life but can cause economic loss, environment damage, disruption of lifeline facilities, or impact other concerns. Significant hazard dams are often located in rural or agricultural areas but could be located in areas with population and significant infrastructure.
- High Hazard: Includes dams where failure will likely cause loss of life.

Table 4-12 – Dam Hazards Classification

Hazard Classification	Loss of Human Life	Economic, Environmental, Lifeline Losses
Low	None Expected	Low and generally limited to owner
Significant	None Expected	Yes
High	Probable. One or more expected	Yes

Source: Florida Department of Environmental Protection; FEMA Guidelines for Dam Safety

The State Road 846 Land Trust earthen dam is the only dam located in Collier County, and it is not classified as a high or significant hazard. Given the predominantly agricultural setting surrounding the dam, failure would be expected to have limited consequences for downstream areas and communities.

The National Levee Database (NLD) also provides risk ratings for structures, which can be used to approximate the magnitude of the hazard. The risk class categorizes the Likelihood of inundation due to breach and/or system component malfunction in combination with loss of life, economic, or environmental consequences. There are six risk classifications: very high, high, moderate, low, very low, and no verdict.

All levees located in Collier County have a low risk of failure and are predominantly located in agriculture areas where the magnitude of a potential failure is considered limited.

Impact: 2 – Limited

Past Occurrences

There are no past reported dam breaches or levee failures within Collier County.

Probability of Future Occurrence

Collier County does not have any high or significant hazard dams, and there are no records of dam failures within the County. Additionally, because there have been no recorded levee failures and no significant levees are present, future dam and levee failure is considered unlikely.

Probability: 1 – Unlikely

Climate Change and Future Conditions

Future development may increase the overall risk of dam failure by increasing downstream exposure of people and property. Regular inspection and evaluation of dam hazard potential can ensure appropriate safety precautions, such as the preparation of an Emergency Action Plan and the establishment of procedures for warning and evacuation of all at-risk structures should a failure occur.

Dam failure is already tied to flooding and the increased pressure that flooding places on dams. Climate change impacts on dam failure will most likely be those related to changes in precipitation and flood probability. The Sixth National Climate Assessment indicates that heavy precipitation events are already becoming more frequent and intense, and that this trend is likely to continue. This change may increase the risk of flooding, putting stress on dams and increasing the likelihood of dam failure. A 2024 study evaluated the hydrologic failures of dams in the United States and found that many dam failures are not caused by a single extreme storm but by a combination of sustained rainfall over several weeks followed by an additional heavy rainfall event. These compound precipitation patterns can saturate watersheds, reduce reservoir storage capacity, and increase the likelihood of dam overtopping. As climate change contributes to more intense and persistent rainfall sequences across much of the United States, the risk of failure for the nation's aging dam infrastructure may continue to grow (Hwang, 2024).

Vulnerability Assessment

Vulnerability – Low

Although uncommon, dam and levee failure events can occur, and regular monitoring is necessary to minimize their probability. Given the low hazard rating and lack of modeling on the potential inundation area, no property exposure analysis was conducted for the one dam located in Collier County.

A geospatial analysis using parcel data and the National Levee Database evaluated property exposure associated with the three levee systems found in Collier County. Results show relatively limited exposure across all three levee systems, with a total of 90 properties totaling approximately $34 million in combined structure and content value. Table 4-13 through Table 4-15 detail the property exposure by occupancy for each levee system found in Collier County.

Table 4-13 – Levee Property Exposure, East Big Cypress Seminole IR

Occupancy	Property Count	Structure Value	Estimated Content Value	Total Value
Agriculture	0	$0	$0	$0
Commercial	0	$0	$0	$0
Education	0	$0	$0	$0
Government	0	$0	$0	$0
Industrial	0	$0	$0	$0
Religious	0	$0	$0	$0
Residential	3	$34,862	$17,431	$52,293
Total	**3**	**$34,862**	**$17,431**	**$52,293**

Source: Collier County Property Appraiser parcel data, National Levee Database

Table 4-14 – Levee Property Exposure, L-29

Occupancy	Property Count	Structure Value	Estimated Content Value	Total Value
Agriculture	0	$0	$0	$0
Commercial	7	$11,304,222	$11,304,222	$22,608,444
Education	0	$0	$0	$0
Government	2	$0	$0	$0
Industrial	0	$0	$0	$0
Religious	0	$0	$0	$0
Residential	30	$1,833,220	$916,610	$2,749,829
Total	**39**	**$13,137,442**	**$12,220,832**	**$25,358,273**

Source: Collier County Property Appraiser parcel data, National Levee Database

Table 4-15 – Levee Property Exposure, Picayune Strand

Occupancy	Property Count	Structure Value	Estimated Content Value	Total Value
Agriculture	2	$220,720	$110,360	$331,080
Commercial	3	$188,238	$188,238	$376,476
Education	0	$0	$0	$0
Government	1	$0	$0	$0
Industrial	0	$0	$0	$0
Religious	0	$0	$0	$0
Residential	42	$5,270,136	$2,635,068	$7,905,203
Total	**48**	**$5,679,094**	**$2,933,666**	**$8,612,759**

Source: Collier County Property Appraiser parcel data, National Levee Database

4.4.3 Coastal and Inland Flooding

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Coastal and Inland Flooding	Highly Likely	Critical	Large	6 to 12 hours	Less than 1 week	3.5

Hazard Description

Flooding is defined by the rising and overflowing of a body of water onto normally dry land. As defined by FEMA, a flood is a general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties. Flooding can result from an overflow of inland waters, or an unusual accumulation or runoff of surface waters from any source.

Flooding is the most frequent and costly of all natural hazards in the United States. Ninety percent of all natural disasters in the U.S. involve flooding.

Sources and Types of Flooding

Flooding within Collier County can be attributed to three main sources as noted below. Flooding can result from an overflow of inland or tidal waters, or an unusual accumulation or runoff of surface waters from any source. Primary flooding within Collier County can be attributed to tidal flooding resulting from hurricanes and tropical storms and heavy rainfall that overburdens the drainage system within the community.

Coastal or Tidal Flooding: All lands bordering the coast along the Gulf of Mexico are prone to tidal affects and flooding. Coastal lands such as sand bars, barrier islands, and deltas provide a buffer zone to help protect human life and real property relative to the sea, as floodplains provide a buffer zone along rivers and other bodies of water. Coastal floods usually occur as a result of abnormally high tides, storm surge and heavy rains in combination with high tides, tropical storms and hurricanes.

***Riverine or Overbank Flooding*:** Collier County has numerous canals running throughout its jurisdiction that are susceptible to overflowing their banks during and following excessive precipitation events. While localized flash flooding caused by surface water runoff is not uncommon in the county, riverine flood events (such as the "100-year flood") will cause significantly more damage and economic disruption for the area.

***Flash or Rapid Flooding*:** Flash flooding is the result of heavy, localized rainfall, possibly from slow-moving intense thunderstorms that cause small streams and drainage systems to overflow within six hours or less of the beginning of the rainfall. Flash flooding can happen in Special Flood Hazard Areas (SFHAs) as delineated by the NFIP and can also happen in areas not associated with floodplains. Flash flood hazards caused by surface water runoff are most common in urbanized cities, where greater population density generally equates to more impervious surfaces (e.g., pavement and buildings) which increase the amount of surface water generated. Flash flooding is also discussed in Section 4.4.5 Flood: Stormwater/Localized because flash flooding can often occur when the capacity of the stormwater system is exceeded or if conveyance is obstructed by debris, sediment and other materials that limit the volume of drainage.

Warning time can vary significantly depending on the source of flooding but can be as little as three hours in the case of flash flooding.

Warning Time: 3 – 6 to 12 hours

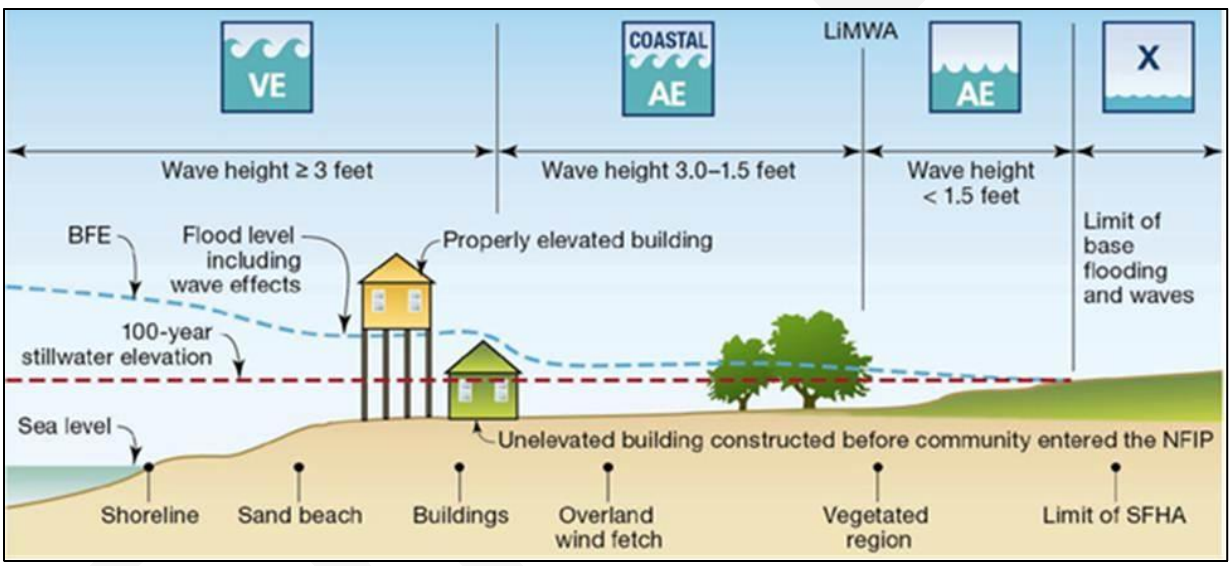
Duration: 3 – Less than 1 week

Flooding and Floodplains

Floodplains are the areas adjacent to bodies of water that experience periodic flooding. In coastal areas, flooding generally occurs due to high tides, tidal waves, storm surge, or heavy rains. In these areas, flood hazards typically include the added risk of wave action. Wave height and intensity decrease as floodwaters move inland.

Floodplain boundaries are designated and routinely updated through cooperation between local governments, states, and FEMA. Flood Insurance Study findings are shown on Flood Insurance Rate Maps (FIRMs) and describe various flood hazard zones based on flood height exceedance return periods. Figure 4-10 shows the typical coastal floodplain and the breakdown of flood zones in these settings. These flood zones are discussed further in Table 4-16.

Figure 4-10 – Characteristics of a Coastal Floodplain



Source: FEMA

In its common usage, the floodplain most often refers to that area that is inundated by the “100-year flood,” which is the flood that has a 1% chance in any given year of being equaled or exceeded. The 500-year flood is the flood that has a 0.2% chance of being equaled or exceeded in any given year. The potential for flooding can change and increase through various land use changes and changes to land surface, which result in a change to the floodplain. A change in environment can create localized flooding problems inside and outside of natural floodplains by altering or confining natural drainage channels. These changes are most often created by human activity.

The 1% annual chance flood, which is the national minimum standard to which communities must regulate their floodplains through the National Flood Insurance Program (NFIP). Participation in the NFIP requires adoption and enforcement of a local floodplain management ordinance which is intended to prevent unsafe development in the floodplain, thereby reducing future flood damage. Participation in the NFIP allows the federal government to make flood insurance available within the community as financial protection against flood losses. Since floods have an annual probability of occurrence, have a known magnitude, depth and velocity for each event, and in most cases, have a map indicating where they will likely occur, they are in many ways often the most predictable and manageable hazard.

Location

Regulated floodplains are illustrated on inundation maps called Flood Insurance Rate Maps (FIRMs). FIRMs are the official maps for a community on which FEMA has delineated both the special flood hazard areas (SFHAs) and the risk premium zones applicable to the community. SFHAs represent the areas subject to inundation by the 1% annual chance flood event. Structures located within the SFHA have a 26-percent chance of flooding during the life of a standard 30-year mortgage.

Flood zones are geographic areas that FEMA has defined according to varying levels of flood risk and type of flooding. Flood prone areas were identified within Collier County using the most current FIS and associated FIRMs developed by FEMA dated February 8, 2024. Table 4-16 summarizes the flood insurance zones identified by the FIRMs.

Spatial Extent: 4 – Large

Table 4-16 – Mapped Flood Insurance Zones within Collier County

Zone	Description
VE	Also known as the coastal high hazard areas. They are areas subject to high velocity water including waves; they are defined by the 1% annual chance (base) flood limits (also known as the 100-year flood) and wave effects 3 feet or greater. The hazard zone is mapped with base flood elevations (BFEs) that reflect the combined influence of stillwater flood elevations, primary frontal dunes, and wave effects 3 feet or greater.
AE	AE Zones, also within the 100-year flood limits, are defined with BFEs that reflect the combined influence of stillwater flood elevations and wave effects less than 3 feet. The AE Zone generally extends from the landward VE zone limit to the limits of the 100-year flood from coastal sources, or until it reaches the confluence with riverine flood sources. The AE Zones also depict the SFHA due to riverine flood sources, but instead of being subdivided into separate zones of differing BFEs with possible wave effects added, they represent the flood profile determined by hydrologic and hydraulic investigations and have no wave effects.
AH	Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are 1–3 feet. BFEs derived from detailed hydraulic analyses are shown in this zone.
A	Areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply.
Shaded Zone X (0.2% Annual Chance)	Moderate risk areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percent-annual-chance flood by a levee. No BFEs or base flood depths are shown within these zones. (Zone X (shaded) is used on new and revised maps in place of Zone B.)
Zone X (Unshaded)	Minimal risk areas outside the 1-percent and .2-percent-annual-chance floodplains. No BFEs or base flood depths are shown within these zones. (Zone X (unshaded) is used on new and revised maps in place of Zone C.)

Source: FEMA

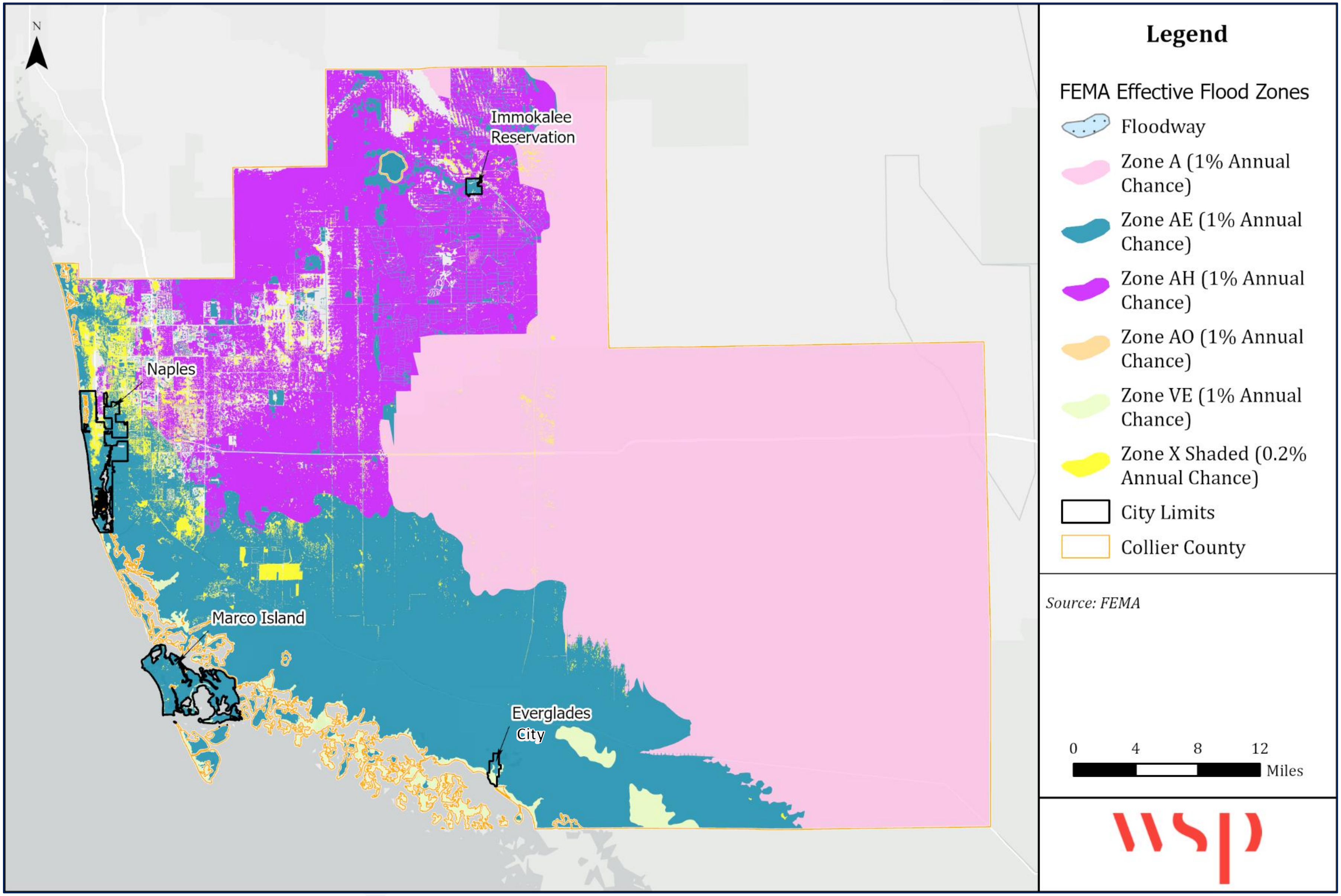
Figure 4-11 reflects the mapped flood insurance zones for Collier County. The coastal portions of the county are comprised of Zone VE and Zone AE. The north-central portion of the county is primarily Zone AH with small areas of Zone AE. The eastern portion of the county is primarily Zone A. A summary of acreage by flood zone is shown in Table 4-17.

Table 4-17 – Flood Zone Acreage

Flood Zone	Acreage
Zone VE	26,153
Zone AE	315,977
Zone AH	246,656
Zone A	631,385
Zone X (500-yr)	13,934
Zone X (Unshaded)	52,845
Total	**1,286,950**

Source: FEMA Effective DFIRM

Figure 4-11 – Collier County FIRM Flood Zones



Extent

The severity of a flood can be measured by its depth and velocity. The depth of flooding that impacts a property is correlated with the property damage that results in greater depths causing more substantial damage.

Figure 4-17 shows the flood depths throughout Collier County for the 1% annual chance flood event, as defined by the Effective FIRMs.

Flood extent varies throughout the floodplain, but overall flooding impacts can be critical, with the potential for severe damage and destruction of property and the possibility of injuries and deaths.

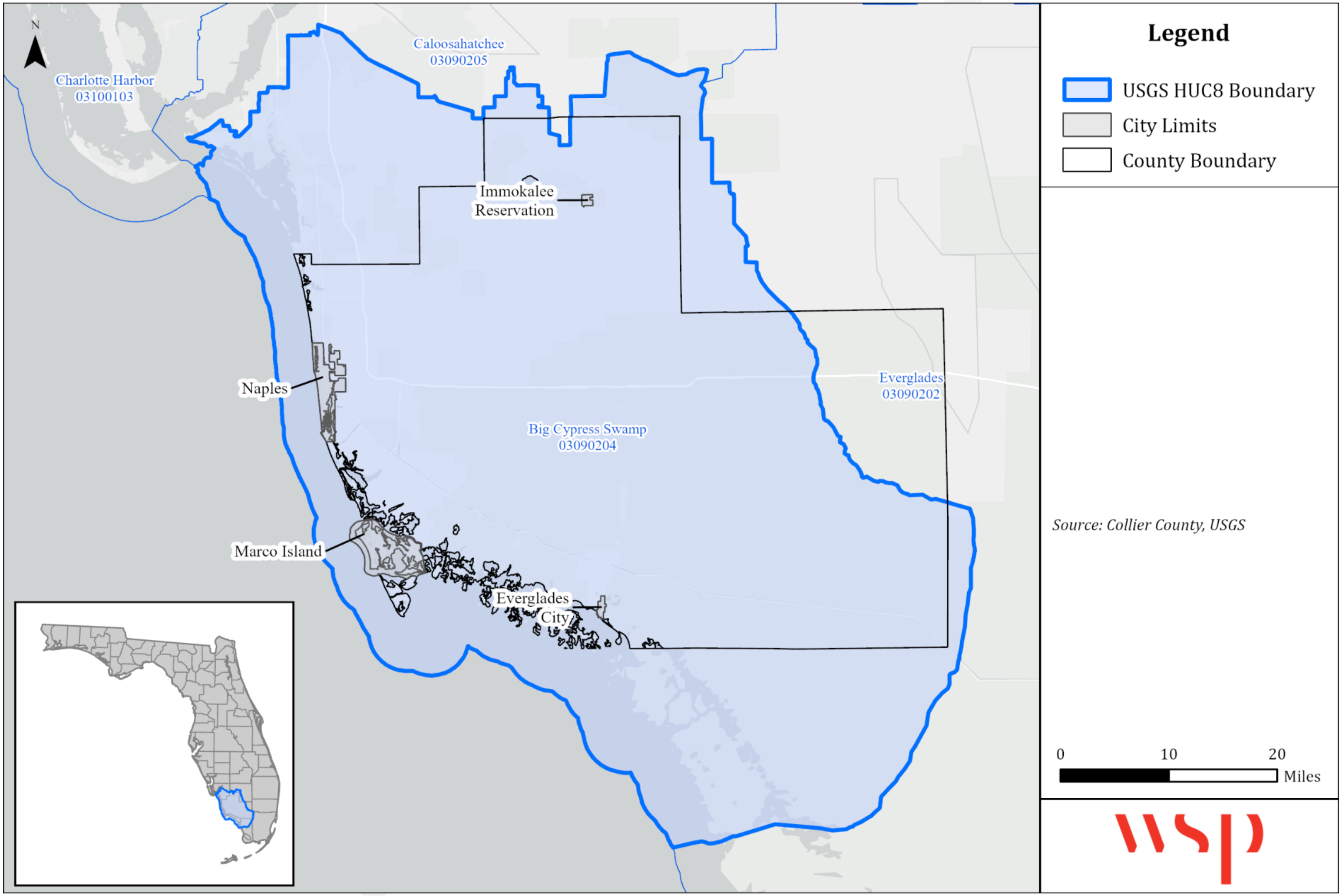
Impact: 3 – Critical

Flood Protection Level of Service

The SFWMD is conducting state-wide review of its regional water management infrastructure to determine the flood protection level of service (FPLOS) currently provided in Southern Florida basins. The Big Cypress Basin (BCB) office performed software updates to enhance the hydrologic and hydraulic (H&H) model to better capture the basin's conditions. BCB captures most of Collier County, as shown in Figure 4-12. The BCB Model Update report, published in 2025, presents the results from the updated study.

SFWMD relies on six performance metrics (PMs) to evaluate the FPLOS provided by the primary water management infrastructure. The results from PM #1, Maximum Stage in Primary Canals, and PM #5, Frequency of Flooding provide further context for the extent of flooding in the BCB and are summarized below.

Figure 4-12 – Big Cypress Basin



PM #1: Maximum Stage in Primary Canals

PM #1, Maximum Stage in Primary Canals, provides the highest water level profile within the primary canal system, its tributaries, and some secondary systems. The analyzed canals are shown in Figure 4-13 and Figure 4-14. The canal water level profiles are created for various design storm events (5-yr, 10-yr, 25-yr, and 100-yr). Below is a summary of results for the canals that were found to not meet the flood protection level of service, as indicated by water levels that exceed the canal banks.

Airport Road Canal 1: The 100-yr event shows the highest water level (around 13 feet upstream), while the 5-yr event shows the lowest (around 10.5 feet downstream). The water levels for all return periods remain above both left and right bank elevations throughout most of the reach, except for a section between the roads Summit Pl. and Winterview Dr. where water levels drop below both banks. Airport Road Canal 1 does not meet flood protection levels of service for any design events.

Airport Road Canal 2: Water levels for Airport Road Canal 2 remain nearly constant throughout the complete reach, with very minimal variation. The 100-yr event maintains approximately 13 feet, the 25-yr event stays around 12.70 feet, the 10-yr event remains at about 12.5 feet, and the 5-yr event holds steady at approximately 12.16 feet. Water levels for all return periods consistently exceed both left and right bank elevations throughout most of the reach. Airport Road Canal 2 does not meet flood protection levels of service for any design events (5-, 10-, 25-, and 100-yr).

Cocohatchee Canal 1: The water profile for Cocohatchee Canal 1shows minimal variation in water levels across the entire reach, with a slight decrease from upstream to downstream. The most notable variation is from the 100-yr event which shows decreasing levels from 7.3 feet at upstream end and 6.8 feet at the downstream end of the reach. Water levels for all return periods stay above both bank elevations throughout the entire reach indicating potential flooding concerns for even smaller storm events. Cocohatchee Canal 1 does not meet flood protection levels service for any design events.

Cocohatchee Canal 6: Cocohatchee Canal 6 partially meets flood protection levels service for 5- and 10-yr design events. All events stay below both banks throughout most of the reach (first 600 feet), except near the upstream end. At the upstream portion of the reach, all design events exceed bank elevations with the 100-yr event exceeding both banks and other events exceeding the left bank.

Cocohatchee Canal: The water profile shows a general decrease in water levels from upstream to downstream. The 100-yr event shows the highest water level starting at 14.64 feet at the upstream end and dropping significantly to 6.79 feet downstream. Water levels for the 100-yr event exceed the right bank elevations in some upstream sections and both banks near a culvert (Coles Br). The canal does not meet flood protection service levels for any design event. Localized exceedances occur for all events in locations around NW 25th Ave and a culvert near Coles Bridge.

Corkscrew Canal: Water levels for all return periods alternate between exceeding and falling below both bank elevations throughout the reach, particularly in sections between structures. A notable drop in water levels occurs around the middle of the canal, near a culvert (CCB-00-S0110) and road, 33rd Ave NW. The canal does not meet flood protection service levels for any return period as water levels alternate resulting in consistent overtopping in multiple locations.

Cypress Canal: Water levels for all return periods fluctuate between exceeding and falling below both bank elevations throughout the reach, with several sections where water levels exceed the right bank, particularly between 8th St NE and 13th St. NW. The 5- and 10-yr events generally remain below banks throughout 50% of the canal, while the 25- and 100-yr events exceed bank elevations in most of the locations. The canal does not meet flood protection service levels for any of the design events.

Faka Union Canal: Faka Union Canal does not meet flood protection service levels for any return period (5-, 10-, 25-, and 100yr) in the upstream portion where there's a significant spike in water elevation. However, it partially meets protection levels in the areas from Weir - FU-7 to Golden Gate Blvd E, where all events water levels remain below both bank elevations.

Golden Gate 9: The canal maintains almost a constant water level across the reach and water levels generally remain below bank elevations. However, water levels do exceed the banks around SW 23rd St, thus the canal does not meet flood protection service levels for all design storms.

Golden Gate Main: The 100-yr event shows the highest water levels with a peak of 19.14 feet. The left and right bank elevations show considerable variation throughout the reach, with several notable spikes and dips, particularly around Golden Gate Blvd E and Airport Pulling Rd N. Golden Gate Main canal does not meet flood protection levels for any return period (5-, 10-, 25-, or 100-yr) as water levels remain above both bank elevations throughout most of the reach.

Henderson Creek Canal: Water levels for all return periods generally remain below both bank elevations throughout most of the reach. However, there are some locations where these events approach or exceed either one of both bank elevations, particularly around Tamiami Trl E. Henderson Creek Canal does not meets flood protection service levels for all return periods.

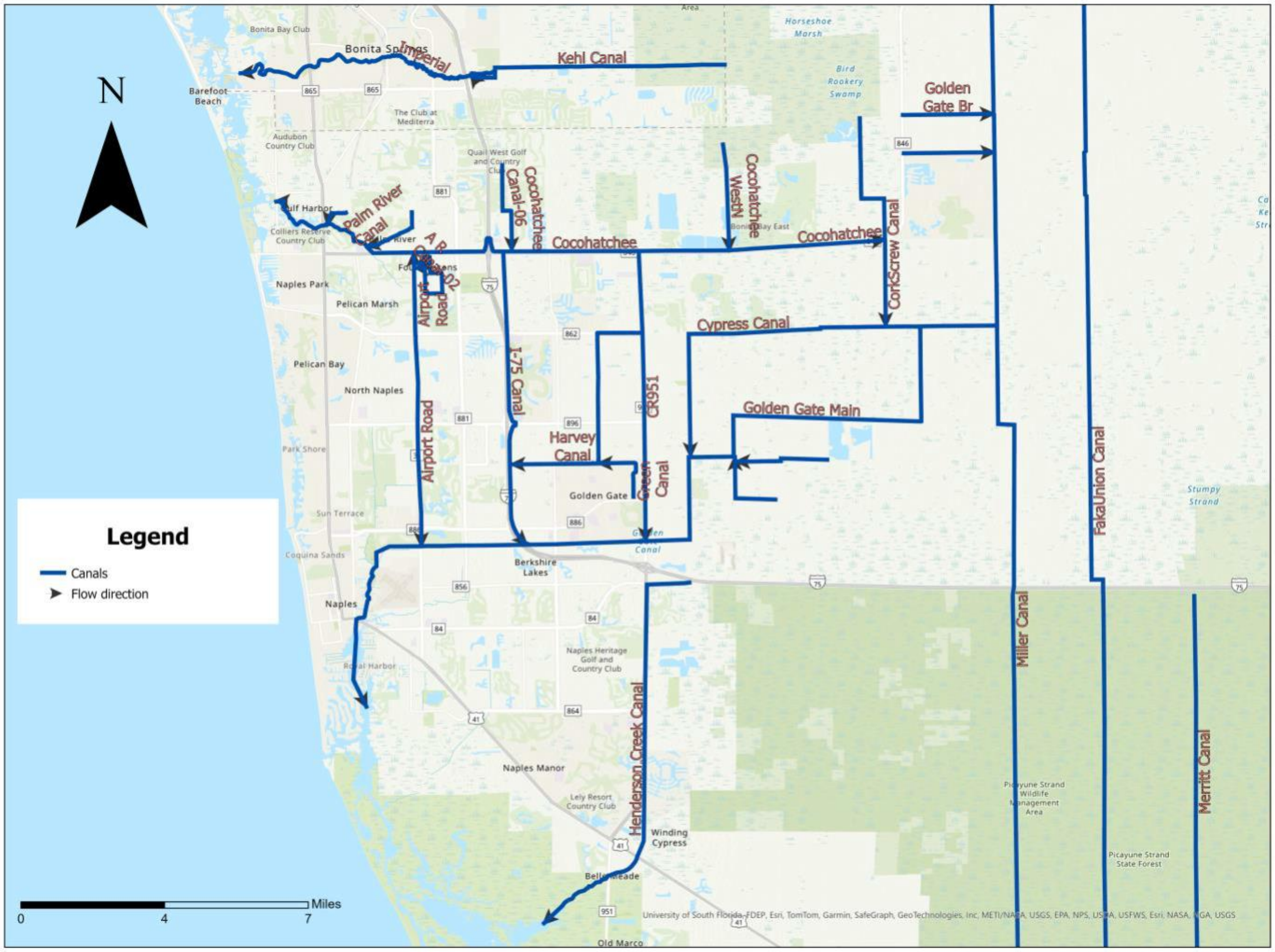
I-75 Canal: I-75 Canal mostly meets flood protection levels for all return periods throughout the reach, with only localized exceedances around Shady Oaks Ln, where almost all design events exceed both bank elevations.

Kehl Canal: The canal partially meets the flood protection service levels for the downstream portion of the reach where water levels are lower. The upstream and middle portions of the reach do not meet the protection levels as water levels exceed bank elevations.

Miller Canal: Multiple structures including a bridge, gate, weir, and SE 28th Ave, influence the flood profile for Miller Canal. Water levels for all return periods are above bank elevations throughout most of the reach. The canal does not fully meet flood protection levels for any return period.

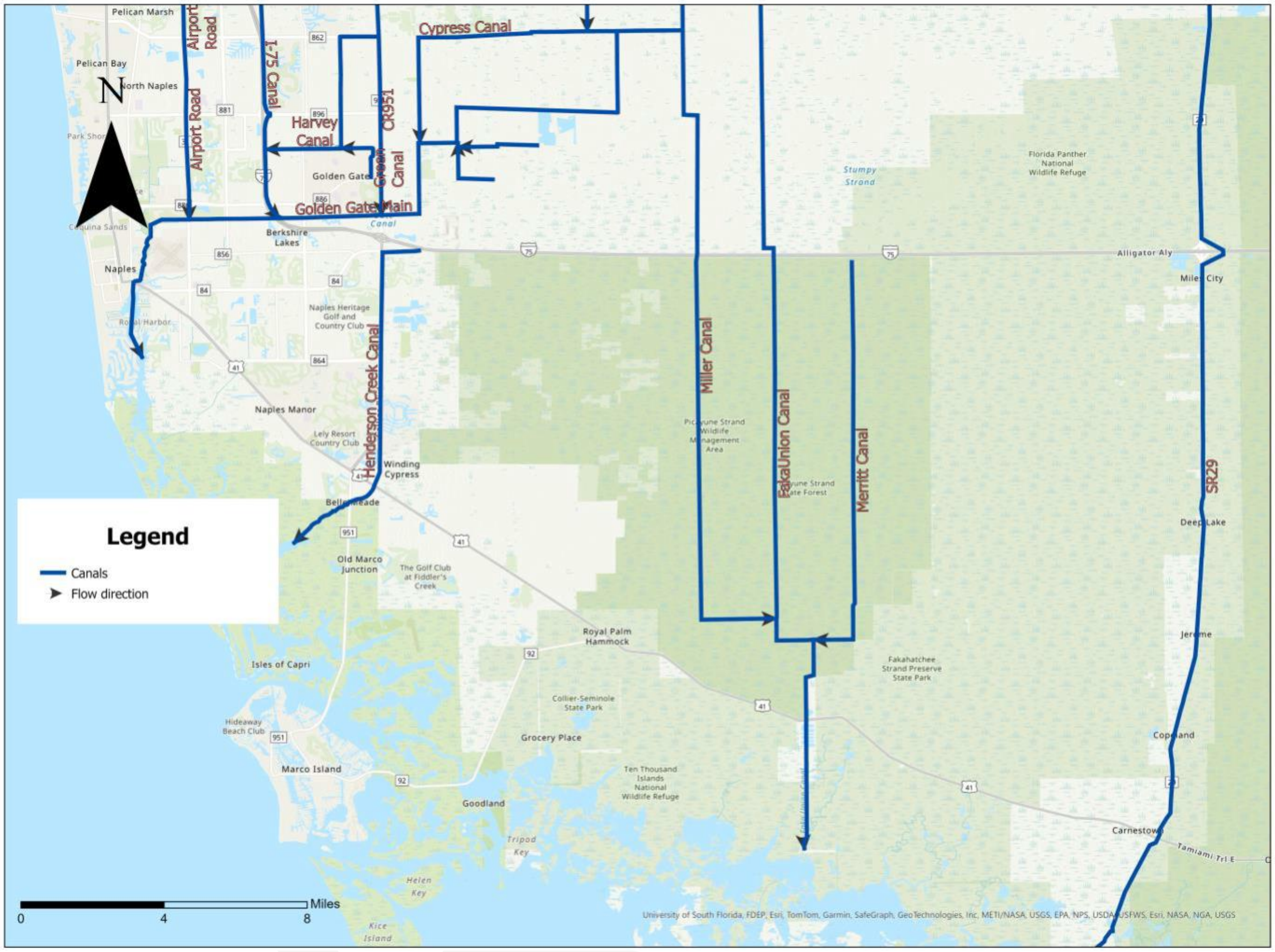
Palm River Canal: The canal shows constant water levels until Cypress Way E, where water levels start to decrease. Cypress Way E and Palm River Blvd were both found to influence water levels. Water levels for all return periods exceed both bank elevations throughout the entire reach and thus do not meet flood protection levels of service for any return periods.

Figure 4-13 – Canals Included in BCB Model Domain



Source: Big Cypress Basin Model Update Report, 2025

Figure 4-14 – Canals Included in BCB Model Domain, Southern Extent



Source: Big Cypress Basin Model Update Report, 2025

PM #5: Frequency of Flooding

PM #5, Frequency of Flooding, assesses the elevations or depths of overland flooding across various design storms in the BCB. Figure 4-15 and Figure 4-16 from the BCB model report, show flood inundation maps for the 25-yr and 100-yr events.

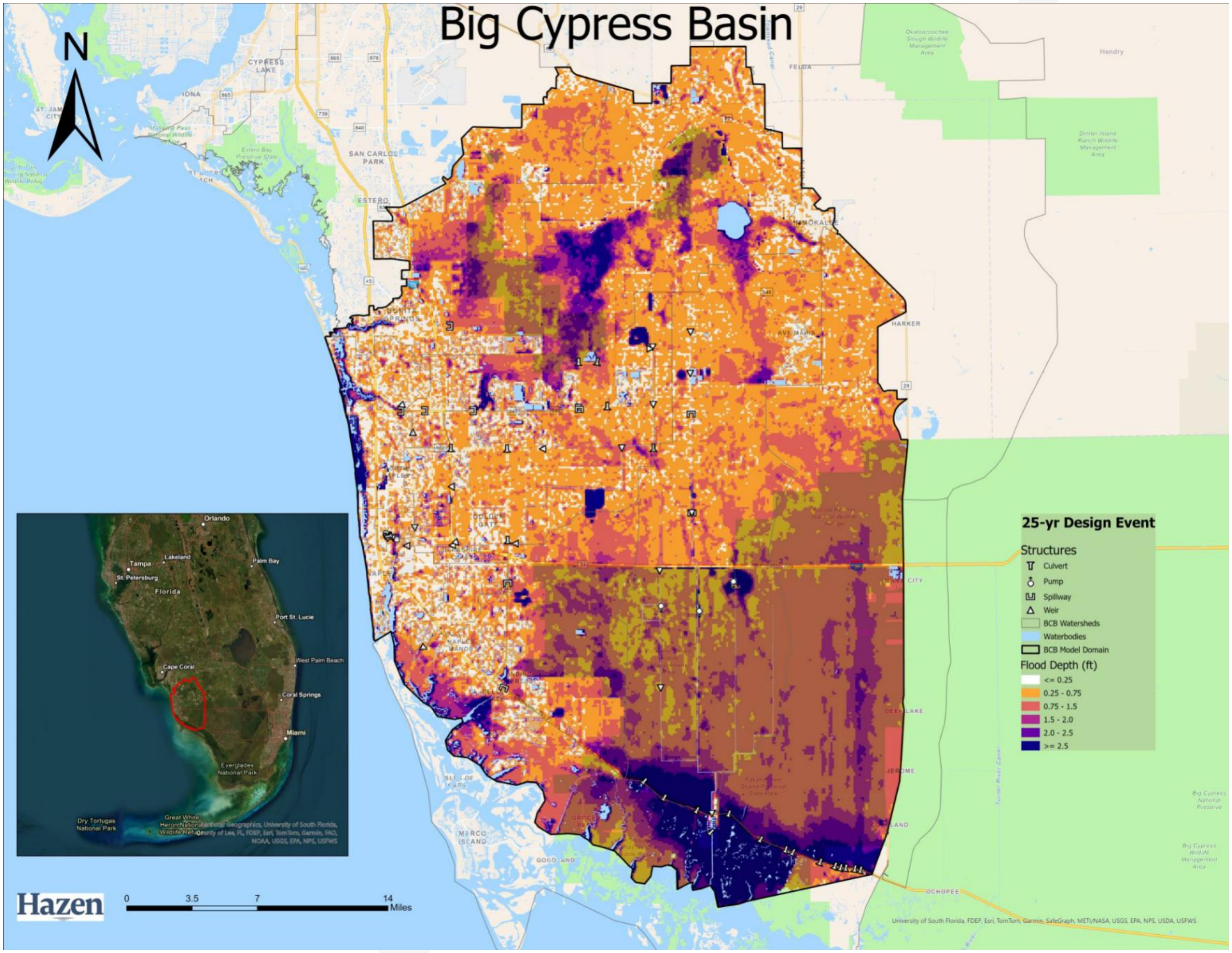
The 25-yr event shows areas of deep flooding throughout the basin. The southern, southeastern and central portions or the basin have flood depths exceeding 2-2.5 feet with some locations reaching maximum depths near culvert structures. These areas mostly consist of natural wetlands. The central region shows largely 1.5-2 feet of flooding while the western, more developed areas maintain relatively lower depths of 0.75-1.5 feet. However, some western coastal areas, particularly in low-lying areas of Vanderbilt Beach and Pelican Bay, experienced increased flooding with depths over 2 feet.

The 100-yr design event flood depth map shows the most extreme flooding scenario, with substantially increased flood depths and inundation extent across all regions. The southern and eastern portions show widespread flooding exceeding 2.5 feet while the central region has flood depths of 1.5-2.5 feet. The western coastal areas, which are typically less impacted, show increased flood depths of 0.75-1.5 feet, with some developed areas experiencing depths up to 2 feet. Some of the northwestern coastal areas near Vanderbilt Beach and Pelican Bay experience flood depths up to more than 2.5 feet. The

100-yr event indicates the most severe flooding conditions out of the modeled scenarios. These inundation estimates indicate flood implications for both natural and developed areas across the entire BCB.

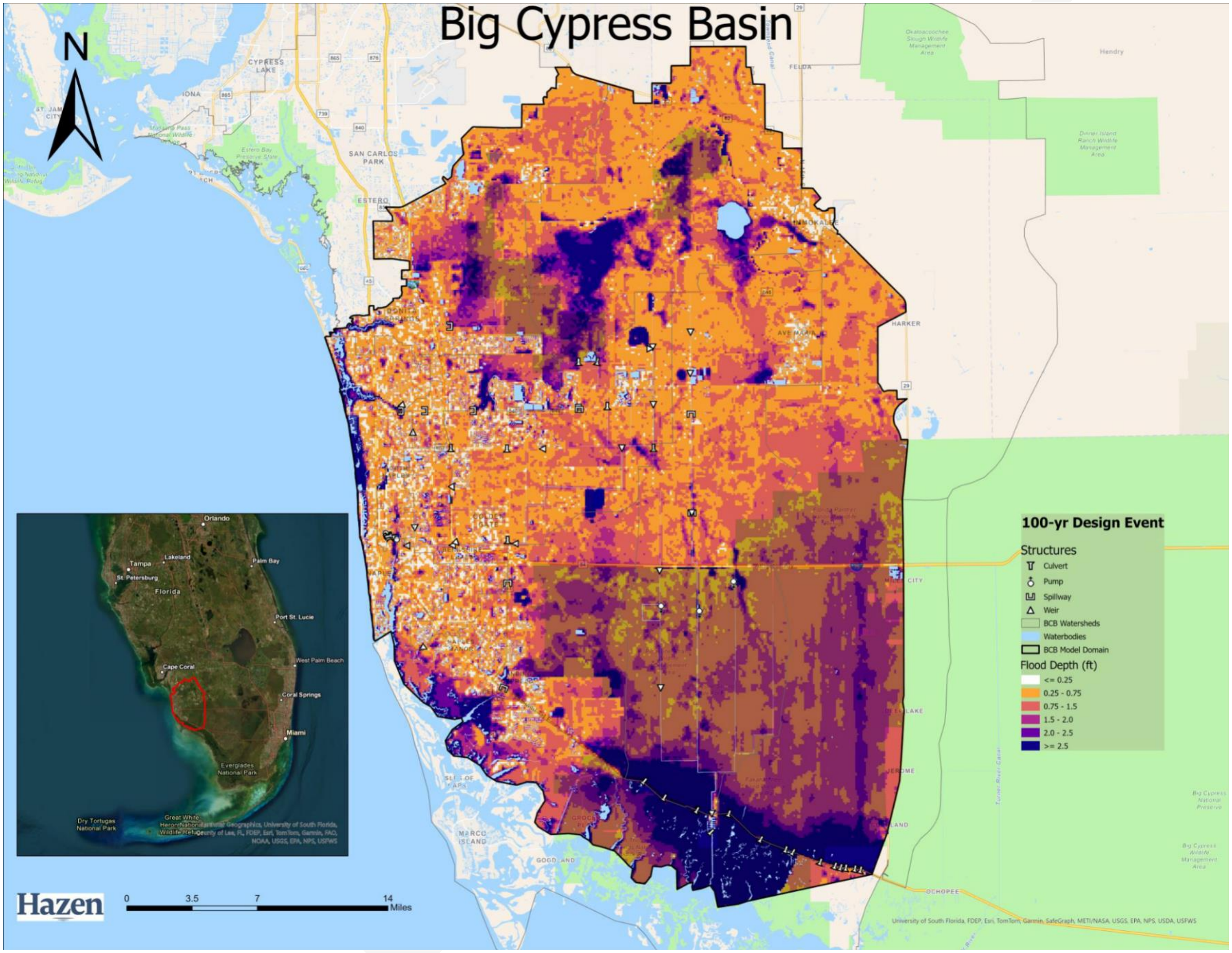
The BCB sub-basins, Cocohatchee, Faka Union, Fakahatchee, Henderson/Belle Meade, and portions of the Golden Gate and Trafford remain in a natural and undeveloped state. These areas do not have planned stormwater management systems and tend to experience greatest flood depths and inundation but lack development at risk of flood damage. In contrast, East Naples, Estero Bay, and parts of the Coastal basins sub-basins are equipped with designed stormwater management systems that effectively drain these areas.

Figure 4-15 – Flood Depths Map from 25-yr Design Event



Source: Big Cypress Basin Model Update, 2025

Figure 4-16 – Flood Depths Map from 100-yr Design Event



Source: Big Cypress Basin Model Update, 2025

Past Occurrences

Table 4-18 summarizes the 58 coastal flood, flash flood, flood, and heavy rain events reported in the NCEI Storm Events Database since 1996 for Collier County.

Table 4-18 – Summary of NCEI Flooding Events, 1996-2025

Type	Event Count	Deaths/ Injuries	Reported Property Damage
Coastal Flood	11	0/0	$71,000
Flash Flood	12	0/0	$565,000
Flood	29	0/0	$43,500
Heavy Rain	6	0/0	$60,000
Total	**58**	**0/0**	**$739,500**

Source: NCEI

Table 4-19 provides a summary of this historical information by location. It is important to note that many of the events attributed to the county are countywide or include incorporated areas. Similarly, though some events have a starting location identified, the event may have covered a larger area including multiple jurisdictions. Still, this list provides an indication of areas that may be particularly flood prone.

Table 4-19 – NCEI Flooding Events in Collier County (January 1996-December 2025)

Location	Date	Event Type	Injuries/Deaths	Property Damage
Coastal Collier County	6/26/2012	Coastal Flood	0/0	$70,000
Coastal Collier	9/25/2015	Coastal Flood	0/0	$0
Coastal Collier County	1/17/2016	Coastal Flood	0/0	$1,000
Inland Collier County	8/30/2016	Coastal Flood	0/0	$0
Coastal Collier County	10/5/2017	Coastal Flood	0/0	$0
Coastal Collier County	10/9/2018	Coastal Flood	0/0	$0
Coastal Collier County	10/9/2018	Coastal Flood	0/0	$0
Coastal Collier County	10/9/2018	Coastal Flood	0/0	$0
Coastal Collier County	12/21/2018	Coastal Flood	0/0	$0
Coastal Collier County	8/20/2024	Coastal Flood	0/0	$0
Coastal Collier County	10/4/2025	Coastal Flood	0/0	$0
Naples	9/20/1999	Flash Flood	0/0	$200,000
Immokalee	7/4/2000	Flash Flood	0/0	$0
Marco	7/23/2001	Flash Flood	0/0	$150,000
West Portion	9/29/2003	Flash Flood	0/0	$100,000
Immokalee	8/30/2006	Flash Flood	0/0	$0
Marco	7/16/2008	Flash Flood	0/0	$10,000
Naples	8/4/2014	Flash Flood	0/0	$40,000
North Naples	6/13/2020	Flash Flood	0/0	$0
East Naples	9/13/2020	Flash Flood	0/0	$20,000
East Naples	6/4/2022	Flash Flood	0/0	$20,000
Everglades City	6/12/2024	Flash Flood	0/0	$25,000
Marco	8/4/2024	Flash Flood	0/0	$0
Coastal Collier	12/30/1997	Flood	0/0	$0
Collier Co.	5/28/1998	Flood	0/0	$0

Location	Date	Event Type	Injuries/Deaths	Property Damage
Naples	9/7/2000	Flood	0/0	$0
Naples	9/11/2000	Flood	0/0	$0
Marco Island Airport	1/28/2016	Flood	0/0	$3,000
North Naples	10/4/2016	Flood	0/0	$500
Marco	6/6/2017	Flood	0/0	$30,000
Monroe Station	6/6/2017	Flood	0/0	$0
East Naples	7/16/2017	Flood	0/0	$0
(Apf)Naples Muni Airport	8/25/2017	Flood	0/0	$0
North Naples	8/26/2017	Flood	0/0	$0
Marco Island Airport	8/27/2017	Flood	0/0	$0
East Naples	9/29/2017	Flood	0/0	$10,000
(Apf)Naples Muni Airport	5/18/2020	Flood	0/0	$0
(Apf)Naples Muni Airport	6/2/2020	Flood	0/0	$0
Marco	7/19/2020	Flood	0/0	$0
Marco	9/9/2020	Flood	0/0	$0
Marco Island Airport	9/13/2021	Flood	0/0	$0
(Apf)Naples Muni Airport	7/6/2022	Flood	0/0	$0
Golden Gate	8/25/2022	Flood	0/0	$0
Immokalee	5/16/2024	Flood	0/0	$0
Naples	6/11/2024	Flood	0/0	$0
Marco	6/11/2024	Flood	0/0	$0
Naples	6/30/2024	Flood	0/0	$0
Naples	8/16/2024	Flood	0/0	$0
East Naples	8/16/2024	Flood	0/0	$0
Marco Island Airport	8/16/2024	Flood	0/0	$0
Marco	9/9/2025	Flood	0/0	$0
Marco	9/9/2025	Flood	0/0	$0
Marco	7/12/1998	Heavy Rain	0/0	$0
Marco Island Airport	7/20/1998	Heavy Rain	0/0	$0
Naples	9/28/2001	Heavy Rain	0/0	$0
Golden Gate	6/12/2005	Heavy Rain	0/0	$0
Golden Gate	2/3/2006	Heavy Rain	0/0	$60,000
(Apf) Naples Muni Airport	9/29/2015	Heavy Rain	0/0	$0
		Total	**0/0**	**$739,500**

Source: NCEI

The following event narratives are provided in the NCEI Storm Events Database and illustrate the impacts of flood events on the county:

July 23, 2001 – At least four residences and 20 vehicles were damaged by flood waters on Marco Island and in East Naples. 48-hour rainfall amounts of 4 to 10 inches of rain were measured over southwest Florida as a trough of low pressure stalled in the eastern Gulf of Mexico. Radar estimated 8-12 inches of rain fell over a 96-hour period in Marco Island. Strong onshore winds caused some minor tidal flooding of streets.

September 29, 2003 – Very heavy rainfall fell across southwest Florida with radar estimated amount of 8 to 10 inches. Naples measured a record 6.99 inches. The resulting flood closed numerous roads in Collier County. Numerous cars were stalled. Houses and businesses, including a shopping mall, suffered minor flood damage.

October 24, 2005 – Hurricane Wilma produced a maximum measured storm tide of 8 feet at the USGS tide gauge at the Turner River near Chokoloskee in southern Collier County, with a storm surge of 7 feet after subtracting a 1-foot astronomical tide. Significant damage to structures close to the water was observed in Chokoloskee, along with some washing out of part of the road leading to the town. A storm tide of 7 feet was estimated in Marco Island by Collier County Emergency Management, along with significant beach erosion. An NWS survey team estimated a storm tide of 4 feet in Everglades City based on debris line heights, with little structural damage. The NOS tide gauge in Naples recorded a maximum storm tide of 4.8 feet, with a storm surge of 3.8 feet after considering astronomical tide levels.

August 27, 2012 – Tropical Storm Isaac moved west-northwest across the Florida Straits south of the Florida Keys on August 26th. The northern edge of the wind and rain area associated with Isaac affected the South Florida peninsula throughout the day on the 26th. Severe beach erosion and coastal flooding occurred in Collier County on Monday, August 27th as the center of the storm moved into the Gulf of Mexico. A storm surge of 2.05 feet was measured at the Naples pier. Farther east along the coast, inundation depths as high as 3 feet were reported in Goodland and Everglades city. Inundation in the Naples area was about 1 foot. Most damage from coastal flooding was to infrastructure in Goodland and Everglades City areas and was estimated at $400,000. Severe beach erosion in the Naples and Marco Island areas led to damaged estimated at $5.6 million.

June 6, 2017 – A disturbance meandering across the Gulf of Mexico in combination with an upper-level system across the western Gulf of Mexico lead to nearly a week of heavy rainfall across South Florida. The heaviest rainfall fell in the corridor from Marco Island and southern Collier County northeast into Broward and southern Palm Beach counties. Many locations in this swath saw rainfall amounts in excess of 9 to 10 inches in a single day, and as high as almost 15 inches on the heaviest day, resulting in event totals of 15 to 20 inches in this area. This rainfall forced the closure of numerous roads across South Florida, especially in Collier and Broward counties where cars were trapped at times in the flood waters.

Multiple streets in Marco Island were closed due to flooding, including Bald Eagle Road from Bayport to San Marco Roads and South Collier Boulevard near Winterberry Drive. Multiple cars were stalled in the middle of the road at the time of call. Marco Island had received 6 to 8 inches of rainfall in 6 to 12 hours, with a storm total of up to 15 inches over a 3-day period. Flooding across central and eastern Collier County resulted in the closure of Gulf Coast Visitor Center of Everglades National Park, in Everglades City, the Everglades City Airport, as well as Big Cypress National Preserve from June 6th through June 7th. Pictures received from the National Park Service show flooding of numerous access roads, trails, campgrounds, and bridges around the park, along with widespread areas of higher-than-normal water across the park, including flooding of normally dry forest. The Ochopee Post Office was flooding during the event, with water encroaching on Tamiami Trail (US 41) in places where it bisects the park. County Road 29 south of Tamiami Trail (US 41), which is used to access many of these areas, was also closed.

August 25-27, 2017 – A slow moving tropical disturbance first moved west across South Florida, then northeast across Central and North Florida as a frontal boundary dropped into the state. This system would develop into Potential Tropical Cyclone 10 as it moved up the east coast, leaving a trailing trough that would bring additional heavy rainfall through Aug 29th. Significant flooding was reported over three days across Collier County, especially across the Naples area, with multiple roadways and intersections closed and standing water across the city. Flood water entered a guest home along Trail Terrace, along with stranding vehicles along 10th Street south of 5th Avenue. As rain continued to fall, there was additional flooding along Logan Boulevard as well as Vanderbilt beach, with several sections impassable due to flooding.

September 10, 2017 – Major Hurricane Irma made landfall in Southwest Florida on Marco Island as a Category 3 hurricane around 3:30 PM EDT on September 10th. The storm traveled north through southwest Florida through the evening. Effects from Irma were felt across South Florida from September 9th through September 11th. Irma brought a significant storm surge on both coasts of South Florida and widespread rainfall and some flooding across the region. From the period between 8 AM September 9th and 8 AM September 11th, 8 to 15 inches of rain were measured over interior portions of Southwest Florida. This rainfall near the end of a wet summer led to significant flooding.

Storm surge across Collier County ranged from 4 to 8 feet, highest in the Chokoloskee and Everglades City area and lowest at the northern Collier County coast. Impacts were most severe in Chokoloskee, Everglades City, Plantation Island and Goodland where numerous homes were flooded and suffered major to catastrophic damage. Storm survey and data from USGS rapid deployment gauges indicated highest inundation from storm surge in Chokoloskee with up to 8 feet at waterfront, approximately 8 feet above Mean Higher High Water (MHHW), as well as 3-5 feet of inundation across the island. In Everglades City, there was a maximum 6 ft of inundation at the Everglades National Park Gulf Visitor Center, with 2-4 feet across the town and as high as 5 feet in a few areas. USGS high water mark data showed 1-2 feet of inundation as far inland as Tamiami Trail between State Road 29 and Collier-Seminole State Park. In Goodland, maximum storm tide was about 5.5 ft above MHHW, translating to between 5-6 ft of inundation at the waterfront and 3-4 ft across most of town. In Marco Island, storm tide was as high as 4.5 feet above MHHW, translating to between 2-4 ft inundation mainly over south and east parts of the island. Inland penetration was generally less than a half-mile. In Naples, NOS tide gauge at Naples Pier measured maximum storm tide of 5.14 feet above MHHW. Between 3-4 feet of inundation was noted along the Gulf beachfront within 1 block of beach, with less than a half-mile of inland penetration. Along Naples Bay, a maximum storm tide of about 2-3 ft above MHHW resulted in inundation of 1 to 2 feet on west side of bay just south of Tamiami Trail. This led to flooding of restaurants and shops.

October 9, 2018 – The high October astronomical tides, King tides, in combination with the strong winds and minor surge from Hurricane Michael in the Gulf of Mexico brought a couple days of minor saltwater flooding along both the Atlantic and Gulf coasts of South Florida. NBC2 in Fort Myers reported water covering County Road 92A between Marco Island and Goodland. Videos and photos shared via social media show abnormally high tide moving into and above sand dunes at Naples Beach as well as water over topping the seawall and approaching the backs of residences in the Isles of Capri neighborhood.

May 18, 2020 – Tropical Storm Arthur, which was moving over the outer banks of North Carolina, was forecast to continue moving northeastward off the Mid-Atlantic coastline. At the same time, the tail of Arthur, basically a trough of low pressure, extended into the southeastern portion of the country. This also combined with a mid to upper-level area of low pressure moving into the Tennessee Valley and a trough of low pressure moving into the eastern Gulf of Mexico which allowed for a south southwesterly flow across South Florida. This allowed for the Gulf coast sea breeze to push inland as the east coast sea breeze remained pushed up against the east coast. This eventually led to the development of scattered to numerous showers and thunderstorms across all of South Florida. The primary impacts with these storms were heavy rainfall and associated flooding, frequent lightning strikes, small hail, and gusty winds.

September 13, 2021 – High pressure over the western Atlantic waters allowed for light easterly wind flow to set up across South Florida. With the light flow in place, waterspouts were able to develop across the Atlantic waters. In fact, one even moved onshore. The Atlantic Sea breeze also was able to push westward across South FL while the Gulf Sea breeze remained pinned across the west coast metro areas. This allowed for strong showers and storms to develop during the afternoon hours, including over the Gulf and Atlantic waters due to outflow boundaries. Strong wind gusts, heavy rainfall, flooding, and frequent lightning were the main hazards.

August 29, 2023 – The center of Hurricane Idalia passed about 180 miles west of Naples as a Category 2 moving north over the eastern Gulf of Mexico. The outermost edge of Idalia's tropical storm force wind field skirted the SW Florida Gulf coast, and a few outer rain bands moved through South Florida on August 29th and 30th bringing brief tropical storm force wind gusts. A storm surge of about 3 feet, combined with high astronomical tides, led to minor coastal flooding in Collier County during the high tide cycles on August 29th and 30th.

June 13, 2024 – A plume of deep tropical moisture streamed into South Florida during the week of June 10 through 15th as the region remained south of a stationary boundary and in close proximity to a weak tropical disturbance. Multiple mesoscale convective systems developed to the south of this boundary over Central Florida and gradually pivoted southward into South Florida during the morning and afternoon hours of June 11th, 12th, and 13th, 2024. With a very moist and warm atmospheric composition, rainfall rates were efficient and tropical in nature. Storm total rainfall of up to 20 inches occurred across NE Miami-Dade and SE Broward counties, with totals as high as 18 inches in the Big Cypress National Preserve in Collier County. These rainfall totals resulted in major flooding across these areas.

Probability of Future Occurrence

By definition of the 1-percent-annual-chance flood event, SFHAs are defined as those areas that will be inundated by the flood event having a 1-percent chance of being equaled or exceeded in any given year. Properties located in these areas have a 26 percent chance of flooding over the life of a 30-year mortgage. Flooding of other magnitudes can occur with varying frequency. Less severe flooding could be expected to occur more frequently.

Based on the historical record of 59 floods, coastal floods, flash floods, and heavy rain events over the 30-year period from 1996 through December 2025, Collier County experienced an average of 1.9 flood events per year. Based on these considerations, the probability of flooding is considered highly likely (100% annual probability) for Collier County.

Probability: 4 – Highly Likely

Climate Change and Future Conditions

Per the 2023 Sixth National Climate Assessment, the frequency and intensity of heavy precipitation events is expected to increase across the country. Specifically, it is “very likely” (90-100% probability) that most areas of the United States will exhibit an increase of at least 5% in the maximum 5-day precipitation by late 21st century. Additionally, increases in precipitation totals are expected in the Southeast. The mean change in the annual number of days with rainfall over 1 inch for the Southeastern U.S. is 0.5 to 1.5 days. With more rainfall falling in more intense incidents, the region may experience more frequent flash flooding. However, it should be noted that at a more localized level, regional rainfall trends have not been observed in South Florida, and projections of future precipitation changes are less clear. Still, increased flooding may also result from more intense tropical cyclone; researchers have noted the occurrence of more intense storms bringing greater rainfall totals, a trend that is expected to continue as ocean and air temperatures rise.

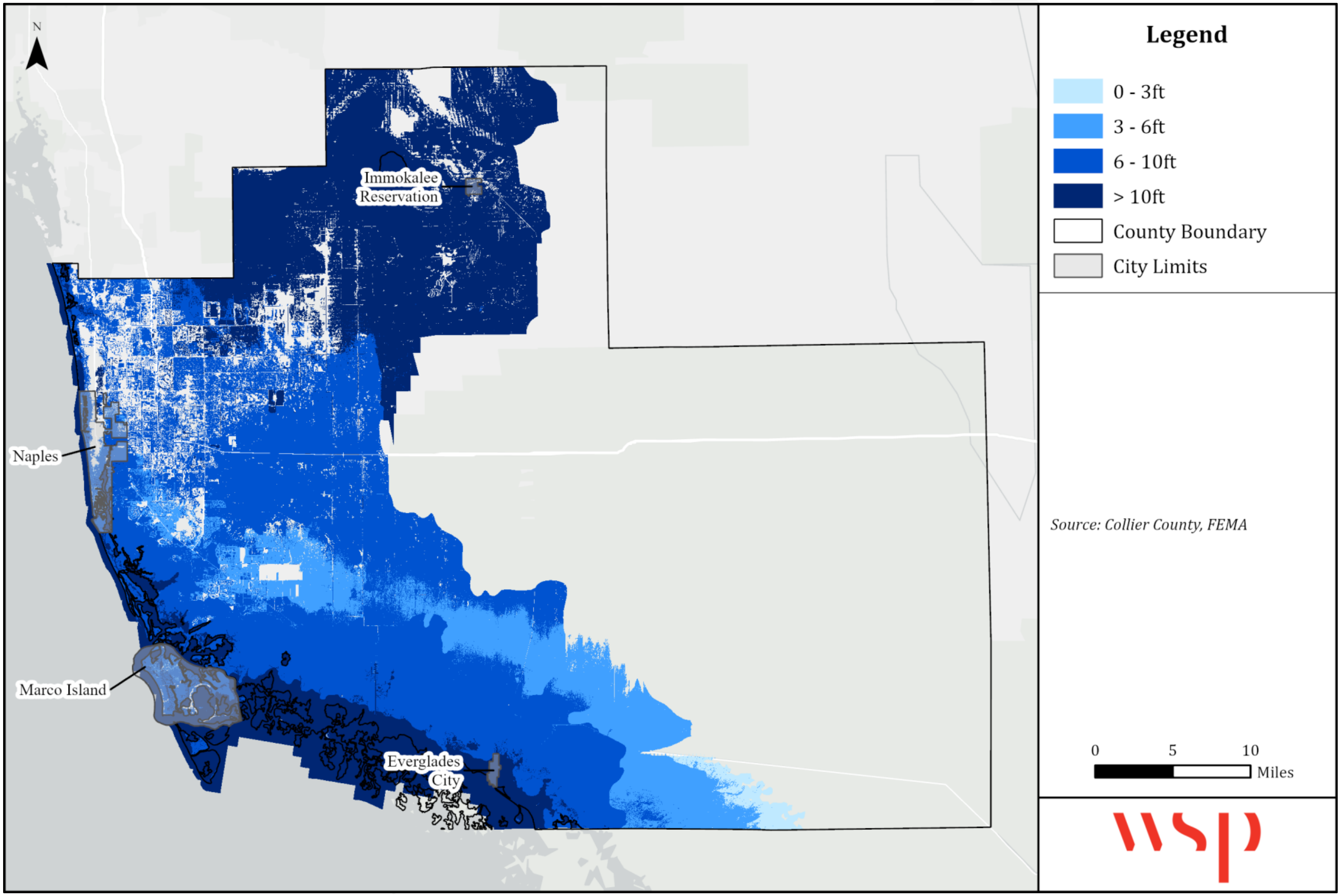
Vulnerability Assessment

Vulnerability – Extremely High

Flood damage is directly related to the depth of flooding and can be estimated by the application of a depth damage curve. In applying the curve, a specific depth of water translates to a percentage of damage to the structure, which translates to the same percentage of the structure's replacement value. Figure 4-17 depicts the depth of flooding that can be expected within the County during the 1-percent-annual-chance flood event based on the Effective DFIRM.

Vulnerability to flooding was evaluated using GIS analysis and version 7.2 of FEMA's Hazus software. To estimate exposure to flood risk, parcel counts by FEMA flood zone were determined using a spatial intersection of Collier County tax parcel data and the FEMA DFIRM database. In the case of parcels affected by multiple zones, the entire parcel value was applied to the highest risk flood zone that intersected the parcel. Occupancy types were derived from parcel data and translated into occupancy classes used in Hazus to facilitate an accurate loss estimate. An occupancy class is required in Hazus to apply the correct depth damage factor which ensures the most accurate damage assessment.

Figure 4-17 – 100-yr Flood Depths for Collier County



Property

Property exposure in unincorporated Collier County is provided in Table 4-20. Parcels are counted with the highest risk flood zone that they intersect. Risk information is detailed in terms of the number of buildings by flood zone, occupancy type, and total assessed value of improvements that may be exposed to the identified hazards.

Table 4-20 – Property at Risk

Occupancy Type	Building Count Exposed	Total Building Value	Estimated Content Value	Total Value
Zone A				
Agricultural	14	$1,891,590	$1,470,629	$3,362,219
Commercial	18	$18,547,997	$18,547,997	$37,095,994
Education	0	$0	$0	$0
Government	5	$62,883	$62,883	$125,765
Industrial	0	$0	$0	$0
Religious	0	$0	$0	$0
Residential	122	$10,307,516	$5,153,758	$15,461,273
Total	**159**	**$30,809,985**	**$25,235,266**	**$56,045,250**
Zone AE				
Agricultural	122	$29,535,964	$26,722,231	$56,258,195
Commercial	1,937	$4,617,369,849	$4,617,369,849	$9,234,739,699
Education	81	$293,137,984	$293,064,341	$586,202,324
Government	26	$159,978,054	$159,978,004	$319,956,057
Industrial	153	$165,024,999	$178,951,629	$343,976,628
Religious	57	$116,697,664	$116,171,400	$232,869,063
Residential	35,348	$25,482,355,037	$12,741,177,519	$38,223,532,556
Total	**37,724**	**$30,864,099,551**	**$18,133,434,972**	**$48,997,534,523**
Zone AH				
Agricultural	318	$34,467,066	$27,488,045	$61,955,111
Commercial	965	$1,235,248,334	$1,235,248,334	$2,470,496,668
Education	70	$239,231,616	$238,146,331	$477,377,947
Government	21	$102,362,696	$100,994,192	$203,356,888
Industrial	61	$164,640,675	$220,383,814	$385,024,488
Religious	79	$94,386,405	$90,737,558	$185,123,962
Residential	37,747	$18,127,062,748	$9,063,531,374	$27,190,594,122
Total	**39,261**	**$19,997,399,539**	**$10,976,529,647**	**$30,973,929,186**
Zone VE				
Agricultural	0	$0	$0	$0
Commercial	17	$965,680	$965,680	$1,931,360
Education	0	$0	$0	$0
Government	0	$0	$0	$0
Industrial	0	$0	$0	$0
Religious	0	$0	$0	$0
Residential	109	$43,897,634	$21,948,817	$65,846,451
Total	**126**	**$44,863,314**	**$22,914,497**	**$67,777,811**
Zone X Shaded				
Agricultural	93	$7,779,235	$4,724,191	$12,503,426
Commercial	1,412	$2,295,410,555	$2,295,410,555	$4,590,821,111
Education	79	$197,763,166	$195,112,754	$392,875,920

Occupancy Type	Building Count Exposed	Total Building Value	Estimated Content Value	Total Value
Government	14	$92,786,989	$92,786,989	$185,573,978
Industrial	122	$71,650,045	$71,650,045	$143,300,091
Religious	61	$105,010,535	$104,532,928	$209,543,463
Residential	26,387	$17,837,757,857	$8,918,878,929	$26,756,636,786
Total	**28,168**	**$20,608,158,382**	**$11,683,096,391**	**$32,291,254,774**
Zone X Unshaded				
Agricultural	32	$6,135,537	$3,893,166	$10,028,704
Commercial	951	$1,233,104,798	$1,233,104,798	$2,466,209,597
Education	120	$463,527,316	$448,277,508	$911,804,824
Government	14	$5,672,008	$5,672,008	$11,344,016
Industrial	20	$14,236,886	$16,800,578	$31,037,464
Religious	44	$108,125,850	$108,125,850	$216,251,700
Residential	22,258	$11,020,437,710	$5,510,218,855	$16,530,656,566
Total	**23,439**	**$12,851,240,106**	**$7,326,092,764**	**$20,177,332,870**

Source: Collier County parcel data, 2025; FEMA Effective DFIRM

WSP performed a Level 2 flood loss analysis in the Hazus FAST flood tool by leveraging the 2025 Collier County parcel data. WSP developed a depth raster for all areas of the SFHA and loaded this raster as well as the parcel data into Hazus. Losses were calculated based on Hazus standard depth damage functions. In all, there are over 128,838 buildings in unincorporated Collier County; of these, 65,071 are within the SFHA.

The following assumptions were made as part of this analysis:

- Foundation type was not provided in the parcel data, so 95% of buildings were assumed to have a slab on grade foundation and 5% were assumed to have a crawl space foundation.
- Parcels with unknown occupancy were treated as residential properties.
- Where year built was not provided in the parcel data, a standard year built of 1950 was assigned.
- Buildings were assumed to be single story if not otherwise defined in the parcel data.

Table 4-21 shows the building count, total value, estimated damage and loss ratio for buildings that have estimated losses from the 1% -annual chance flood. The loss estimate for flood is based on the total of improved building value and contents value. Land value is not included in any of the loss estimates as generally the land is not subject to loss from floods.

The loss ratio is the loss estimate divided by the total potential exposure (i.e., total of improved and contents value for all buildings located within the 100-year floodplain) and displayed as a percentage of loss. FEMA considers loss ratios greater than 10% to be significant and an indicator a community may have more difficulties recovering from a flood.

Based on the Hazus analysis, Collier County would sustain an estimated $33.5 billion in property damage from a 1% annual chance flood event. This level of flooding would exceed a 10 percent loss ratio and pose a significant challenge for recovery.

Table 4-21 – Estimated Building Damage and Content Loss

Occupancy Type	Total Number of Buildings with Loss	Total Value (Building & Contents)	Estimated Building Damage	Estimated Content Damage	Loss Estimate	Loss Ratio
Agriculture	353	$97,528,964.58	$18,284,130.64	$23,325,079.27	$41,609,209.92	42.7%
Commercial	2,205	$6,401,419,161.05	$467,185,218.40	$1,524,454,950.81	$1,991,640,169.21	31.1%
Educational	142	$964,945,956.72	$22,485,621.75	$102,712,258.59	$125,197,880.34	13.0%
Government	34	$255,781,737.01	$20,980,783.49	$92,086,937.27	$113,067,720.76	44.2%
Industrial	119	$603,613,253.98	$66,309,505.12	$168,286,006.95	$234,595,512.08	38.9%
Religious	108	$427,915,520.57	$18,987,533.77	$106,454,264.72	$125,441,798.50	29.3%
Residential	61,703	$51,691,441,562.62	$20,628,297,528.35	$10,310,109,743.60	$30,938,407,271.96	59.9%
Total	**64,664**	**$60,442,646,156.53**	**$21,242,530,321.54**	**$12,327,429,241.22**	**$33,569,959,562.76**	**55.5%**

Source: Collier County parcel data, 2025; FEMA Effective DFIRM; Hazus

People

A separate analysis was performed to determine the population at risk in the individual FEMA flood zones for the Effective DFIRMs based on the exposure of residential property and the average household size in Collier County of 2.3 people per household according to U.S. Census Bureau. The resulting estimates of population at risk by flood zone are shown in Table 4-22. See Section 4.5.4 for discussion on the impacts of flooding on life, safety, warning, evacuation, and public health.

Table 4-22 – Population at Risk to Flood

Flood Zone	Residential Property Count	Population at Risk
Zone A	122	281
Zone AE	35,348	81,300
Zone AH	37,747	86,818
Zone VE	109	251
Zone X (Shaded)	26,387	60,690
Zone X	22,258	51,193
SFHA Total	**73,326**	**168,650**

Source: American Community Survey 2020-2024 5-Year Estimates; Collier County parcel data, 2025-2026

Critical Facilities

A separate GIS analysis was performed to identify critical facilities located in the 1-percent-annual-chance and 0.2-percent-annual-chance floodplains. Critical facility data was overlaid with the DFIRM flood zones to determine exposure by flood zone. Facilities in Zone VE and Zone AE were also compared to flood depth raster data to estimate the depth of flooding that would occur at the facility. Table 4-23 summarizes and Figure 4-18 displays critical facility exposure by flood zone in Collier County. Table 4-24 provides a detailed list of critical facilities by location and flood depth and is shown in Figure 4-19.

Table 4-23 – Critical Facility Flood Exposure Summary

	Flood Zone					
FEMA Lifeline	**A**	**AE**	**AH**	**VE**	**X SHADED**	**X UNSHADED**
Communications	3	12	6	0	0	3
Energy	0	35	13	1	33	29
Food, Hydration, Shelter	0	9	4	0	10	13
Hazardous Materials	4	18	20	0	19	13
Health and Medical	0	13	2	0	20	8
Safety and Security	0	14	4	0	15	21
Transportation	7	8	2	1	0	1
Water Systems	4	11	11	0	3	12
Total	**18**	**120**	**62**	**2**	**100**	**100**

Source: FEMA, Collier County, 2024

Table 4-24 – Critical Facilities by Flood Zone

Facility Name	Address	Facility Type	Estimated Flood Depth (NAVD ft)
Zone A			
W263BC		Radio Communications Tower	<0
WFLU-LP		Radio Communications Tower	<0
WFLP-LP		Radio Communications Tower	<0
Collier County Utilities - South Regional WTP	3851 Utilities Drive	Hazardous Materials Facility	<0
F G U A - Golden Gate WTP - 2184	4300 Golden Gate Parkway	Hazardous Materials Facility	<0
Everglades Farms	14747 Oil Well Rd	Hazardous Materials Facility	<0
Farm Op - Farm 8	15000 County Road 858	Hazardous Materials Facility	<0
I-75 Rest stop & Recreat. Area	I-75 Near Broward Co Line	Public Water Supply	<0
I-75 Big Cypress Rest Stop		Wastewater Facility	<0
Sunniland Mine - Florida Rock		Wastewater Facility	<0
Oasis Ranger Station	Hcr 61 Box 110	Public Water Supply	<0
Oasis Ranger Station-U.S. Government		Airport	<0
Calusa Ranch		Airport	<0
Lost Horn Ranch		Airport	<0
Little Deer		Airport	<0
Romor Ranch		Airport	<0
Dade-Collier Training and Transition		Airport	<0
I-75 & State 29		Major Intersection	<0
Zone AE			
WVOI	12801 Curcie Rd	Radio Communications Tower	7.9
WMKO		Radio Communications Tower	7.1
WMKO		Radio Communications Tower	6.6
W286AK		Radio Communications Tower	6.6
W298AW		Radio Communications Tower	10.2
W272BM		Radio Communications Tower	7.7
W248AU		Radio Communications Tower	5.8
W260BI		Radio Communications Tower	5.8
W299BG		Radio Communications Tower	5.8
W262AJ		Radio Communications Tower	5.3
WGUF		Radio Communications Tower	5.1
WSGL		Radio Communications Tower	6.6
Main Admin	3301 E. Tamiami Trail	Local Government Facility	7.3
County Hall / Main Courthouse	3301 E. Tamiami Trail	Local Government Facility	7.3
Berkshire Commons	7101 Radio Rd	Grocery Store	7.1

Facility Name	Address	Facility Type	Estimated Flood Depth (NAVD ft)
The Salvation Army	3180 Estey Ave	Relief Agency	5.8
Walmart	6650 Collier Blvd	Grocery Store	5.9
Habitat for Humanity	11145 Tamiami TRL E	Relief-Agency	4.9
Collier County Jail/Sheriff Dept	3301 Tamiami Trl E Bldg J	Correctional Facility	7.6
Big Cypress Wilderness Institute	259595 Turner River Rd	Correctional Facility	4.5
Lorenzo Walker Institute of Technology	3702 Estey Ave	Public School	6.8
Ochopee Fire Control Dist St 66	41015 Tamiami Trl E	Fire Station	6.5
NNFD #45	1885 Veterans Park Dr	Fire Station	6.3
Isle Of Capri Fire Rescue St 90	175 Capri Blvd	Fire Station	7.4
Collier County Sheriff's Dept Dist. 7 Everglades City Substation	32020 Tamiami Trail E	Law Enforcement	6.6
ENFD #23	6055 Collier Blvd	Fire Station	6.5
Big Cypress Natl Preserve Fire & Avn	33090 Satinwood Dr	Fire Station	6.2
Sheriff's Dept HQ & Jail	3301 Tamiami Trl E Bldg J	Law Enforcement	5.8
Ems Station 23	6055 Collier Blvd	Ems	6.5
Ochopee Fire Control Dist St 61	525 New Port Dr.	Fire Station	6.2
Ems Station 22	4375 Bayshore Dr	Ems	5.7
Ems Station 90	175 Capri Blvd	Ems	7.2
EMS Station 61 (Temp Sta. Loc.)	25000 Tamiami Trail E, Unit 253/254	Ems	6.1
8944342		Fuel Facility - Along Evac. Rte.	6.9
8839579		Fuel Facility - Along Evac. Rte.	5.8
8837297		Fuel Facility - Along Evac. Rte.	7.5
8736147		Fuel Facility - Along Evac. Rte.	5.8
8626224		Fuel Facility - Along Evac. Rte.	7.5
8518636		Fuel Facility - Along Evac. Rte.	5.8
8518330		Fuel Facility - Along Evac. Rte.	7.1
8518223		Fuel Facility - Along Evac. Rte.	5.6
8518180		Fuel Facility - Along Evac. Rte.	6.5
8518171		Fuel Facility - Along Evac. Rte.	5.3
8518132		Fuel Facility - Along Evac. Rte.	6.8
8518119		Fuel Facility - Along Evac. Rte.	5.0
8519778		Fuel Facility - Along Evac. Rte.	5.0
9700628		Fuel Facility - Along Evac. Rte.	7.0
8841809		Fuel Facility - Along Evac. Rte.	5.1
8733271		Fuel Facility - Along Evac. Rte.	6.8
9047281		Fuel Facility - Along Evac. Rte.	6.4
8944686		Fuel Facility - Along Evac. Rte.	6.4
8841367		Fuel Facility - Along Evac. Rte.	6.0

Facility Name	Address	Facility Type	Estimated Flood Depth (NAVD ft)
8629445		Fuel Facility - Along Evac. Rte.	7.7
8518341		Fuel Facility - Along Evac. Rte.	6.1
8518236		Fuel Facility - Along Evac. Rte.	7.6
8518215		Fuel Facility - Along Evac. Rte.	4.8
8518190	20018 Tamiami Trl E	Fuel Facility - Along Evac. Rte.	6.0
8518163		Fuel Facility - Along Evac. Rte.	5.0
8518136		Fuel Facility - Along Evac. Rte.	5.1
8626888		Fuel Facility - Along Evac. Rte.	6.1
FPL-Capri	5785 Collier Blvd	Electric Substation	6.9
9802424		Fuel Facility - Along Evac. Rte.	6.7
9803121		Fuel Facility - Along Evac. Rte.	11.4
9804326		Fuel Facility - Along Evac. Rte.	5.6
8944685		Fuel Facility - Along Evac. Rte.	5.3
8519244		Fuel Facility - Along Evac. Rte.	5.3
LCEC-Belle Meade	5735 Collier Blvd	Electric Substation	6.6
LCEC-Carnestown	32096 Tamiami Trl E	Electric Substation	5.9
City Of Everglades City - Water Plant		Hazardous Materials Facility	6.0
Farm Op - Farm 7 Pump Station 02	S of Sunnygrove Av	Hazardous Materials Facility	6.0
Farm Op - Farm 7 Pump Station 03	1/2 Mile E Of Tomato Rd	Hazardous Materials Facility	5.9
Farm Op - Farm 7 Pump Station 04	E Of Tomato Rd & N Of Sunnygrove	Hazardous Materials Facility	4.4
Farm Op - Farm 7 Greenhouse / Pump Station 9	11349 Six Ls Farm Road	Hazardous Materials Facility	5.4
Port Of The Islands WWTP/WTP	12600 Union Road	Hazardous Materials Facility	5.9
Farm Op - Farm 7 Pump Station 14	E of Laredo St in S Agro Plot	Hazardous Materials Facility	5.2
Farm Op - Farm 7 Pump Station 13	E of Six Ls Rd - W Agro Plot N	Hazardous Materials Facility	5.1
Farm Op - Farm 7 Pump Station 11	W of Six Ls Farm Rd - E Agro Plot Se	Hazardous Material Facility	5.3
North Regional Water Reclamation Facility	10500 Goodlette-Frank Rd N	Hazardous Materials Facility	7.0
Gargiulo - Farm 7	15000 East Us Highway 41	Hazardous Materials Facility	6.0
Resource Conservation Systems - Mediterra Corso Circle	15461 Mediterra Corso Circle	Hazardous Materials Facility	8.0
Golf Turf Applications	5565 Shirley Street	Hazardous Materials Facility	6.8
Embarq - NAPLES---28870	5651 Shirley Street	Hazardous Materials Facility	7.4
Farm Op - Farm 7 Pump Station 01	Us Highway 41 - Parcel 41 South	Hazardous Materials Facility	5.7
Farm Op - Farm 7 Pump Station 12	E of Six Ls Farm Rd - East Agro Plot Ne	Hazardous Materials Facility	5.2

Facility Name	Address	Facility Type	Estimated Flood Depth (NAVD ft)
Farm Op - Farm 7 Pump Station 17	W Of Six Ls Farm Rd - W Agro Plot S	Hazardous Materials Facility	5.6
Embarq-Corporation - NAPLES - Lake Park Boulevard	13001 Lake Park Blvd	Hazardous Materials Facility	5.6
Vanderbilt Beach Assisted Living Home	517 100th Avenue N.	Assisted Living Facility	6.8
Cove At Marbella, The	7425 Pelican Bay Blvd.	Assisted Living Facility	5.6
Encore Senior Village At Naples	1155 Encore Way	Assisted Living Facility	6.9
Willough At Naples, The	9001 Tamiami Trail E	Hospital	5.0
North Collier Hospital	11190 Healthpark Boulevard	Hospital	6.9
Collier County Public Health Unit	3301 E Tamiami Trl Bldg H	Clinical Laboratory	7.7
DSI Laboratories at N Collier Hospital	11190 Health Park Blvd	Clinical Laboratory	6.9
Manor Care Nursing & Rehabilitation Cent	3601 Lakewood Blvd.	Skilled Nursing Facility	5.8
Manorcare At Lely Palms	6135 Rattlesnake Hammock Road	Skilled Nursing Facility	5.3
Imperial Health Care Center	900 Imperial Golf Course Blvd.	Skilled Nursing Facility	7.1
Premier Place at Glenview	100 Glenview Place	Skilled Nursing Facility	9.0
Pelican Bay Sewage Treat Plant	6652 Watergate Way	Wastewater Facility	6.9
Trees Camp WTP	11180 Lasko Lane	Public Water Supply	4.4
Lee Cypress Co-Op	PO Box 513	Public Water Supply	5.9
Everglades Shores/Big Cypress Preserve		Public Water Supply	6.0
Marco Shores Utilities		Public Water Supply	7.1
Collier County North Regional WRF		Wastewater Facility	7.5
Collier County South Regional WRF	5600 Warren ST	Wastewater Facility	4.8
Marco Island, City of - RO Plant		Wastewater Facility	4.9
Marco Shores Utilities		Wastewater Facility	4.9
Goodland Isles Estates		Wastewater Facility	10.8
Port of the Islands WWTP	12600 Union Rd	Wastewater Facility	6.2
State Farmers' Market-Immokalee	424 New Market Rd E.	Point Of Distribution	24.6
Freedom Square Parking Lot	12713 Tamiami Trail E	Point Of Distribution	7.2
Collier Health Dept	3301 Tamiami Tr. E., Bldg H		5.8
Wing South Airpark		Airport	6.5
Naples Grand Golf Resort		Heliport/Helipad	6.8
Marco Island		Airport	7.3
US 41/State 90 & County 951 & State 951		Major Intersection	6.1
US 41/State 90 & County 29		Major Intersection	8.7

Facility Name	Address	Facility Type	Estimated Flood Depth (NAVD ft)
I-75 & County 896		Major Intersection	9.5
Isles of Capri Fire Dept	175 Capri Blvd	Heliport/Helipad	7.2
Jolley Bridge		Major Intersection	11.3
Zone AH			
State Hwy Patrol Tower		Communications Tower	7.8
	3547 Plover Ave	Radio Communications Tower	8.4
WNOG		Radio Communications Tower	10.5
WAVV		Radio Communications Tower	8.0
WAFZ-FM		Radio Communications Tower	16.0
WWG92 162.525		Radio Communications Tower	15.7
Florida Sports Park	8520 Collier Blvd	Stadium	6.8
Walmart	9885 Collier Blvd	Grocery Store	6.7
The Pace Program	160 N First St	Public School	21.7
IFD #31	1107 Carson Rd	Fire Station	22.0
BCIFRD #11	18665 Immokalee Rd	Fire Station	14.2
FHP Troop F (office closed)	3205 Beck Blvd	Law Enforcement	7.8
GGFD #72	3820 Beck Blvd	Fire Station	6.7
8518283		Fuel Facility - Along Evac. Rte.	22.4
8518207		Fuel Facility - Along Evac. Rte.	19.1
9100553		Fuel Facility - Along Evac. Rte.	7.9
8519336		Fuel Facility - Along Evac. Rte.	7.7
8518332		Fuel Facility - Along Evac. Rte.	10.6
8518282		Fuel Facility - Along Evac. Rte.	22.1
8839708		Fuel Facility - Along Evac. Rte.	8.8
8518334		Fuel Facility - Along Evac. Rte.	23.8
8944687		Fuel Facility - Along Evac. Rte.	22.2
8518242		Fuel Facility - Along Evac. Rte.	24.0
LCEC-Ave Maria South	6095 Camp Keais Rd	Electric Substation	13.9
LCEC-Immokalee	1299 S 1st St	Electric Substation	17.0
FPL-Collier Bl	8500 Collier Blvd	Electric Substation	6.0
Gargiulo - BHN Research	25672 Immokalee Road	Hazardous Materials Facility	14.7
Immokalee Water and Sewer District - Carson Road WTP	1201 Carson Road	Hazardous Materials Facility	0.1
Immokalee Water and Sewer District - Jerry V Warden WTP	1020 Sanitation Road	Hazardous Materials Facility	18.7
Immokalee Water and Sewer District - Airport Road WTP	1202 Airport Access Road	Hazardous Materials Facility	16.0
Pacific Tomato Growers---2373	9500 County Road 858	Hazardous Materials Facility	13.2
B W J Farms - Lake Trafford Division	East Immokalee Drive Left At Radio Tower	Hazardous Materials Facility	18.1
Garguilo, Inc. Superior Plant Co.	510 Frangipani Ave	Hazmat Fac.	9.1

Facility Name	Address	Facility Type	Estimated Flood Depth (NAVD ft)
Farmers Supply	710 Broward Street	Hazardous Materials Facility	24.0
U A P Distribution - Immokalee	116 Jerome Drive	Hazardous Materials Facility	22.9
Helena Chemical - Immokalee	907 Alachua Street	Hazardous Materials Facility	23.5
Immokalee Groves	3710 Camp Keais Road	Hazardous Materials Facility	15.2
Troyer Brothers Agri	3000 Sthy 29	Hazardous Materials Facility	15.9
Embarq - Golden Gate Central Office	4661 Sunset Road	Hazardous Materials Facility	7.9
Immokalee Groves	3710 Camp Keias Road	Hazardous Materials Facility	15.1
Collier County Utilities - North Regional WTP	8005 Vanderbilt Beach Road Extension	Hazardous Materials Facility	0.1
Qwest - Naples Pop	3960 20 Place Southwest	Hazardous Materials Facility	8.0
Howard Fertilizer - Immokalee	218 West New Market Road	Hazardous Materials Facility	23.9
Haleakala Construction	5758 Taylor Road	Hazardous Materials Facility	7.6
Ag Mart Produce - Farm 12	8355 County Road 858	Hazardous Materials Facility	13.8
Resource Conservation Systems - Messina Lane	16795 Messina Lane	Hazardous Materials Facility	7.4
Ag Mart Produce - Immokalee Farm	County Road 846	Hazardous Materials Facility	15.8
Physicians Regional - Collier Blvd	8300 Collier Blvd	Hospital	5.1
Marion E Fether Medical Center	1454 Madison Ave	Clinical Laboratory	23.6
Immokalee Water	1020 Sanitation Road	Public Water Supply	19.1
S.W. Florida Research Ed. Ctr.	2686 State Road 29 North	Public Water Supply	25.0
Collier County Regional WTP		Public Water Supply	9.4
Florida Governmental Utility Authority	4300 Golden Gate Parkway	Public Water Supply	7.9
Immokalee WWTF		Wastewater Facility	20.0
Handy Food Store #91		Wastewater Facility	22.3
Davis Oil Company - Davis Service Center	726 E Main St	Wastewater Facility	22.2
Port of the Islands Water Plant	12600 Union Rd	Public Water Supply	22.2
Collier South Regional WTP	3851 City Gate Dr	Wastewater Facility	0.1
Orange Tree WWTP		Wastewater Facility	10.3
K-Mart Plaza Parking Lot	4957 Golden Gate Pkwy	Point Of Distribution	8.2
Immokalee		Airport	22.4
I-75 & State 84 & County 951		Major Intersection	8.4
Zone VE			
8736533	150 Smallwood Dr	Fuel Facility - Along Evac. Rte	15.5
Goodland Bridge (SR-92)		Major Intersection	13.3
Zone X			
Farm Worker Village	1800 Farm Worker Way	Relief Agency	N/A
Shops at Hammock Cove	4370 Thomasson Dr	Grocery Store	N/A
The Pavilion Shopping Center	871 Vanderbilt Beach Rd	Grocery Store	N/A

Facility Name	Address	Facility Type	Estimated Flood Depth (NAVD ft)
Riverchase Shopping Center	11200 Tamiami TRL N	Grocery Store	N/A
Crossroads Market S/C	5991 Pine Ridge RD	Grocery Store	N/A
Freedom Square	12663 Tamiami TRL E	Grocery Store	N/A
Walmart	5420 Juliet Blvd	Grocery Store	N/A
Walmart	3451 Tamiami Trl E	Grocery Store	N/A
Catholic Charities	2210 Santa Barbara Blvd	Relief Agency	N/A
Collier Reg Juvenile Detention Center	3315 Tamiami Trl E	Correctional Facility	N/A
NNFD # 44	8970 Hammock Oak Dr	Fire Station	N/A
NNFD #43	16325 Vanderbilt Dr	Fire Station	N/A
GGFD #70	4741 Golden Gate Pkwy	Fire Station	N/A
BCIFRD #12	21520 Immokalee Rd	Fire Station	N/A
IFD #30	502 New Market Rd E	Fire Station	N/A
North Naples Fire Central Dist St 47	2795 N Airport Pulling Rd	Fire Station	N/A
ENFD #20	4798 Davis Blvd	Fire Station	N/A
ENFD #21	11121 Tamiami Trl E	Fire Station	N/A
Collier County Sheriff's Dept Dist. 1 North Naples Substation	776 Vanderbilt Beach Rd	Law Enforcement	N/A
Collier County Sheriff's Dept Dist. 2 Golden Gate Substation	4707 Golden Gate Pkwy	Law Enforcement	N/A
EMS Station 21	11121 Tamiami Trl E,	EMS	N/A
EMS Station 70	4741 Golden Gate Pkwy,	EMS	N/A
EMS Station 44	776 Vanderbilt Beach Rd	EMS	N/A
EMS Station 43	16325 Vanderbilt Dr	EMS	N/A
9201065		Fuel Facility - Along Evac. Rte.	N/A
9063983		Fuel Facility - Along Evac. Rte.	N/A
8731687		Fuel Facility - Along Evac. Rte.	N/A
8519337		Fuel Facility - Along Evac. Rte.	N/A
8519335		Fuel Facility - Along Evac. Rte.	N/A
8519230		Fuel Facility - Along Evac. Rte.	N/A
8518154		Fuel Facility - Along Evac. Rte.	N/A
9402020		Fuel Facility - Along Evac. Rte.	N/A
9700664		Fuel Facility - Along Evac. Rte.	N/A
9803545		Fuel Facility - Along Evac. Rte.	N/A
9804626		Fuel Facility - Along Evac. Rte.	N/A
8518336		Fuel Facility - Along Evac. Rte.	N/A
9807884		Fuel Facility - Along Evac. Rte.	N/A
8518920		Fuel Facility - Along Evac. Rte.	N/A
8944109		Fuel Facility - Along Evac. Rte.	N/A
8732539		Fuel Facility - Along Evac. Rte.	N/A

Facility Name	Address	Facility Type	Estimated Flood Depth (NAVD ft)
8520197		Fuel Facility - Along Evac. Rte.	N/A
8518287		Fuel Facility - Along Evac. Rte.	N/A
8518181		Fuel Facility - Along Evac. Rte.	N/A
8518167		Fuel Facility - Along Evac. Rte.	N/A
8518131		Fuel Facility - Along Evac. Rte.	N/A
FPL-Collier	7221 Golden Gate Pkwy	Electric Substation	N/A
FPL-Golden Gate	4105 15th Ave SW	Electric Substation	N/A
9801610		Fuel Facility - Along Evac. Rte.	N/A
8944110		Fuel Facility - Along Evac. Rte.	N/A
9807455		Fuel Facility - Along Evac. Rte.	N/A
9103363		Fuel Facility - Along Evac. Rte.	N/A
9808618		Fuel Facility - Along Evac. Rte.	N/A
8518339		Fuel Facility - Along Evac. Rte.	N/A
FPL-Alligator	4995 Davis Blvd	Electric Substation	N/A
EXXON Mobile Sta	1235 Creekside Trl	Fuel Facility - Along Evac. Rte.	N/A
FPL-Pine Ridge	7990 Goodlette-Frank Rd N	Electric Substation	N/A
FPL-Weber	191 Weber Blvd N	Electric Substation	N/A
City of Naples - WWTP	1400 Third Avenue North	Hazardous Materials Facility	N/A
Immokalee Water and Sewer District - WWTP	140 White Way	Hazardous Materials Facility	N/A
Farm Op - Farm 7 Pump Station 8	11900 Six L Farm Rd - E Sentel Plot	Hazardous Materials Facility	N/A
Farm Op - Farm 7 Pump Station 06	E Of Tomato Rd on Duda Plot N	Hazardous Materials Facility	N/A
Farm Op - Farm 7 Pump Station 05	E Of Tomato Rd on Duda Plot S	Hazardous Materials Facility	N/A
Farm Op - Farm 7 Pump Station 15	E Of Tomato Rd in Duda Plot E	Hazardous Materials Facility	N/A
Home Depot Usa - 6348	1651 Airport Pulling Rd S	Hazardous Materials Facility	N/A
Everglades Farms	808 Sr 29	Hazardous Materials Facility	N/A
Golf Turf Applications - Stonebridge Country Club	9901 Airport Pulling Rd	Hazardous Materials Facility	N/A
Club Pelican Bay	707 Gulf Park Dr	Hazardous Materials Facility	N/A
Embarq- Naples Airport Rls	3150 Radio Road	Hazardous Materials Facility	N/A
Embarq - Naples Central Office	10201 North Tamiami Trail	Hazardous Materials Facility	N/A
Golf Turf Applications - Royal Palm Country Club	400 Forest Hills Boulevard	Hazardous Materials Facility	N/A
Embarq - NAPLES---28864	761 Commercial Blvd	Hazardous Materials Facility	N/A
Marco Island Utilities - Lime Softening Facility	1825 Mainsail Drive	Hazardous Materials Facility	N/A
Classic Bentley Village	2315 Leisure Lane	Hazardous Materials Facility	N/A
Farm Op - Farm 7 Pump Station 10	Six Ls Farm Rd, N Of Greenhse	Hazardous Materials Facility	N/A

Facility Name	Address	Facility Type	Estimated Flood Depth (NAVD ft)
Golf Turf Applications - Kathleen Court	5615 Kathleen Court	Hazardous Materials Facility	N/A
Farm Op - Farm 7 Pump Station 7	11900 Six L Farm Rd - E Sentel Plot	Hazardous Materials Facility	N/A
Kiva At Canterbury	10 7th Street	Assisted Living Facility	N/A
Aristocrat, The	10949 Parnu Street	Assisted Living Facility	N/A
Manorcare At Lely Palms	1000 Lely Palms Drive	Assisted Living Facility	N/A
Naples Day Surgery North	11161 Health Park Blvd	Ambulatory Surgical Center	N/A
Arbor Glen/Arbor Trace	1000 Arbor Lake Drive	Assisted Living Facility	N/A
Bentley Village	870 Classic Court	Assisted Living Facility	N/A
Merrill Gardens at Naples	1710 S.W. Health Parkway	Assisted Living Facility	N/A
Harborchase of North Collier	101 Cypress Way East	Assisted Living Facility	N/A
Tuscany Villa At Naples	8901 Tamiami Trail	Assisted Living Facility	N/A
Windsor Place	2626 Goodlette-Frank Rd N	Assisted Living Facility	N/A
Arden Courts Manorcare Health Services	6125 Rattlesnake Hammock Road	Assisted Living Facility	N/A
Barrington Terrace	5175 Tamiami Trail East	Assisted Living Facility	N/A
David Lawrence Mental Health Center/ CSU	6075 Bathey Ln	Hospital	N/A
Naples Artificial Kidney Center Inc	3699 Airport Road North	End-Stage Renal Disease	N/A
NRI Naples	6625 Hillway Circle	End-Stage Renal Disease	N/A
Kidney Institute of Naples	878 109th Avenue N	End-Stage Renal Disease	N/A
BMA Of South Collier	12709 Tamiami Trail East	End-Stage Renal Disease	N/A
Harborchase Of Naples	7801 Airport Pulling Road North	Skilled Nursing Facility	N/A
Bentley Care Center	875 Retreat Drive	Skilled Nursing Facility	N/A
Carnestown Transfer Station	1mi NW Carnestown	Solid Waste Facility	N/A
Sabal Palm WTP	4095 18th Ave NE	Public Water Supply	N/A
Orangetree Utility Co.	1341 Oil Well Rd	Public Water Supply	N/A
Barron Collier High School	5600 Cougar Drive	Point Of Distribution	N/A
Collier Health Department - Immokalee	419 N 1st St		N/A

Source: FEMA Effective Firm, Collier County FMP Working Group
Note: The Base Flood Elevation (BFE) is not defined for Zone A, so the depth is unknown but is greater than zero.

Figure 4-18 – Critical Facilities and Flood Zones

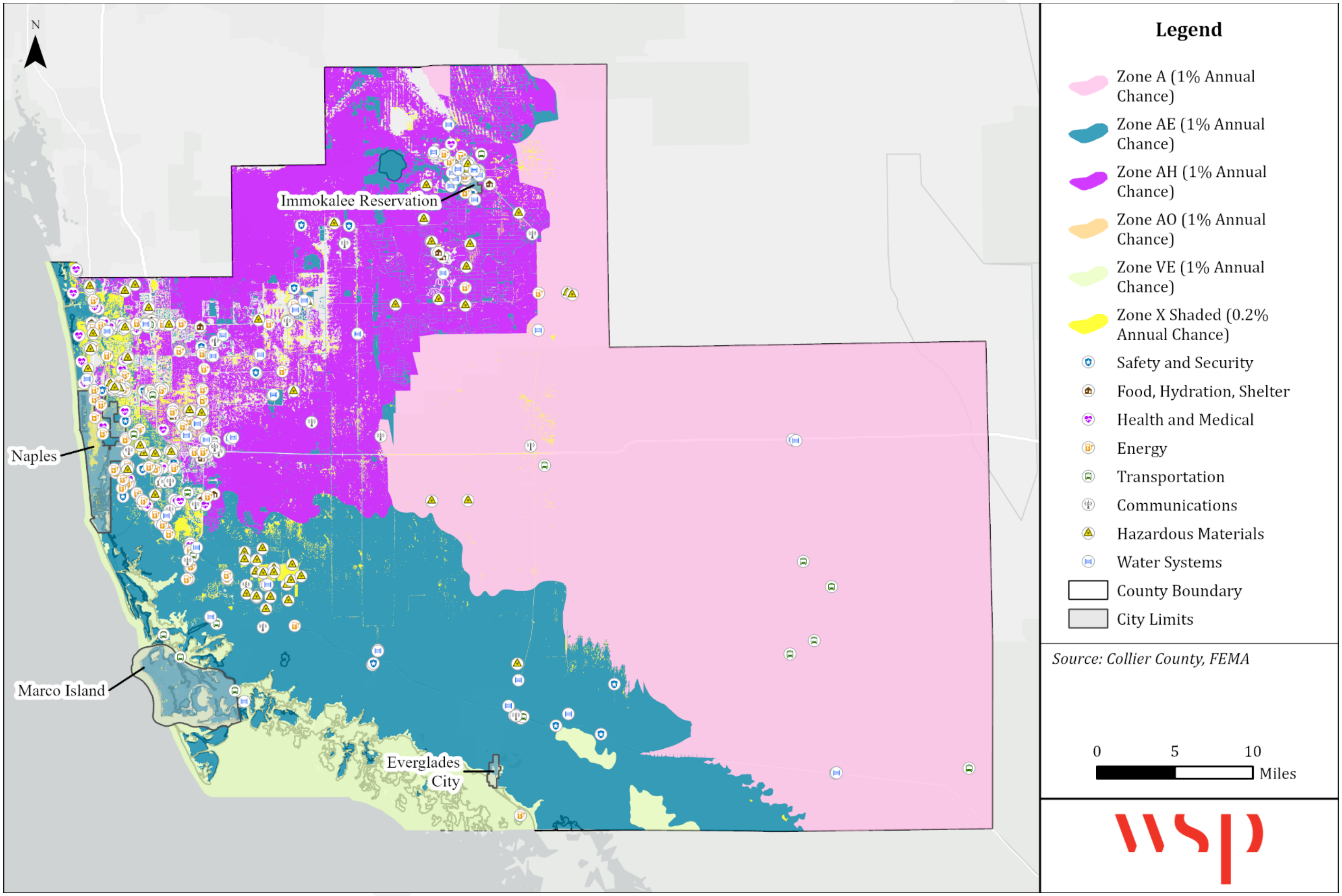
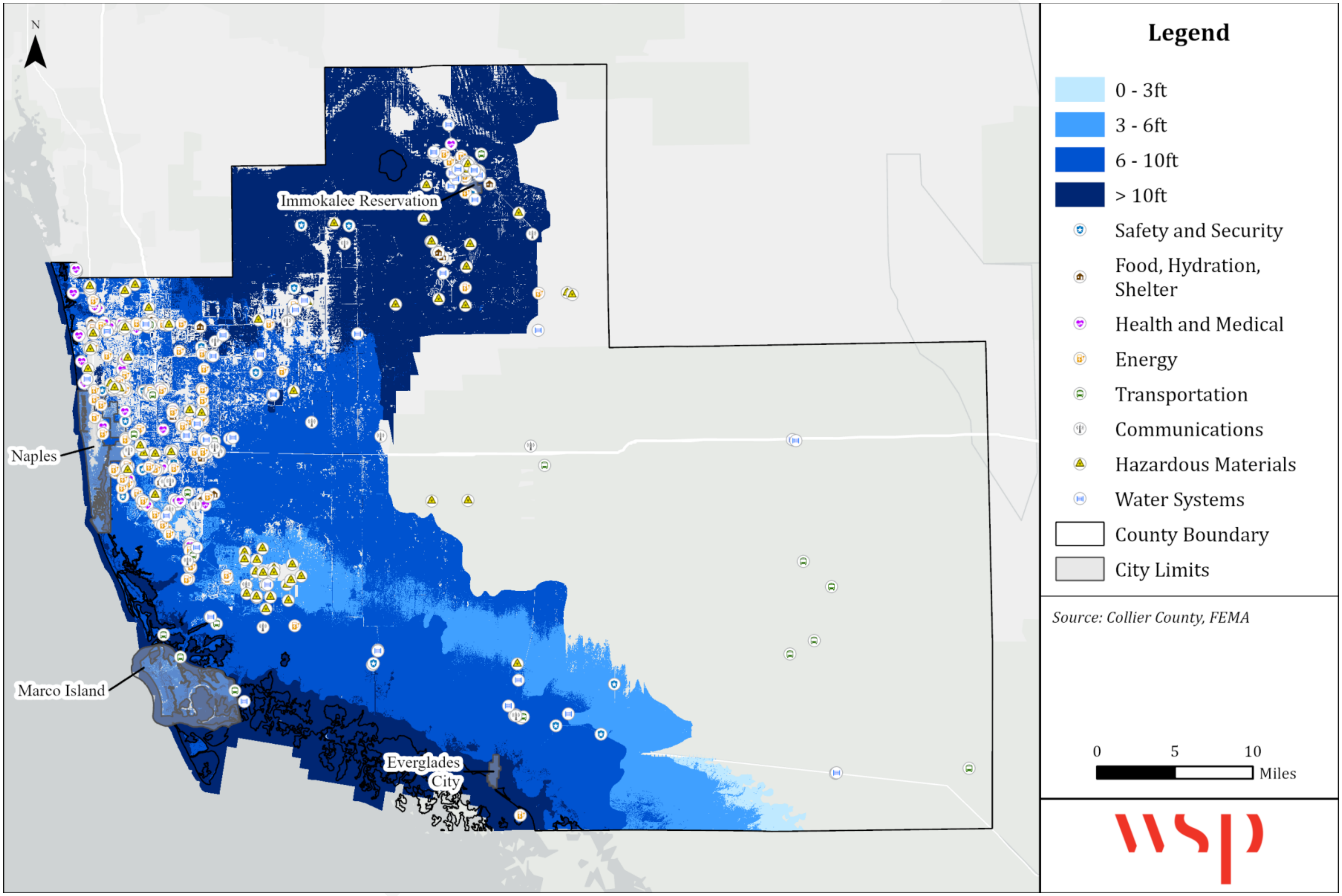


Figure 4-19 – Critical Facilities and 1%-Annual-Chance Flood Depth



Flood Insurance Analysis

One valuable source of information on flood hazards is current flood insurance data for active policies and past claims. Flood insurance is required as a condition of federal aid or a mortgage or loan that is federally insured for a building located in a FEMA flood zone.

Collier County has been a participant in the NFIP since September 1979. Collier County has achieved a Class 5 flood insurance rating through participation in the NFIP's Community Rating System which rewards all policyholders with a 25 percent reduction in their flood insurance premiums. Table 4-25 through Table 4-28 reflect current NFIP policy data and claim data to date for Collier County, according to FEMA's Community Information System, categorized by occupancy type, flood zone, and whether the structure is Pre-FIRM or Post-FIRM. Note that data by flood zone is missing for an estimated 10,447 current policies and 519 paid claims.

Table 4-25 – NFIP Policy and Claims Data by Occupancy Type

Structure Type	Number of Policies in Force	Total Premium	Total Coverage	Number of Closed Paid Losses	Total of Closed Paid Losses
Single Family	23,595	$23,419,650	$7,241,901,000	5,355	$252,684,232.22
2-4 Family	4,180	$3,131,088	$968,130,000	635	$56,166,799.38
All Other Residential	21,926	$10,370,672	$4,966,821,000	921	$113,825,826.91
Non-Residential	1,139	$3,247,271	$574,764,000	599	$28,809,971.30
Total	**50,840**	**$40,168,681**	**$13,751,616,000**	**7,510**	**$451,486,829.81**

Source: FEMA Community Information System, February 2026

Table 4-26 – NFIP Policy and Claims Data by Flood Zone

Flood Zone	Number of Policies in Force	Total Premium	Total Coverage	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	27,798	$22,307,764	$6,855,037,000	5,790	$413,478,202.37
A Zones	5	$5,153	$1,178,000	5	$0.00
AH Zones	1,245	$1,065,563	$352,934,000	117	$4,114,398.28
V01-30 & VE Zones	57	$226,440	$13,101,000	157	$6,359,477.24
D Zones	36	$37,993	$11,930,000	4	$0.00
B, C & X Zone					
Standard	11,252	$10,945,190	$3,686,248,000	560	$9,357,599.11
Preferred	0	$0	$0	358	$9,523,320.22
Total	**40,393**	**$34,588,103**	**$10,920,428,000**	**6,991**	**$442,832,997.22**

Source: FEMA Community Information System, February 2026

Table 4-27 – NFIP Policy and Claims Data Pre-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Total Coverage	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	3,393	$5,521,963	$795,355,000	3,047	$238,929,577.02
A Zones	2	$2,813	$583,000	5	$0.00
AH Zones	220	$348,422	$55,677,000	84	$3,584,684.90
V01-30 & VE Zones	30	$105,621	$6,692,000	69	$4,651,147.39

Flood Zone	Number of Policies in Force	Total Premium	Total Coverage	Number of Closed Paid Losses	Total of Closed Paid Losses
D Zones	3	$1,861	$890,000	2	$0.00
B, C & X Zone	996	$1,150,967	$318,857,000	308	$7,677,515.99
Standard	996	$1,150,967	$318,857,000	222	$6,164,396.11
Preferred	0	$0	$0	87	$1,579,675.28
Total	**4,644**	**$7,131,647**	**$1,178,054,000**	**3,515**	**$254,842,925.30**

Source: FEMA Community Information System, February 2026

Table 4-28 – NFIP Policy and Claims Data Post-FIRM

Flood Zone	Number of Policies in Force	Total Premium	Total Coverage	Number of Closed Paid Losses	Total of Closed Paid Losses
A01-30 & AE Zones	24,405	$16,785,801	$6,059,682,000	2,743	$174,548,625.35
A Zones	3	$2,340	$595,000	0	$0.00
AH Zones	1,025	$717,141	$297,257,000	33	$529,713.38
V01-30 & VE Zones	27	$120,819	$6,409,000	88	$1,708,329.85
D Zones	33	$36,132	$11,040,000	2	$0.00
B, C & X Zone	10,256	$9,794,223	$3,367,391,000	606	$11,136,847.94
Standard	10,256	$9,794,223	$3,367,391,000	338	$3,193,203.00
Preferred	0	$0	$0	271	$7,943,644.94
Total	**35,749**	**$27,456,456**	**$9,742,374,000**	**3,472**	**$187,923,516.52**

Source: FEMA Community Information System, February 2026

Repetitive Loss Analysis

A repetitive loss property is a property for which two or more flood insurance claims of more than $1,000 have been paid by the NFIP within any 10-year period since 1978. An analysis of repetitive loss was completed for Collier County to examine repetitive loss properties against FEMA flood zones.

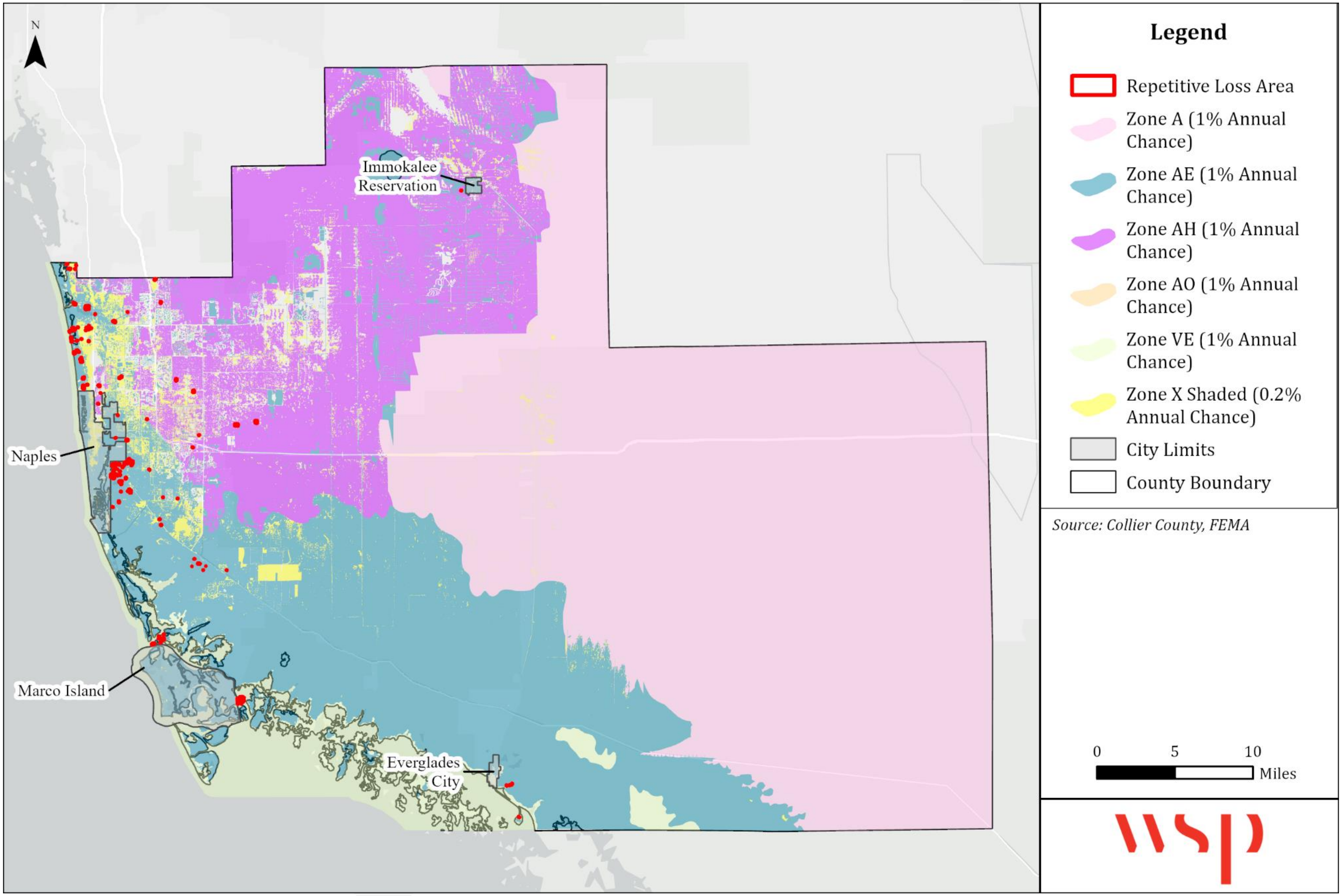
According to December 2024 NFIP records, there are a total of 253 unmitigated repetitive loss properties within unincorporated Collier County. Table 4-29 summarizes repetitive loss building counts and total payments by FEMA flood zone. Figure 4-20 illustrates the location of unmitigated repetitive loss properties in relation to FEMA flood zones.

Table 4-29 – Unmitigated Repetitive Loss Summary

Flood Zone	Building Count by Occupancy Type		Building Count by Insurance Status		Total Building Payments	Total Contents Payments	Total Payments
	Residential	Non-residential	Insured	Not Insured			
AE	200	14	189	25	$25,539,902.33	$2,515,296.35	$28,055,198.68
AH	11	6	15	2	$1,078,935.57	$48,613.62	$1,127,549.19
AHB	9	3	9	3	$694,110.50	$53,886.27	$747,996.77
VE	4	2	6		$1,929,832.66	$262,015.33	$2,191,847.99
X	3	1	1	3	$95,922.09	$1,878.54	$97,800.63
Total	**227**	**26**	**220**	**33**	**$29,338,703.15**	**$2,881,690.11**	**$32,220,393.26**

Source: NFIP Repetitive Loss Data, December 2024
[1]Flood Zone is based on the current DFIRM.

Figure 4-20 – Collier County Repetitive Loss Areas and FEMA Flood Zones



4.4.4 Stormwater/Localized Flooding

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Stormwater/Localized Flooding	Highly Likely	Limited	Small	6 to 12 hours	Less than 24 hours	2.8

Hazard Description

Localized stormwater flooding occurs when heavy rainfall and an accumulation of runoff overburden the stormwater drainage system within the community. Collier County has a natural terrain that is extremely flat. From a high point near Immokalee the drainage pattern is south and southwesterly toward the coast with an average slope of one foot per mile.

Localized flooding may be caused by the following issues:

- **Inadequate Capacity –** An undersized/under capacity pipe system can cause water to back-up behind a structure which can lead to areas of ponded water and/or overtopping of banks.
- **Clogged Inlets** – Debris covering the asphalt apron and the top of grate at catch basin inlets may contribute to an inadequate flow of stormwater into the system. Debris within the basin itself may also reduce the efficiency of the system by reducing the carrying capacity.
- **Blocked Drainage Outfalls** – Debris blockage or structural damage at drainage outfalls may prevent the system from discharging runoff, which may lead to a back-up of stormwater within the system.
- **Improper Grade** – Poorly graded asphalt around catch basin inlets may prevent stormwater from entering the catch basin as designed. Areas of settled asphalt may create low spots within the roadway that allow for areas of ponded water.

Localized flooding can result from smaller rain events, and it typically occurs with little warning. Although the flooding may drain quickly, it can still amount to significant damage. While it may not impact an area as large or produce the damaging wave energy of coastal flooding, it is, nonetheless, a chronic problem. Repetitive losses caused by localized flooding can add up.

Warning Time: 3 – 6 to 12 hours

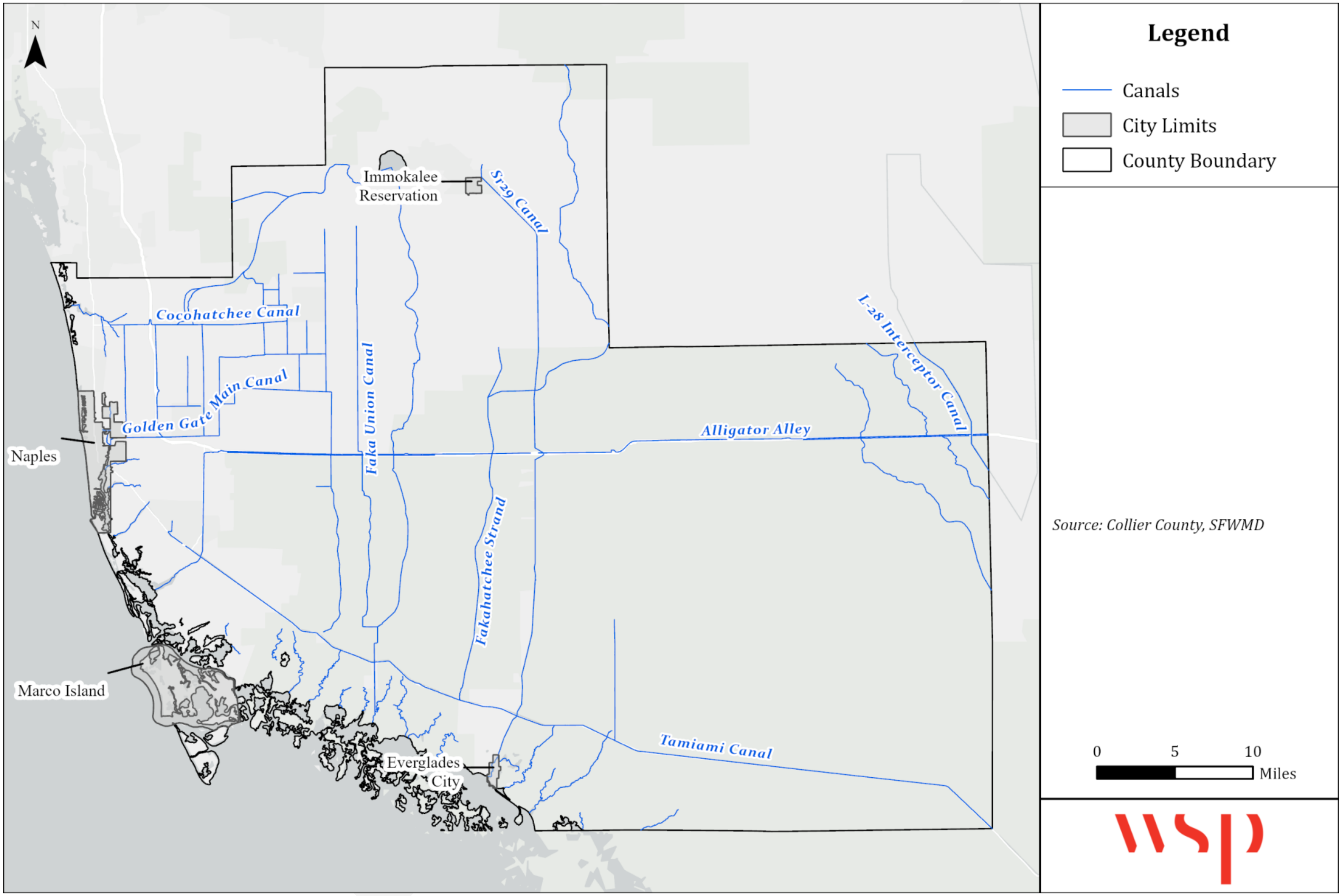
Duration: 3 – Less than 24 hours

Location

A Primary and a Secondary canal system form the major surface water / stormwater drainage network in Collier County. The Secondary system consists of a network of ditches, canals, weirs and pump stations that collect and convey stormwater run-off from neighborhoods and public roadside drainage systems. It is linked to, and operates in close cooperation with, the Primary system, which consists of canals and water level control structures that collect and convey stormwater runoff from the Secondary system, roadways and neighborhoods. Major canals within Collier County are shown in Figure 4-21.

Spatial Extent: 2 – Small

Figure 4-21 – Major Canals in Collier County



Extent

The severity of localized stormwater flooding is generally linked to the flood depth, velocity, and how rapidly it occurs. However, unlike with the mapped floodplain, there is limited data on flood depths and recurrence intervals for localized flooding because it is highly variable based on stormwater system maintenance, development and runoff management, recent weather patterns, and each rain event.

Impact: 2 – Limited

Past Occurrences

Table 4-30 lists flash flood and heavy rain events reported in the NCEI Storm Events Database since 1996 for Collier County.

Table 4-30 – NCEI Flash Flooding and Heavy Rain Events in Collier County (1996-2025)

Location	Date	Event Type	Injuries/Deaths	Property Damage
Marco	7/12/1998	Heavy Rain	0/0	$0
Marco Airport	7/20/1998	Heavy Rain	0/0	$0
Naples	9/20/1999	Flash Flood	0/0	$200,000
Immokalee	7/4/2000	Flash Flood	0/0	$0
Marco	7/23/2001	Flash Flood	0/0	$150,000
Naples	9/28/2001	Heavy Rain	0/0	$0
West Portion	9/29/2003	Flash Flood	0/0	$100,000
Golden Gate	6/12/2005	Heavy Rain	0/0	$0
Golden Gate	2/3/2006	Heavy Rain	0/0	$60,000
Immokalee	8/30/2006	Flash Flood	0/0	$0
Evans Pines	4/6/2008	Heavy Rain	0/0	$0
Marco	7/16/2008	Flash Flood	0/0	$10,000
Naples	8/4/2014	Flash Flood	0/0	$40,000
(APF)Naples Muni Arp	9/29/2015	Heavy Rain	0/0	$0
North Naples	6/13/2020	Flash Flood	0/0	$0
East Naples	9/13/2020	Flash Flood	0/0	$20,000
East Naples	6/4/2022	Flash Flood	0/0	$20,000
Everglades City	6/12/2024	Flash Flood	0/0	$25,000
Marco	8/4/2024	Flash Flood	0/0	$0
		Total	**0/0**	**$625,000**

Source: NCEI Storm Events Database, April 2026

Event narratives from the NCEI Storm Events Database for events that caused localized flooding are reported below.

September 20, 1999 – Eight inches of rain fell during the afternoon of September 20 causing major street flooding which submerged six vehicles and caused minor flooding to 34 structures.

September 28, 2001 – Between 3 and 5 inches of rain with local amounts of 8 inches caused street flooding.

June 12, 2005 – Rainfall amounts of one to three inches fell in one hour causing street flooding in Golden Gate and at Vanderbilt Beach.

July 16, 2008 – A combination of 6-8 inches of rain over a short period of time and high tide caused flooding on Marco Island. Coconuts, palm fronds, and plastic bags also clogged storm drains at some locations exacerbating the flooding. One towing company on Marco Island pulled out 35 to 40 cars alone. Water reached around 2 feet deep in some roadways and a few inches deep in some residences. Several roads were closed, including the main bridge connecting Marco Island to the mainland.

August 4, 2014 – Intense rainfall associated with several bands of thunderstorms developed across much of the Naple's area during the early afternoon, leading to copious rain amounts and severe street flooding in parts of Naples and Golden Gate. The first report of flooding was received from a trained spotter and stated that at least two feet of water was on roads near Airport Road and Mercantile Avenue with cars stalled out. The Collier County Sheriff's Office reported severe flooding and stalled vehicles from Collier Blvd. to Tamiami Trail with some roads closed. Rainfall totals included 7 inches at Naples Beach Hotel and Club with 6.73 inches at the Naples Municipal Airport. A trained spotter measured 4.21 inches in just under an hour in the area of Airport and Pine Ridge Roads. A few businesses had water enter their structures, with one business estimating $12,000 in damage. Over 300 cars were towed from area streets due to stalling in deep water.

September 29, 2015 – Heavy rain and ongoing tidal flooding lead to road flooding in several locations across Naples. Water was reported on Davis Blvd between US 41 and Airport-Pulling Road as well as on Airport-Pulling Road between Estey Ave and Glades Blvd. Additional flooding was reported around the same time in Old Naples along Golden Gate Parkway near Naples HS and along SW 41st Ave.

June 13, 2020 – Numerous reports from the public and social media of widespread street flooding in downtown Naples near the intersection of south 9th street and south 5th avenue through West Lake in Downtown Naples, where a sports utility vehicle was largely submerged into a storm-drain runoff area. The significant flooding extended northward along North Tamiami Trail, North of Naples Bay, where water was seen extending over street surfaces onto sidewalks and continuing across Quail Run Golf Club in Naples just south of Pine Ridge Road, where a few cars were flooded by becoming partially submerged in flood waters. Areas of flooding extended a couple feet deep over streets and surrounding property.

Past occurrences of localized stormwater flooding have also been tracked by Collier County staff based on drainage complaints and road flooding observations. Figure 4-22 through Figure 4-26 depict poor drainage areas and locations of observed roadway flooding. Roadway flooding locations are categorized by the year the flood complaint was made or if flooding has been reported for multiple years. Figure 4-23 through Figure 4-26 provide a more detailed view of each area. Note that some of the poor drainage areas have ongoing or identified public utility projects designed to address flooding.

Figure 4-22 – Localized Flooding and Poor Drainage Areas

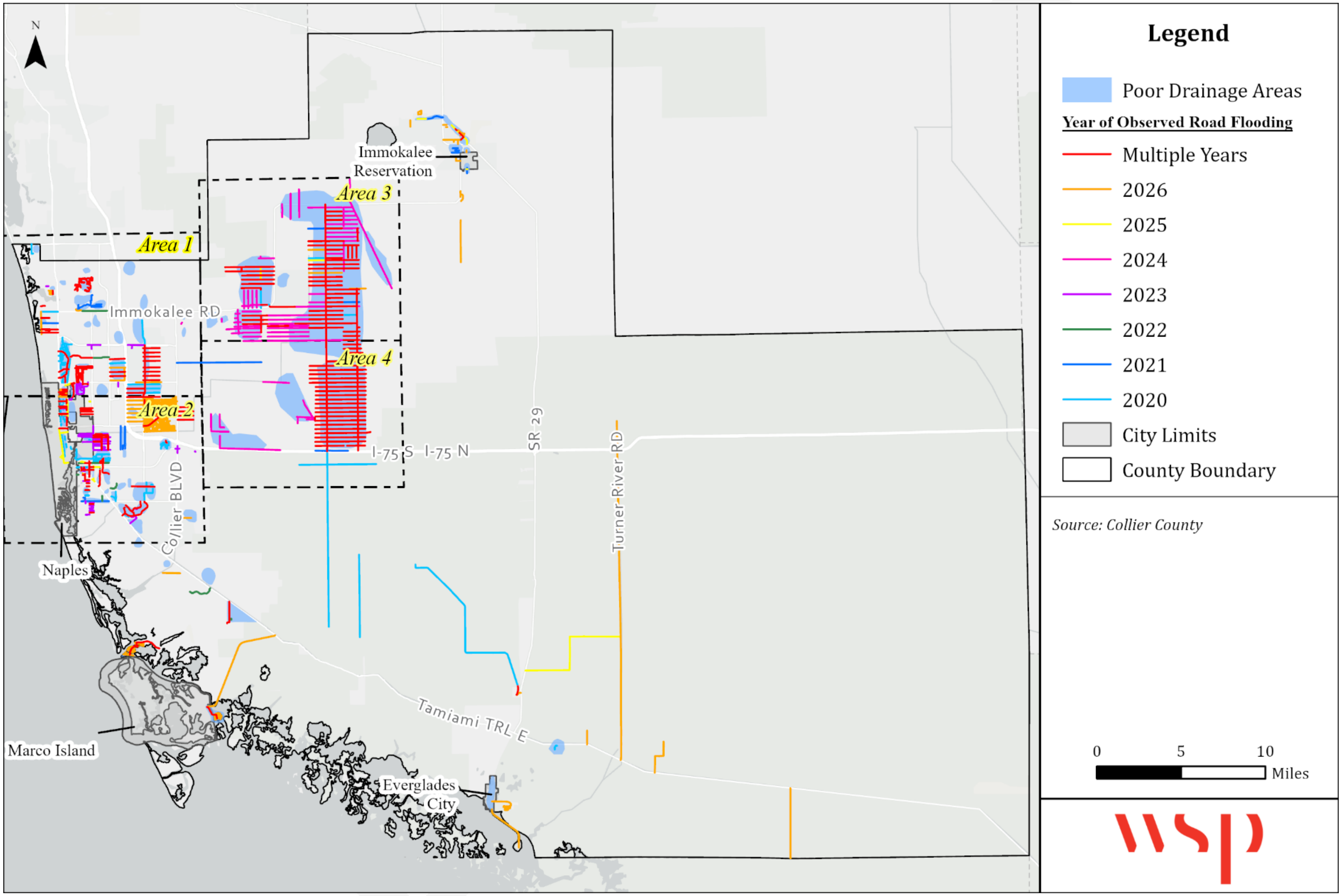


Figure 4-23 – Subarea 1: Localized Flooding and Poor Drainage Areas

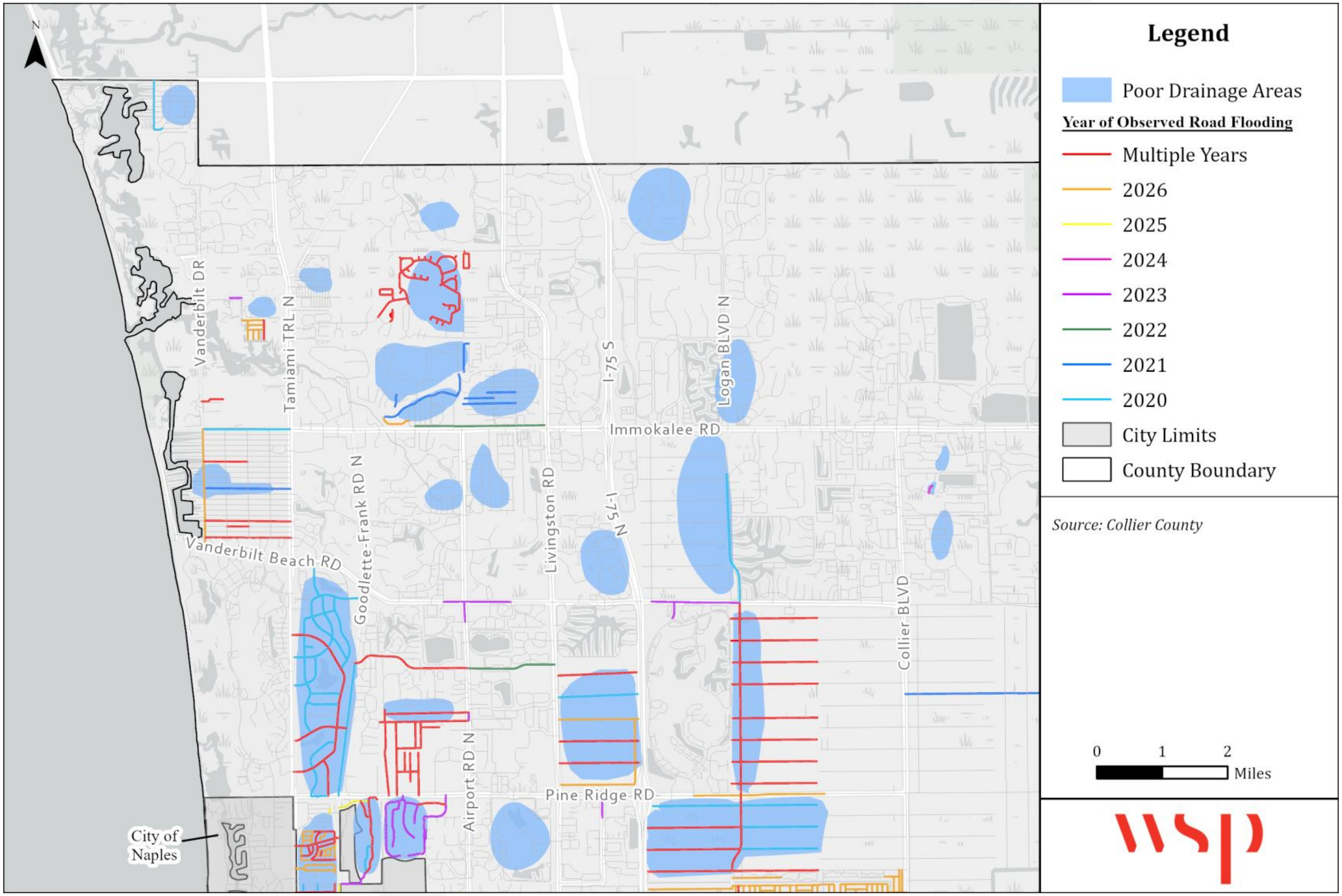


Figure 4-24 – Subarea 2: Localized Flooding and Poor Drainage Areas

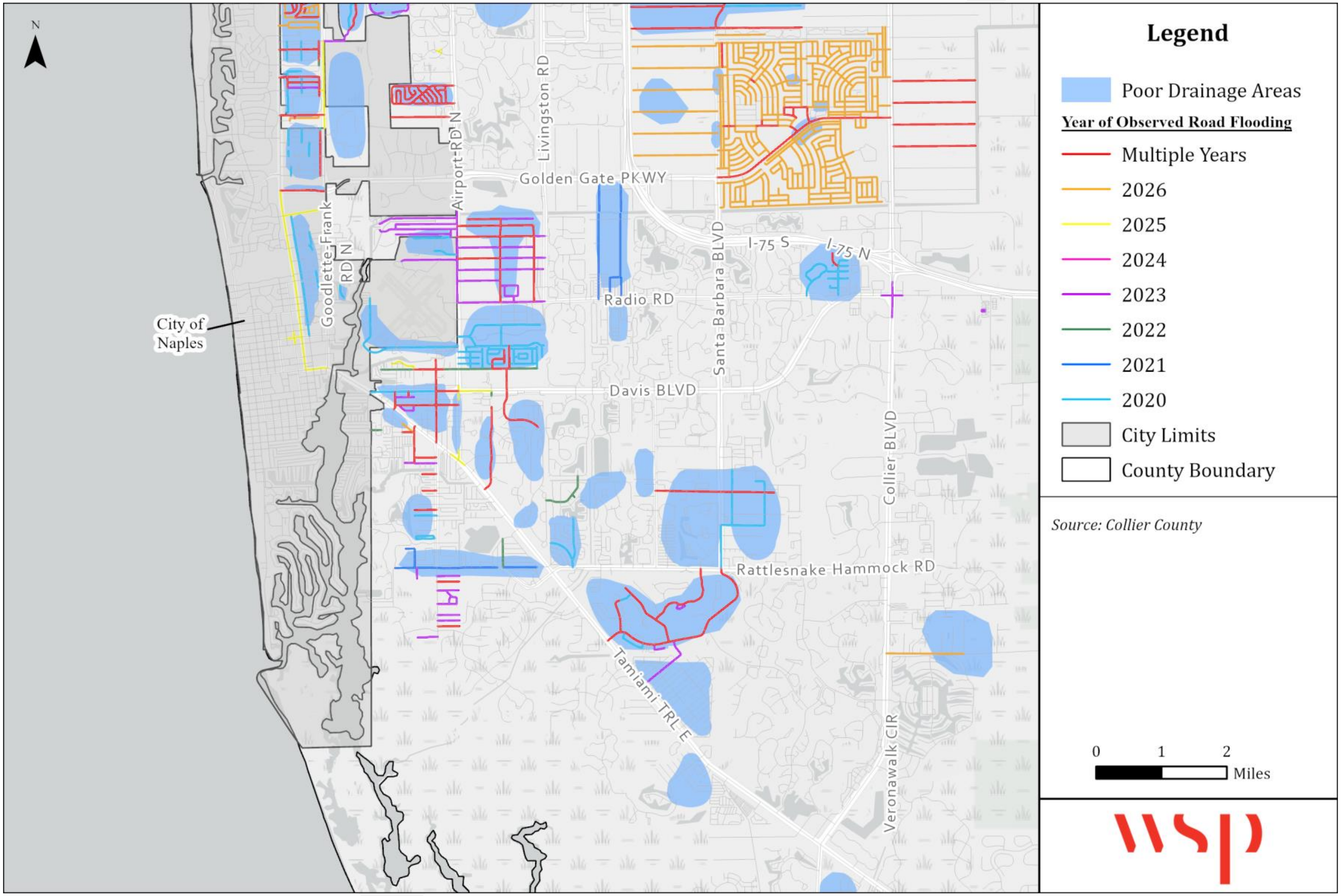


Figure 4-25 – Subarea 3: Localized Flooding and Poor Drainage Areas

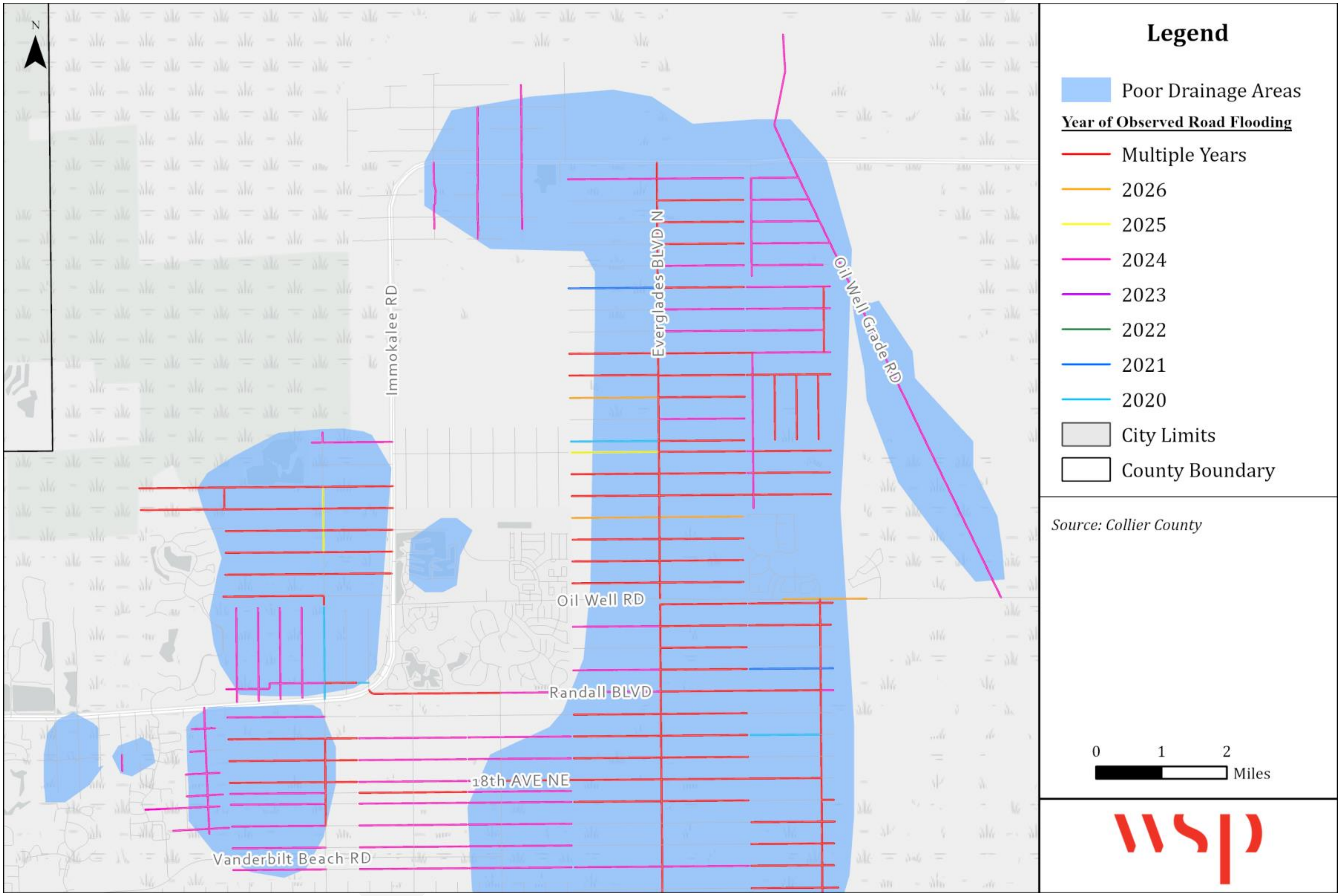
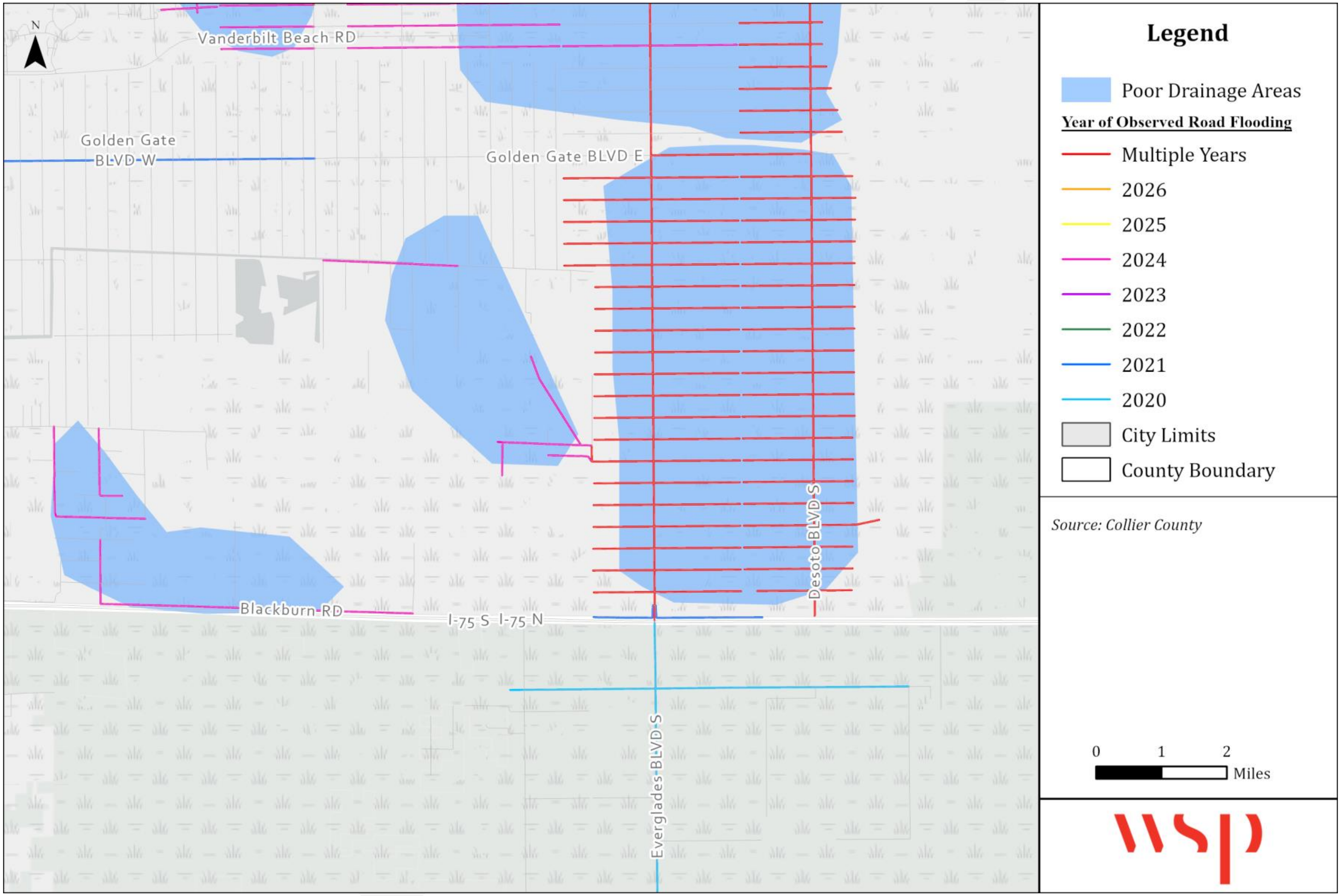


Figure 4-26 – Subarea 4: Localized Flooding and Poor Drainage Areas



Probability of Future Occurrence

Given the 11 flash flood events and 5 heavy rain events recorded in NCEI over a 26-year period, and the tidal influence on canal drainage resulting from heavy rainstorms, there is, on average, a 42 percent annual chance of occurrence of localized stormwater flooding. Due to the low elevations, flat terrain, consistent level of seasonally concentrated annual precipitation, and the tidal influence on canal drainage, it is highly likely that unmitigated areas will continue to experience localized flooding.

Probability: 4 – Highly Likely

Climate Change and Future Conditions

Climate change and sea level rise have the potential to affect localized flooding. According to the Fifth National Climate Assessment, the frequency and intensity of rainfall events is expected to increase across the U.S., and total precipitation amounts are expected to increase in the Southeast. These trends have not been clearly observed in South Florida; however, if they extend to the planning area, these changes may cause increases in localized flooding, as stormwater drainage systems designed for smaller flood volumes may become overwhelmed more frequently.

New development can also affect the occurrence of localized flooding. As greenfield areas are developed, impervious surface increases, putting additional strain on existing stormwater infrastructure. Incorporating low-impact development techniques and other on-site stormwater management, and designing those systems for greater stormwater volumes, can help to mitigate the impacts of new development.

The risk of localized flooding to future development can also be minimized by accurate recordkeeping of repetitive localized storm activity and an evaluation of local and regional drainage issues. Mitigating the root causes of the localized flooding or choosing not to develop in areas that often are subject to localized flooding will reduce future risks of losses due to this hazard. If new development does not incorporate adequate on-site stormwater management, not only will more property be exposed due to new construction, but an associated increase in impervious surface and reduction in flood storage areas could increase the vulnerability of existing property within these watersheds. This is especially true for sub-basins where localized flooding is already noted as a problem.

Vulnerability Assessment

Vulnerability – High

Localized flooding occurs at various times throughout the year with several areas of primary concern to Collier County. Localized flooding and ponding affect streets and property. Loss estimates for localized flooding cannot be created because the frequency and depth of localized flooding is unknown. However, all properties in and around the known localized flooding areas may be at risk of future flood damage.

4.4.5 Hurricane and Tropical Storm

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Hurricane and Tropical Storm	Highly Likely	Critical	Large	More than 24 hrs	Less than 1 week	3.3

Hazard Description

A hurricane is a type of tropical cyclone or severe tropical storm that forms in the southern Atlantic Ocean, Caribbean Sea, Gulf of Mexico, and in the eastern Pacific Ocean. All Atlantic and Gulf of Mexico coastal areas are subject to hurricanes. The Atlantic hurricane season lasts from June to November, with the peak season from mid-August to late October.

While hurricanes pose the greatest threat to life and property, tropical storms and depressions also can be devastating. A tropical disturbance can grow to a more intense stage through an increase in sustained wind speeds. The progression of a tropical disturbance is described below.

- **Tropical Depression:** A tropical cyclone with maximum sustained winds of 38 mph (33 knots) or less.
- **Tropical Storm:** A tropical cyclone with maximum sustained winds of 39 to 73 mph (34 to 63 knots).
- **Hurricane:** A tropical cyclone with maximum sustained winds of 74 mph (64 knots) or higher. In the western North Pacific, hurricanes are called typhoons; similar storms in the Indian Ocean and South Pacific Ocean are called cyclones.
- **Major Hurricane:** A tropical cyclone with maximum sustained winds of 111 mph (96 knots) or higher, corresponding to a Category 3, 4 or 5 on the Saffir-Simpson Hurricane Wind Scale.

The Saffir-Simpson Hurricane Wind Scale classifies hurricanes by intensity into one of five categories as shown in Table 4-31. This scale estimates potential property damage. Hurricanes reaching Category 3 and higher are considered major hurricanes because of their potential for significant loss of life and damage. Category 1 and 2 storms are still dangerous, however, and require preventative measures.

Table 4-31 – Saffir-Simpson Hurricane Wind Scale

Category	Wind Speed (mph)	Potential Damage
1	74-95	**Very dangerous winds will produce some damage**: Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96-110	**Extremely dangerous winds will cause extensive damage:** Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3	111-129	**Devastating damage will occur:** Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.

Category	Wind Speed (mph)	Potential Damage
4	130-156	**Catastrophic damage will occur:** Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5	≥ 157	**Catastrophic damage will occur:** A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

Source: National Hurricane Center/NOAA

As an incipient hurricane develops, barometric pressure (measured in millibars or inches) at its center falls and winds increase. If the atmospheric and oceanic conditions are favorable, it can intensify into a tropical depression. When maximum sustained winds reach or exceed 39 miles per hour, the system is designated a tropical storm, given a name, and is closely monitored by the National Hurricane Center in Miami, Florida. When sustained winds reach or exceed 74 miles per hour the storm is deemed a hurricane. This process generally occurs over many days, allowing for ample warning and preparation.

Tropical storm force winds may extend even further, up to approximately 300 miles from the eye of a large hurricane. In general, the front right quadrant of a storm, relative to its direction of movement, is the most dangerous part of the storm. Wind speeds are highest in this area due to the additive impact of the atmospheric steering winds and the storm winds. Additionally, floods from heavy rains and severe weather, such as tornadoes, can cause extensive damage and loss of life.

Warning Time: 1 – More than 24 hours

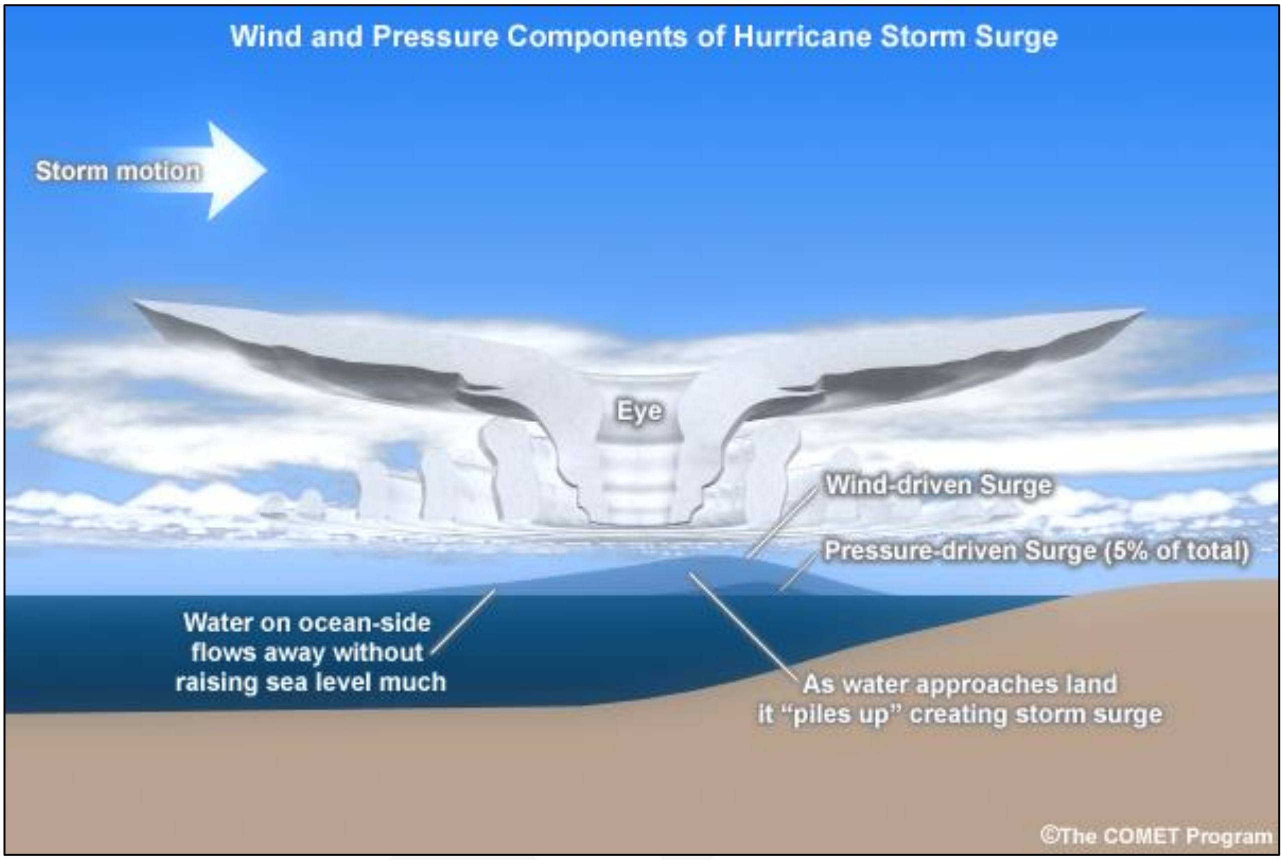
Duration: 3 – Less than 1 week

Storm Surge

The greatest potential for loss of life related to a hurricane is from the storm surge. Storm surge is simply water that is pushed toward the shore by the force of the winds swirling around the storm as shown in Figure 4-27. This advancing surge combines with the normal tides to create the hurricane storm tide, which can increase the mean water level to heights impacting roads, homes and other critical infrastructure. In addition, wind driven waves are superimposed on the storm tide. This rise in water level can cause severe flooding in coastal areas, particularly when the storm tide coincides with the normal high tides.

The maximum potential storm surge for a particular location depends on a number of different factors. Storm surge is a very complex phenomenon because it is sensitive to the slightest changes in storm intensity, forward speed, size (radius of maximum winds-RMW), angle of approach to the coast, central pressure (minimal contribution in comparison to the wind), and the shape and characteristics of coastal features such as bays and estuaries. Other factors which can impact storm surge are the width and slope of the continental shelf. A shallow slope will potentially produce a greater storm surge than a steep shelf. For example, a Category 4 storm hitting the Louisiana coastline, which has a very wide and shallow continental shelf, may produce a 20-foot storm surge, while the same hurricane in Miami Beach, Florida, where the continental shelf drops off very quickly, might see an 8- or 9-foot surge.

Figure 4-27 – Components of Hurricane Storm Surge



Source: NOAA/The COMET Program

Location

The heavy rains associated with tropical weather systems are not only responsible for major flooding in areas where the storm initially strikes but can also affect areas hundreds of miles inland. Heavy and prolonged rains from hurricanes and tropical storms can produce extensive urban and riverine flooding, especially if the storm systems are large and slow moving. Winds from these storms located offshore can drive ocean water up the mouth of a river or canal, compounding the severity of inland overbank flooding. Additionally, hurricanes and tropical storms can create storm surges along the coast and cause extensive damage. Given Collier County's coastal location and low elevation, much of the county is vulnerable to storm surge. The entire county can be impacted by hurricanes and tropical storms.

The Sea, Lake and Overland Surges from Hurricanes (SLOSH) model is a computerized numerical model developed by the National Weather Service to estimate storm surge heights resulting from historical, hypothetical, or predicted hurricanes by taking into account the atmospheric pressure, size, forward speed, and track data. These parameters are used to create a model of the wind field which drives the storm surge. The SLOSH model consists of a set of physics equations which are applied to a specific locale's shoreline, incorporating the unique bay and river configurations, water depths, bridges, roads, levees and other physical features. The model creates output for all different storm simulations from all points of the compass. Each direction has a MEOW (maximum envelope of water) for each category of storm (1-5), and all directions combined result in a MOMs (maximum of maximums) set of data.

Anticipated SLOSH model surge elevations for Category 1 through Category 5 hurricanes are shown for Collier County in Figure 4-28 through Figure 4-32 on the following pages. The feature set depicting surge zones in this figure was created using a Surge Modeling application created for the Florida Statewide Regional Evacuation Update Study. The data was derived from National Hurricane Center SLOSH model runs on all the NOAA SLOSH basins throughout Florida. The runs create outputs for all different storm simulations from all points of the compass. Each direction has a MEOW (maximum envelope of water) for each category of storm (1-5), and all directions combined result in a MOMs (maximum of maximums) set of data. The MOMs are used in this surge model.

Location: 4 – Large

Figure 4-28 – SLOSH Storm Surge Model for a Category 1 Storm

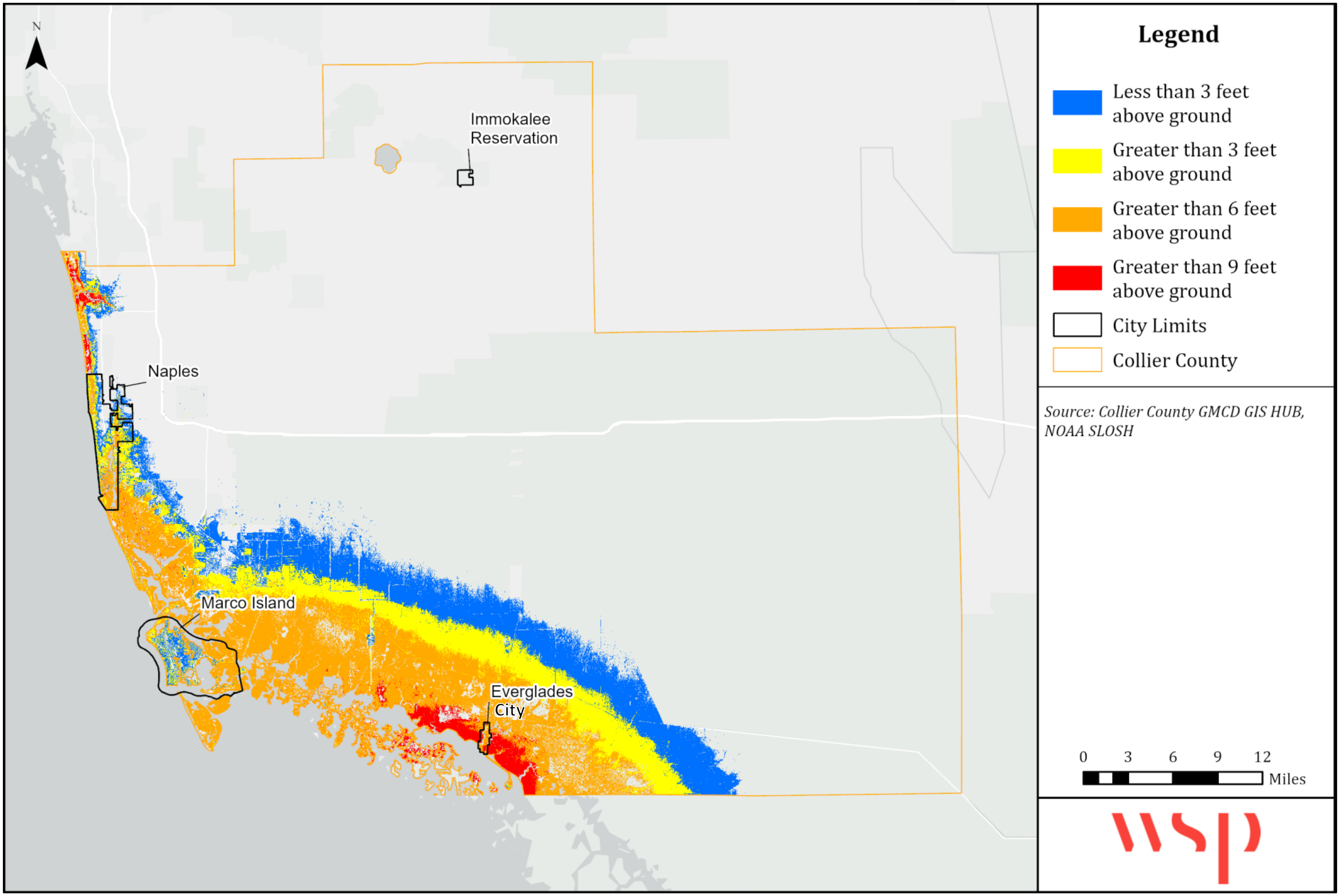


Figure 4-29 – SLOSH Storm Surge Model for a Category 2 Storm

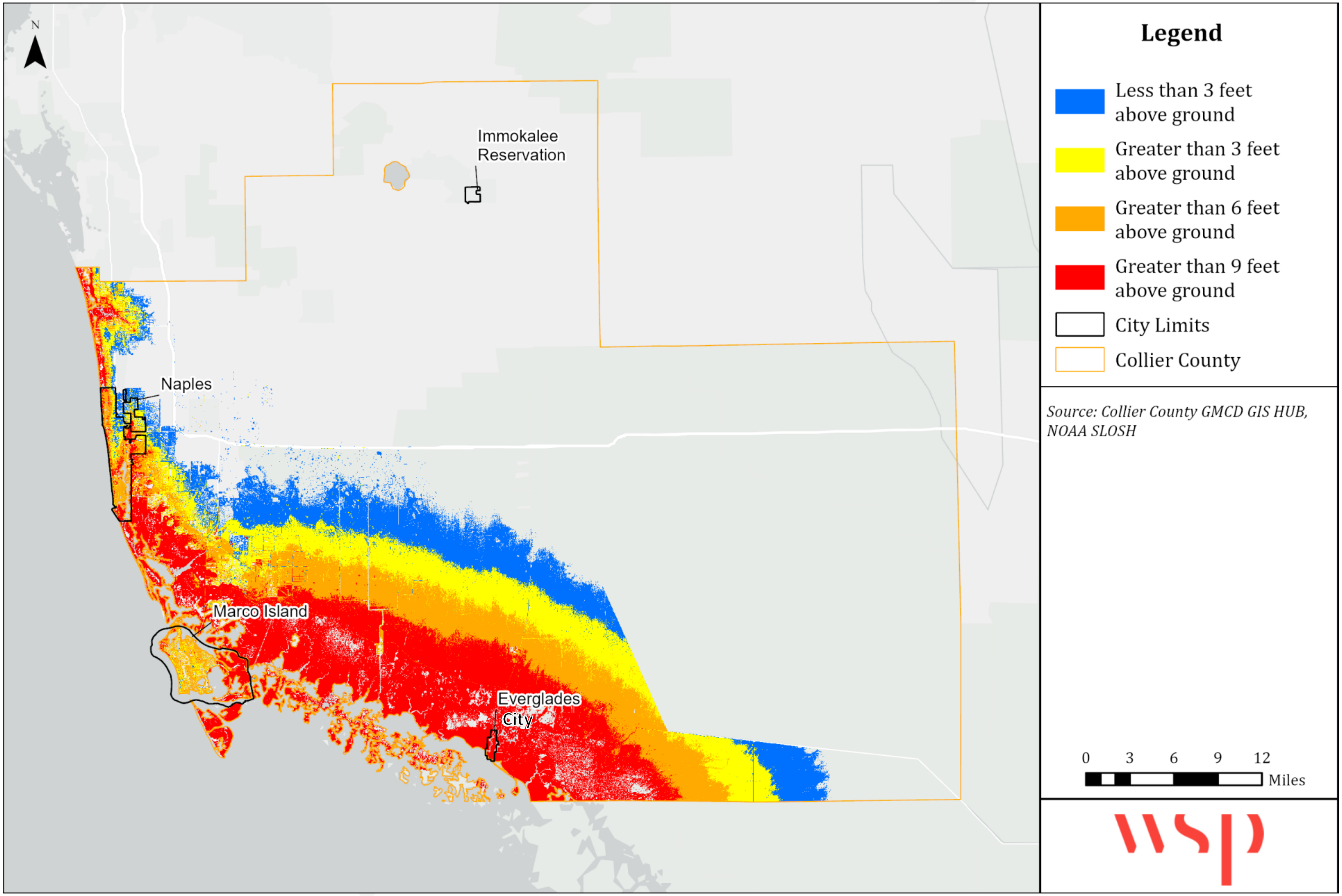


Figure 4-30 – SLOSH Storm Surge Model for a Category 3 Storm

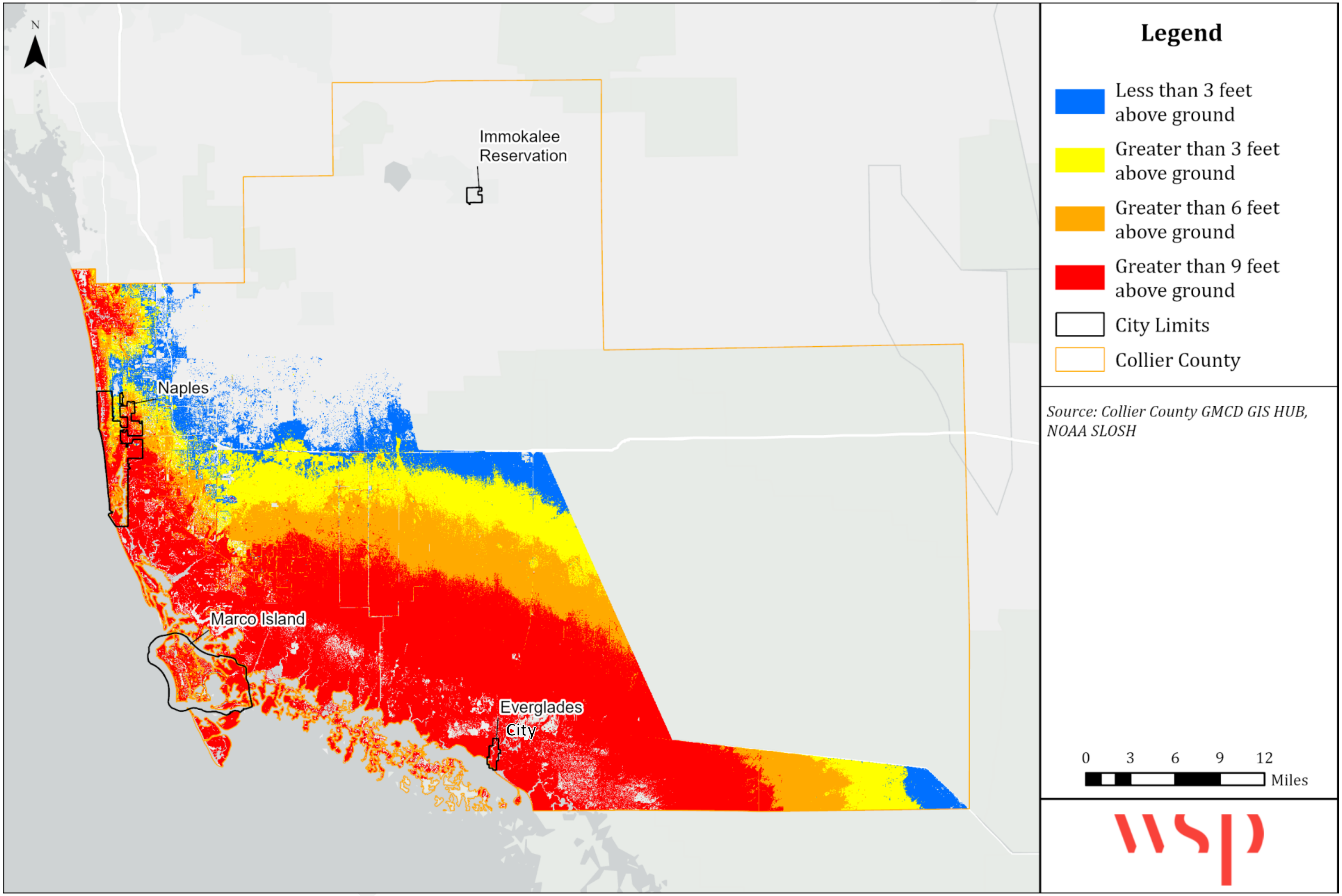


Figure 4-31 – SLOSH Storm Surge Model for a Category 4 Storm

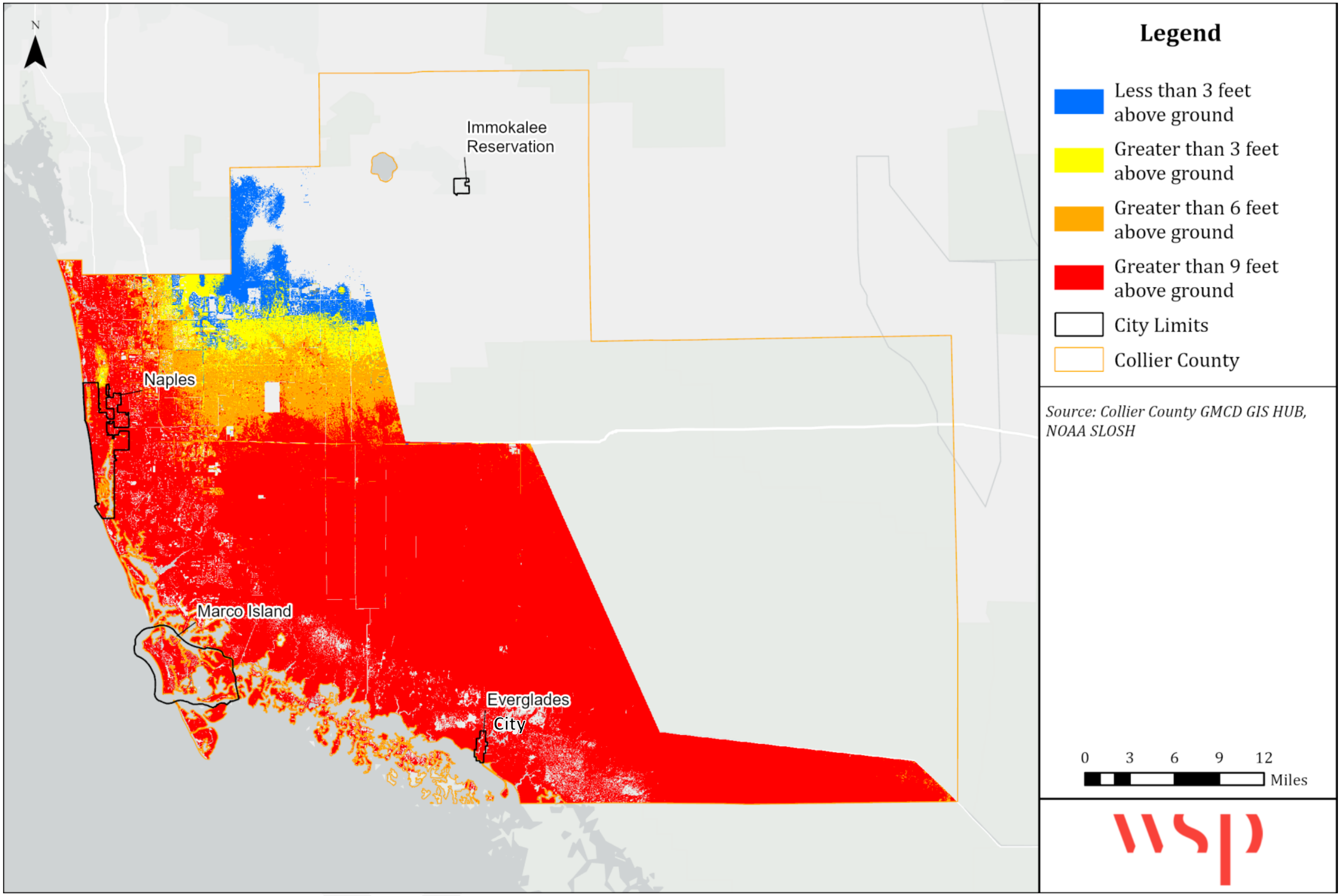
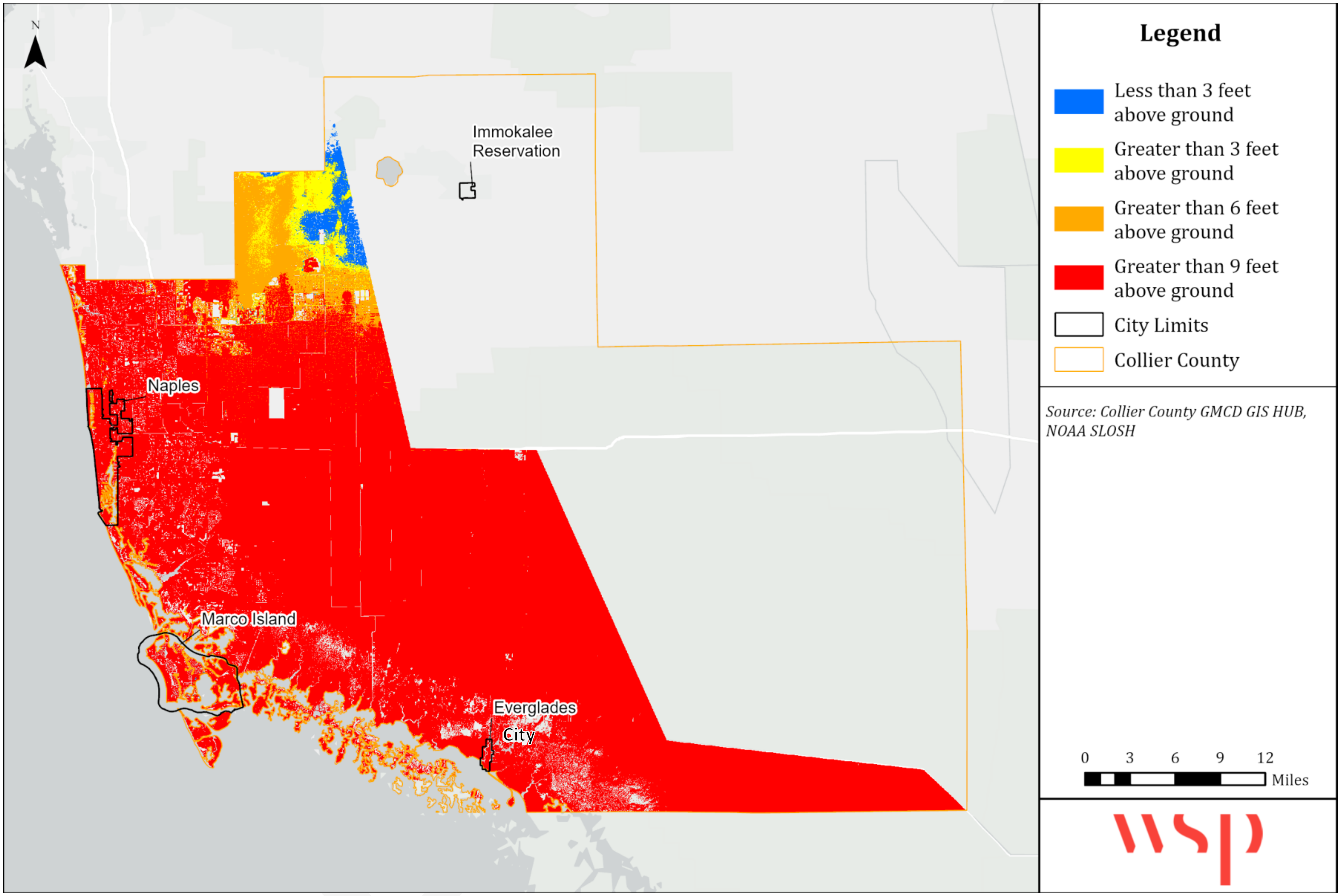


Figure 4-32 – SLOSH Storm Surge Model for a Category 5 Storm



Extent

Hurricanes and tropical storms can cause catastrophic damage to coastlines and several hundred miles inland. Hurricanes can produce winds exceeding 157 miles per hour as well as tornadoes and microbursts. Additionally, hurricanes and tropical storms can create storm surges along the coast and cause flash flooding from heavy rainfall. Floods and flying debris from the excessive winds are often the deadly and destructive results of these weather events.

Wind speed is the determining factor in the Saffir-Simpson scale, which is used as a measure of hurricane intensity. Storm surge is also significant to a hurricane's magnitude, and storm surge projections are often tied to a storm's category on the Saffir-Simpson scale; however, storm surge values are highly dependent on the slope of the continental shelf, the shape of the coastline in the landfall region, and the storm's path. The following describes the characteristics of each category storm from the Saffir-Simpson Hurricane Wind Extended Table:

Storm surge also affects the severity of hurricane and tropical storm impacts. Storm surge can raise the sea level as high as 25 feet or more in the strongest hurricanes. As a hurricane approaches the coast, its winds drive water toward the shore. Once the edge of the storm reaches the shallow waters of the continental shelf, the water begins to pile up. Winds of hurricane strength eventually force the water onto the shore. At first, the water level climbs slowly, but as the eye of the storm approaches, water rises rapidly. Storm surge can also cause extensive damage on the backside of a hurricane as storm surge waters are sucked back out to sea. The potential depth and spatial extent of storm surge by storm category is shown in Figure 4-28 through Figure 4-32 above based on the SLOSH model. Note that actual storm surge levels can vary substantially from these estimates.

Impact: 3 – Critical

Past Occurrences

According to storm track and intensity data from NOAA's National Hurricane Center, 84 hurricanes or tropical storms, including 53 tropical, extratropical, or subtropical storms, have passed within 50 miles of Collier County since 1900. Table 4-32 summarizes these past occurrences and provides average frequency of occurrence by storm intensity. A list of these storms, their data of occurrence, and maximum storm category and wind speed within 50 miles of Collier County is provided in Table 4-33.

Table 4-32 – Past Hurricanes & Frequency by Storm Intensity, 1900-2025

Storm Intensity	Number of Occurrences	Rate of Occurrence
CAT I Hurricane	7	1 in 17.8 years
CAT II Hurricane	6	1 in 20.8 years
CAT III Hurricane	5	1 in 25 years
CAT IV Hurricane	10	1 in 12.5 years
CAT V Hurricane	3	1 in 41.6 years
Tropical Storm	33	1 in 3.8 years
Tropical Depression	20	1 in 6.2 years
Total	**84**	1 in 1.5 years

Source: NOAA Historical Hurricane Tracks

Figure 4-33 on the following page illustrates past hurricane strike data for storm tracks that have passed within 50 miles of Collier County according to NOAA National Hurricane Center data.

Figure 4-33 – Historical Hurricane Tracks (1900-2025)

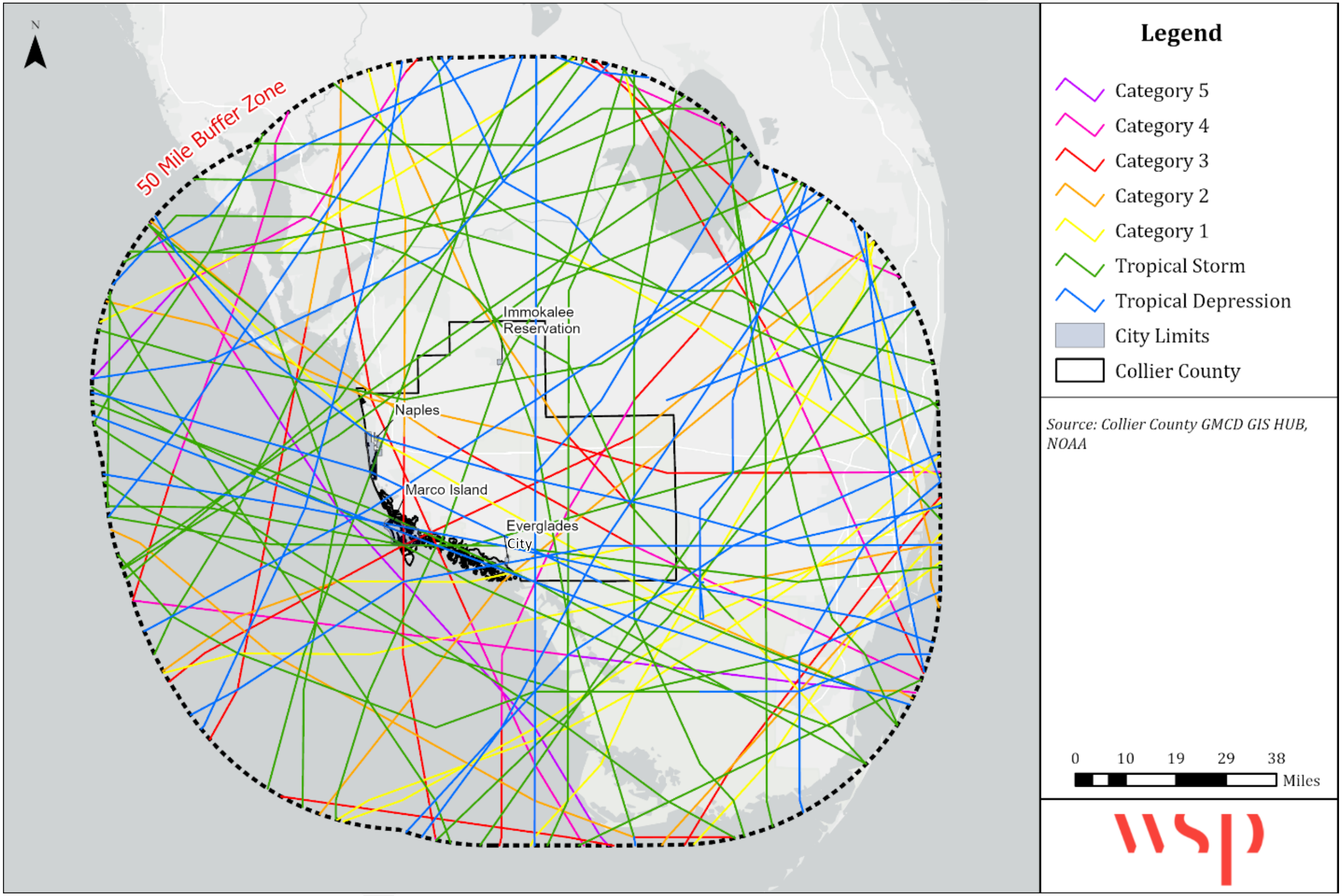


Table 4-33 – Historical Hurricane Tracks Within 50 Miles of Collier County

Storm Name	Date	Category	Max Wind Speeds (mph)
UNNAMED	8-10-1901	Tropical Storm	46
UNNAMED	9-11-1903	Category 1	86
UNNAMED	10-17-1904	Category 1	81
UNNAMED	6-17-1906	Category 1	86
UNNAMED	10-18-1906	Category 3	121
UNNAMED	10-22-1906	Tropical Depression	35
UNNAMED	9-19-1907	Tropical Depression	38
UNNAMED	6-28-1909	Tropical Storm	52
UNNAMED	8-29-1909	Tropical Storm	52
UNNAMED	9-25-1909	Tropical Depression	35
UNNAMED	10-17-1910	Category 3	127
UNNAMED	5-14-1916	Tropical Storm	46
UNNAMED	8-25-1916	Tropical Storm	46
UNNAMED	11-15-1916	Tropical Storm	61
UNNAMED	10-15-1921	Tropical Depression	35
UNNAMED	10-20-1924	Category 2	104
UNNAMED	12-1-1925	Tropical Storm	63
UNNAMED	9-18-1926	Category 4	144
UNNAMED	18-13-928	Tropical Storm	69
UNNAMED	9-17-1928	Category 4	130
UNNAMED	9-28-1929	Category 3	115
UNNAMED	8-30-1932	Tropical Storm	63
UNNAMED	7-31-1933	Tropical Storm	58
UNNAMED	9-3-1935	Category 5	184
UNNAMED	11-4-1935	Category 2	98
UNNAMED	6-15-1936	Tropical Storm	46
UNNAMED	7-29-1936	Tropical Storm	63
UNNAMED	10-6-1941	Category 2	98
UNNAMED	9-4-1945	Tropical Storm	40
UNNAMED	9-15-1945	Category 4	132
UNNAMED	9-17-1947	Category 4	132
UNNAMED	10-12-1947	Category 1	92
UNNAMED	9-22-1948	Category 4	132
UNNAMED	10-5-1948	Category 2	104
UNNAMED	8-27-1949	Category 4	132
KING	10-18-1950	Category 4	132
HOW	10-2-1951	Tropical Storm	63
UNNAMED	2-3-1952	Tropical Storm	63
UNNAMED	7-12-1953	Tropical Depression	35
UNNAMED	8-29-1953	Tropical Depression	29
HAZEL	10-9-1953	Category 1	86
UNNAMED	6-19-1954	Tropical Depression	35
UNNAMED	10-16-1956	Tropical Storm	63
JUDITH	10-18-1959	Tropical Storm	63
DONNA	9-10-1960	Category 4	139
FLORENCE	9-24-1960	Tropical Storm	40
CLEO	8-27-1964	Category 2	110
ISBELL	10-14-1964	Category 2	110
BETSY	9-8-1965	Category 3	115

Storm Name	Date	Category	Max Wind Speeds (mph)
ABBY	6-4-1968	Tropical Storm	63
BRENDA	6-18-1968	Tropical Depression	29
DOLLY	8-10-1968	Tropical Depression	35
UNNAMED	9-27-1968	Tropical Depression	35
GERDA	9-7-1969	Tropical Depression	29
JENNY	10-2-1969	Tropical Storm	46
UNNAMED	8-13-1971	Tropical Depression	29
UNNAMED	8-30-1971	Tropical Depression	29
DAWN	9-5-1972	Tropical Depression	35
UNNAMED	6-11-1976	Tropical Depression	23
DOTTIE	8-19-1976	Tropical Storm	40
UNNAMED	7-2-1981	Tropical Depression	29
DENNIS	8-17-1981	Tropical Storm	40
UNNAMED	10-26-1984	Tropical Depression	32
BOB	7-23-1985	Tropical Storm	46
MARCO	10-11-1990	Tropical Storm	61
ANA	6-30-1991	Tropical Depression	23
ANDREW	8-24-1992	Category 5	167
GORDON	11-16-1994	Tropical Storm	52
MITCH	11-5-1998	Tropical Storm	63
HARVEY	9-21-1999	Tropical Storm	58
IRENE	10-15-1999	Category 1	81
CHARLEY	8-13-2004	Category 4	150
IVAN	9-21-2004	Tropical Depression	29
KATRINA	8-26-2005	Category 1	81
WILMA	10-24-2005	Category 3	127
ERNESTO	8-30-2006	Tropical Storm	46
FAY	8-19-2008	Tropical Storm	69
BONNIE	7-23-2010	Tropical Storm	40
IRMA	9-10-2017	Category 4	132
GORDON	9-3-2018	Tropical Storm	61
SALLY	9-13-2020	Tropical Storm	40
ALEX	6-4-2022	Tropical Storm	44
IAN	9-28-2022	Category 5	159
CHANTAL	7-3-2025	Tropical Depression	17

Source: NOAA

It should be noted that the above list of hurricanes, tropical storms and depressions passing within 50 miles of Collier County does not capture all events that have impacted the County, as storms can have some impacts hundreds of miles from the eye of the storm. For example, Hurricane Helene was tracked further than 50 miles from Collier County, yet Helene caused widespread damage throughout South Florida, as described below. Table 4-34 shows hurricanes, tropical storms, tropical depressions and storm surge data reported by NCEI since 1996 for Collier County. This event history includes 45 recorded storm events.

Table 4-34 – NCEI Hurricane/Tropical Storm Data for Collier County, 1996-2025

Location	Date	Event Type	Deaths/ Injuries	Property Damage
Coastal Collier	9/25/1998	Hurricane (Typhoon)	0/0	$0
Coastal Collier	8/13/2004	Hurricane (Typhoon)	0/0	$2,500,000
Inland Collier	9/4/2004	Hurricane (Typhoon)	0/0	$0
Coastal Collier	9/4/2004	Hurricane (Typhoon)	0/0	$0
Coastal Collier	7/8/2005	Hurricane (Typhoon)	0/0	$0
Coastal Collier	10/24/2005	Hurricane (Typhoon)	1/0	$0
Coastal Collier County	9/9/2017	Hurricane (Typhoon)	0/0	$222,500,000
Inland Collier County	9/9/2017	Hurricane (Typhoon)	0/0	$0
Coastal Collier County	9/28/2022	Hurricane (Typhoon)	0/0	$2,200,000,000
Inland Collier County	9/28/2022	Hurricane (Typhoon)	0/0	$0
Coastal Collier	10/24/2005	Storm Surge/Tide	0/0	$0
Coastal Collier County	8/19/2008	Storm Surge/Tide	0/0	$60,000
Coastal Collier County	8/27/2012	Storm Surge/Tide	0/0	$6,000,000
Coastal Collier County	6/6/2016	Storm Surge/Tide	0/0	$0
Coastal Collier County	9/10/2017	Storm Surge/Tide	0/0	$0
Coastal Collier County	11/11/2020	Storm Surge/Tide	0/0	$0
Coastal Collier County	9/28/2022	Storm Surge/Tide	3/0	$0
Coastal Collier County	8/29/2023	Storm Surge/Tide	0/0	$0
Coastal Collier County	8/4/2024	Storm Surge/Tide	0/0	$878,000
Coastal Collier County	9/26/2024	Storm Surge/Tide	0/0	$1,200,000
Coastal Collier County	10/9/2024	Storm Surge/Tide	0/0	$0
Coastal Collier County	9/12/2020	Tropical Depression	0/0	$0
Inland Collier County	9/12/2020	Tropical Depression	0/0	$0
Coastal Collier County	11/9/2020	Tropical Depression	0/0	$0
Inland Collier County	11/9/2020	Tropical Depression	0/0	$0
Coastal Collier County	7/6/2021	Tropical Depression	0/0	$0
Coastal Collier County	8/29/2023	Tropical Depression	0/0	$0
Inland Collier County	8/29/2023	Tropical Depression	0/0	$0
Coastal Collier County	8/3/2024	Tropical Depression	0/0	$0
Inland Collier County	8/3/2024	Tropical Depression	0/0	$0
Inland Collier County	9/26/2024	Tropical Depression	0/0	$0
Inland Collier	9/25/1998	Tropical Storm	0/0	$0
Coastal Collier	11/4/1998	Tropical Storm	0/0	$0
Inland Collier	11/4/1998	Tropical Storm	0/0	$0
Coastal Collier	9/20/1999	Tropical Storm	0/0	$325,000
Coastal Collier	9/16/2000	Tropical Storm	0/0	$0
Coastal Collier	9/13/2001	Tropical Storm	0/0	$50,000
Inland Collier	8/30/2006	Tropical Storm	0/0	$0
Coastal Collier	8/30/2006	Tropical Storm	0/0	$0
Coastal Collier County	8/18/2008	Tropical Storm	0/0	$20,000
Inland Collier County	8/18/2008	Tropical Storm	0/0	$0
Coastal Collier County	8/26/2012	Tropical Storm	0/0	$0
Coastal Collier County	9/26/2024	Tropical Storm	0/0	$20,000
Coastal Collier County	10/9/2024	Tropical Storm	0/0	$280,000,000
Inland Collier County	10/9/2024	Tropical Storm	0/0	$280,000,000
		Total:	**4/0**	**$2,993,553,000**

Source: NCEI Storm Events Database, June 2026

The following is a description of past occurrences of hurricanes and tropical storms that have impacted the planning area, as recorded by NCEI:

Hurricane Wilma, October 24, 2005 – Hurricane Wilma produced a maximum measured storm tide of 8 feet at the USGS tide gauge at the Turner River near Chokoloskee in southern Collier County, with a storm surge of 7 feet after subtracting a 1-foot astronomical tide. Significant damage to structures close to the water was observed in Chokoloskee, along with some washing out of part of the road leading to the town. A storm tide of 7 feet was estimated in Marco Island by Collier County Emergency Management, along with significant beach erosion. A National Weather Service survey team estimated a storm tide of 4 feet in Everglades City based on debris line heights, with little structural damage. The National Ocean Service tide gauge in Naples recorded a maximum storm tide of 4.8 feet, with a storm surge of 3.8 feet after considering astronomical tide levels.

Tropical Storm Fay, August 19, 2008 – Tropical Storm Fay affected South Florida on the 18th and 19th of August. The storm made landfall early in the morning of the 19th near Cape Romano and moved over inland sections of South Florida during the morning and afternoon hours of the 19th, exiting the area near Lake Okeechobee. Fay caused tropical storm force winds, significant rainfall flooding in some areas, as well as two confirmed tornadoes. Due to Fay remaining at tropical storm strength and the rather limited nature of its wind field, storm surge and coastal flooding impacts were rather minor. The highest storm tide was estimated to be in the Everglades City/Chokoloskee areas, where the maximum storm tide was in the 5-foot range according to tide gauge data and estimates from local officials. Water of 1-2 feet deep was observed in Everglades City, and the Chokoloskee Causeway was under water for a short time on the morning of the 19th. Minimal storm surge was noted elsewhere, although moderate to severe beach erosion occurred in Naples.

Tropical Storm Isaac, August 27, 2012 – Tropical Storm Isaac moved west-northwest across the Florida Straits south of the Florida Keys on August 26. The northern edge of the wind and rain area associated with Isaac affected the South Florida peninsula throughout the day on the 26th. Isaac continued on a west-northwest track into the Gulf of Mexico on the 27th with winds, rain and flooding continuing over parts of South Florida. Severe beach erosion and coastal flooding occurred on Monday, August 27th as the center of Tropical Storm Isaac moved into the Gulf of Mexico. A storm surge of 2.05 feet was measured at the Naples pier. Farther east along the coast, inundation depths as high as 3 feet were reported in Goodland and Everglades City. Inundation in the Naples area was about 1 foot. Most damage from coastal flooding was to infrastructure in the Goodland and Everglades City areas and was estimated at $400,000. Severe beach erosion in the Naples and Marco Island areas led to damage estimated at $5.6 million.

Hurricane Irma, September 11, 2017 – Hurricane Irma produced maximum sustained winds near 115 mph at landfall in Marco Island and 80-100 mph across the rest of Coastal Collier County. Wind gusts were in excess of 100 mph, with a peak gust of 142 mph near Naples Regional Airport at 435 PM in association with the eastern eye wall. These winds produced major wind damage with at least 88 buildings destroyed and over 1,500 with major damage. Heavy tree and power pole damage, along with minor structural damage, was observed in areas affected by the eye wall. Post-storm survey revealed the likelihood of mini-vortices in the eastern eye wall causing enhanced tree and structural damage in Port of the Islands and Collier-Seminole State Park. A total of 197,630 customers lost power across all of Collier County.

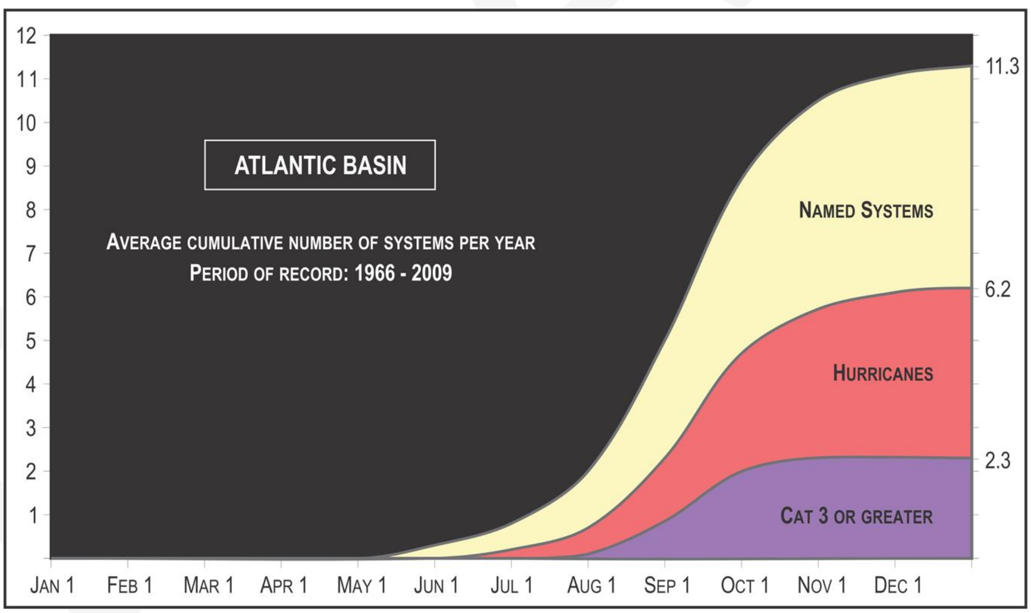
Hurricane Idalia, August 30, 2023 – The center of Hurricane Idalia passed about 180 miles west of Naples as a Category 2 moving north over the eastern Gulf of Mexico. The outermost edge of Idalia's tropical storm force wind field skirted the SW Florida Gulf coast, and a few outer rain bands moved through South Florida on August 29th and 30th bringing brief tropical storm force wind gusts. A storm surge of about 3 feet, combined with high astronomical tides, led to minor coastal flooding in Collier County during the high tide cycles on August 29th and 30th.

Hurricane Helene, September 27, 2024 - The center of Hurricane Helene passed about 200 miles west of Naples as a Category 3 hurricane moving N-NE over the eastern Gulf of Mexico around midday on Thursday, September 26th, then made landfall later that evening in the Florida Big Bend as a Category 4 hurricane with maximum sustained winds of 140 mph and lowest central pressure of 938 mb. Sustained tropical storm force winds around 40 mph were observed across much of coastal Collier County on September 26th. The highest wind gust of 58 kts / 67 mph was recorded at Naples Municipal Airport at 3:08 PM. Wind damage was primarily to trees, although some weaker structures suffered minor roof and lanai/porch damage. An estimated 25,000 customers lost electricity during the event.

Probability of Future Occurrence

The Atlantic basin hurricane season runs from June 1st to November 30th. The Atlantic basin includes the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico. Figure 4-34 shows the progress of a typical hurricane season in terms of the total number of tropical systems and hurricanes produced throughout the year in the Atlantic basin. The curves represent the average cumulative production of all named tropical systems, all hurricanes, and those hurricanes which were Category 3 or stronger in those basins. Hurricanes are certain to continue occurring in the Atlantic Basin.

Figure 4-34 – Average Number of Tropical Storms per Year (Atlantic Basin)



Source: NOAA/National Hurricane Center

Given the 45 hurricane, tropical storm, and storm surge occurrences recorded in NCEI over a period of 30 years (1995-2025), Collier County averages 1.5 hurricane, tropical storm, or storm surge related events annually. Therefore, hurricane or tropical storm related flooding in Collier County is highly likely in the future.

Per the 2023 State of Florida Enhanced Hazard Mitigation Plan, Collier County is considered relatively high-risk for hurricanes. The state plan estimates the 20-year and 100-year return period for hurricane winds across Florida, and based on this assessment, indicates that Collier County has a 5 percent annual chance of experiencing Category 1 to Category 2 hurricane winds and a 1 percent annual chance of experiencing Category 3 to Category 4 hurricane winds.

Probability: 4 – Highly Likely

Climate Change and Future Conditions

One of the primary factors contributing to the origin and growth of tropical storm and hurricanes systems is water temperature. Sea surface temperature may increase significantly in the main hurricane development region of the North Atlantic during the next century as well as in the Gulf of Mexico. NOAA models predict that while there may be less frequent, low-category storm events (Tropical Storms, Category 1 Hurricanes), there will be more high-category storm events (Category 4 and 5 Hurricanes) in the future. This means that there may be fewer hurricanes overall in any given year, but when hurricanes form, it is more likely that they will become large storms that can create massive damage. Per the Sixth National Climate Assessment, studies suggest that there will be an increase in the number of very intense tropical cyclones. The total number of storms may remain consistent, but very intense storms are expected to become more frequent and the amount of rainfall from these storms is projected to increase.

Hurricanes and other coastal storms may result in increased flooding, injuries, deaths, and extreme property loss. According to the US Government Accountability Office, national storm losses from changing frequency and intensity of storms are projected to increase anywhere from $4-6 billion.

Sea level change will be particularly important in influencing storm surge flooding in Collier County, since the area is already subject to flooding from above normal tides, surge and rainfall events from hurricanes and less powerful tropical storms. As a result of sea-level rise, flooding from just high tide events is becoming more common.

Vulnerability Assessment

Vulnerability – Extremely High

Due to the variability in flooding associated with hurricanes, it is difficult to estimate losses for a hurricane event. This vulnerability assessment presents a spatial analysis of property exposure to SLOSH modeled storm surge inundation areas. However, hurricane flooding will also be affected by rainfall, which is not accounted for in these storm surge estimates.

It should be noted that SLOSH models do not predict storm surge, and actual storm surge heights may exceed the estimates shown. Additionally, these storm surge models do not incorporate other hurricane impacts that may exacerbate flooding, including hurricane strength winds and rain. Therefore, these models should be interpreted as a minimum impact scenario.

Property

Table 4-35 through Table 4-39 provides a summary of estimated assets at risk to hurricane storm surge for each hurricane category. Note that these are storm surge estimates.

Areas inundated by storm surge are also those that are more likely to experience some degree of velocity wave action, which can exacerbate the damage caused by a typical flood. Natural resources, particularly beaches, can be devastated by hurricanes. Erosion of the coastline is considerable due to the impact of wind, waves, and debris in a hurricane event. Storm surge and subsequent erosion of the shoreline degrade natural barriers and often leads to the loss of property.

Table 4-35 – Properties at Risk to Category 1 Storm Surge

Occupancy Type	Building Count	Total Building Value	Estimated Content Value	Total Value (Building and Contents)
Agriculture	95	$12,936,304	$11,154,766	$24,091,071
Commercial	1,359	$4,334,493,026	$4,334,493,026	$8,668,986,052
Education	53	$236,552,251	$236,552,251	$473,104,502
Government	19	$116,460,110	$116,460,110	$232,920,220
Industrial	29	$41,948,568	$54,688,452	$96,637,020
Religious	44	$41,754,223	$41,227,959	$82,982,181
Residential	24,156	$21,529,014,798	$10,764,507,399	$32,293,522,197
Total	**25,755**	**$26,313,159,280**	**$15,559,083,963**	**$41,872,243,243**

Source: Collier County parcel data, 2025; NOAA SLOSH

Table 4-36 – Properties at Risk to Category 2 Storm Surge

Occupancy Type	Building Count	Total Building Value	Estimated Content Value	Total Value (Building and Contents)
Agriculture	183	$20,334,717	$15,477,192	$35,811,909
Commercial	2,560	$6,296,806,011	$6,296,806,011	$12,593,612,022
Education	77	$285,872,121	$285,798,478	$571,670,600
Government	26	$117,461,804	$117,461,754	$234,923,557
Industrial	156	$228,447,879	$288,916,742	$517,364,621
Religious	73	$96,773,681	$95,495,753	$192,269,434
Residential	46,699	$34,461,530,728	$17,230,765,364	$51,692,296,091
Total	**49,774**	**$41,507,226,941**	**$24,330,721,294**	**$65,837,948,234**

Source: Collier County parcel data, 2025; NOAA SLOSH

Table 4-37 – Properties at Risk to Category 3 Storm Surge

Occupancy Type	Building Count	Total Building Value	Estimated Content Value	Total Value (Building and Contents)
Agriculture	215	$24,671,556	$18,273,334	$42,944,890
Commercial	3,856	$8,049,982,135	$8,049,982,135	$16,099,964,269
Education	189	$551,295,997	$548,186,893	$1,099,482,889
Government	49	$203,339,375	$201,970,821	$405,310,196
Industrial	331	$336,091,035	$399,836,058	$735,927,093
Religious	139	$296,453,457	$294,937,842	$591,391,298
Residential	70,167	$50,639,460,302	$25,319,730,151	$75,959,190,453
Total	**74,946**	**$60,101,293,857**	**$34,832,917,233**	**$94,934,211,090**

Source: Collier County parcel data, 2025; NOAA SLOSH

Table 4-38 – Properties at Risk to Category 4 Storm Surge

Occupancy Type	Building Count	Total Building Value	Estimated Content Value	Total Value (Building and Contents)
Agriculture	366	$41,117,004	$30,505,998	$71,623,002
Commercial	4,726	$9,108,454,234	$9,108,454,234	$18,216,908,469

Occupancy Type	Building Count	Total Building Value	Estimated Content Value	Total Value (Building and Contents)
Education	292	$906,765,191	$898,980,232	$1,805,745,423
Government	67	$339,899,002	$338,530,448	$678,429,450
Industrial	340	$360,720,556	$430,251,630	$790,972,186
Religious	182	$387,109,006	$383,334,048	$770,443,054
Residential	107,604	$68,794,095,022	$34,397,047,511	$103,191,142,532
Total	**113,577**	**$79,938,160,014**	**$45,587,104,101**	**$125,525,264,115**

Source: Collier County parcel data, 2025; NOAA SLOSH

Table 4-39 – Properties at Risk to Category 5 Storm Surge

Occupancy Type	Building Count	Total Building Value	Estimated Content Value	Total Value (Building and Contents)
Agriculture	402	$45,738,799	$34,080,209	$79,819,008
Commercial	4,769	$9,144,756,733	$9,144,756,733	$18,289,513,465
Education	297	$942,469,606	$934,684,648	$1,877,154,254
Government	67	$339,899,002	$338,530,448	$678,429,450
Industrial	340	$360,720,556	$430,251,630	$790,972,186
Religious	186	$392,176,347	$388,401,390	$780,577,737
Residential	111,635	$70,275,352,853	$35,137,676,427	$105,413,029,280
Total	**117,696**	**$81,501,113,897**	**$46,408,381,483**	**$127,909,495,380**

Source: Collier County parcel data, 2025; NOAA SLOSH

People

Population at risk to storm surge was estimated based on the exposure of residential property and the U.S. Census Bureau's average household size estimate for Collier County of 2.3 persons per household. The resulting estimated population at risk to storm surge by storm category is summarized in Table 4-40.

Table 4-40 – Estimated People at Risk to Storm Surge

Storm Category	Residential Property Count	People at Risk
1	24,156	55,559
2	46,699	107,408
3	70,167	161,384
4	107,604	247,489
5	111,635	256,761

Source: American Community Survey 2020-2024 5-Year Estimates; Collier County parcel data, 2025-2026

The very young, the elderly and individuals with disabilities are especially vulnerable to harm from hurricanes and may face difficulty in evacuating. For those who are unable to evacuate for medical reasons, there should be provision to take care of special-needs patients and those in hospitals and nursing homes. Many of these patients are either oxygen-dependent, insulin-dependent, or in need of intensive medical care. There is a need to provide ongoing treatment for these vulnerable citizens, either on the coast or by air evacuation to upland hospitals. The stress from disasters such as a hurricane can result in immediate and long-term physical and emotional health problems among victims.

Critical Facilities

In total, there are 92 critical facilities located in areas that are vulnerable to category 1 storm surge inundation as estimated by the SLOSH model. The vulnerable facility counts are listed in Table 4-41 by their FEMA Lifeline and by category of storm surge. This analysis does not account for existing property protection measures such as elevation or floodproofing that may be in place.

Table 4-41 – Critical Facilities Exposed to Storm Surge

FEMA Lifeline	Number of CFs Exposed				
	Category 1	**Category 2**	**Category 3**	**Category 4**	**Category 5**
Communications	7	10	14	18	19
Energy	29	48	73	96	96
Food, Hydration, Shelter	7	14	21	29	29
Hazardous Materials	12	31	41	49	50
Health and Medical	12	28	36	41	41
Safety and Security	14	24	30	44	47
Transportation	4	6	8	9	9
Water Systems	7	12	13	22	22
Total	**92**	**173**	**236**	**308**	**313**

Source: SLOSH, FEMA, Collier County FMP Working Group

4.4.6 Sea Level Rise

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Sea Level Rise	Likely	Critical	Moderate	More than 24 hours	More than 1 week	2.9

Hazard Description

Sea level rise is the increase in sea levels as a result of atmospheric and oceanic warming which causes water expansion as well as ice melting from ice sheets and glaciers. There are generally two separate mechanics involved in global sea level rise. The first is directly attributed to global temperature increases, which warm the oceans waters and cause them to expand. The second is attributed to the melting of ice over land which simply adds water to the oceans. Global sea level rise is likely caused by a combination of these two mechanics and can be exasperated on the local level by factors such as erosion and subsidence. The rate of sea level rise has varied throughout geologic history, and studies have shown that global temperature and sea level are strongly correlated.

Due to sea-level rise projected throughout the 21st century and beyond, coastal systems and low-lying areas will increasingly experience adverse impacts such as submergence, coastal flooding, and coastal erosion. The population and assets projected to be exposed to coastal risks as well as human pressures on coastal ecosystems will increase significantly in the coming decades due to population growth, economic development, and urbanization (IPCC, 2023). Collier County is particularly vulnerable to the effects of sea level rise, due to its coastal location, subtropical environment, and low topography.

As a result of climate change, it can reasonably be assumed that the following climate risks could impact the Collier County planning area: 1) increasing temperatures; 2) increasing frequency and strength of severe weather events; 3) more heavy rain/flooding; and 4) more frequent and prolonged drought. A discussion of the effect of climate risks on the individual hazards profiled in this plan has been included in the “Climate Change and Future Conditions” subsection for each hazard.

Warning Time: 1 – More than 24 hours

Duration: 4 – More than 1 week

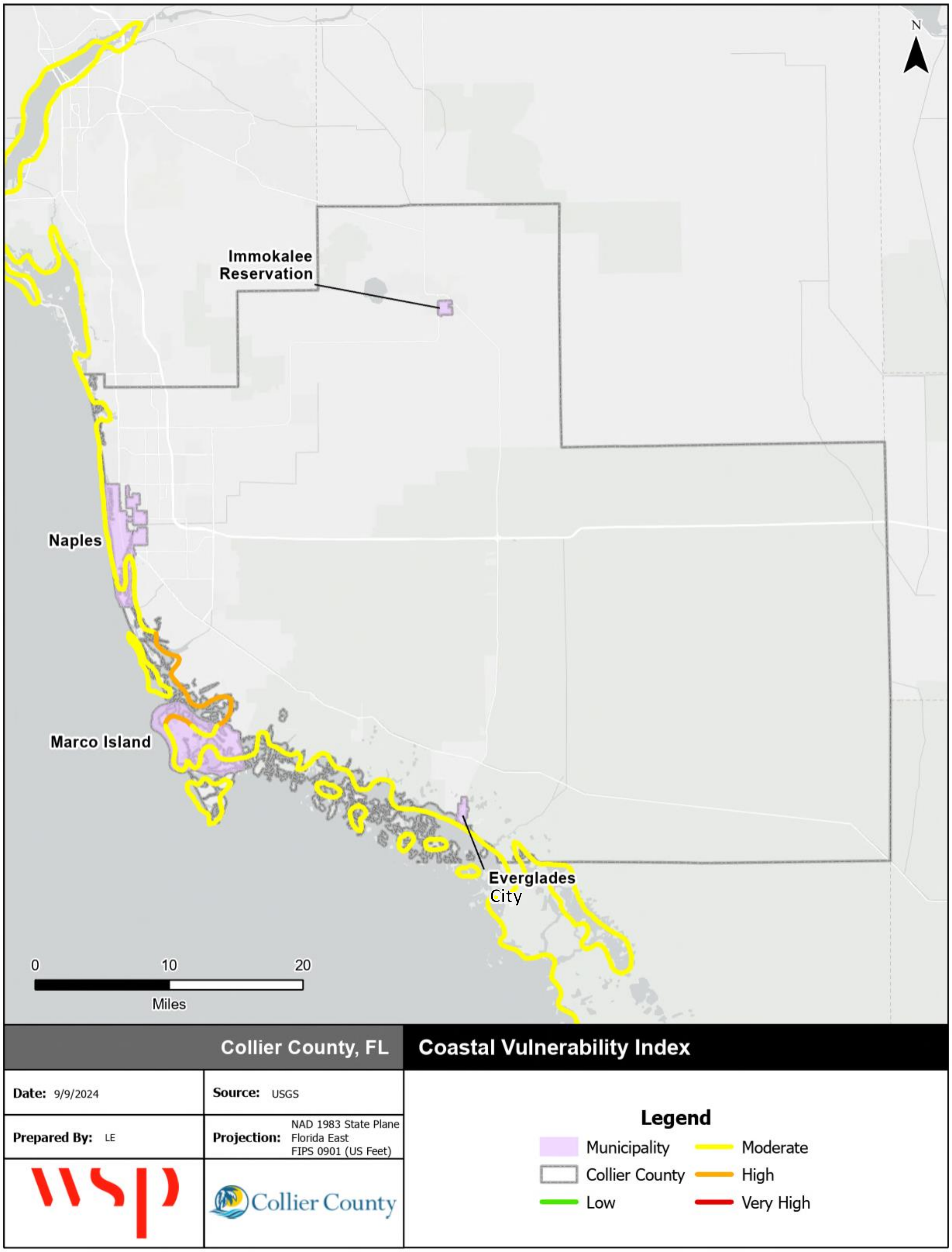
Location

Sea level rise can cause inundation and related impacts anywhere along the coast of Collier County. The United States Geological Survey’s (USGS) Coastal Vulnerability Index (CVI) provides a preliminary overview of the relative susceptibility of the United States coast to sea level rise. The CVI is based on geomorphology, regional coastal slope, tide range, wave height, relative sea level rise, and shoreline erosion and acceleration rates. For each study area, each variable is scored on a 1-5 scale based on defined parameters, where “1” indicates low contribution to coastal vulnerability and “5” indicates high contribution to vulnerability. These scores are then aggregated into a single index through a mathematical formula. The resulting index gives an overview of where physical changes may occur due to sea-level rise.

Figure 4-35 shows the CVI for Collier County. The majority of the county has a CVI rating of “3” or moderate with a small section located north of Marco Island that is rated a “4” for high vulnerability.

Spatial Extent: 3 – Moderate

Figure 4-35 – Coastal Vulnerability Index, Collier County



Extent

The effects of climate change, such as changes in the frequency and intensity of extreme precipitation events, will affect the entire planning area. Sea level rise impacts can occur anywhere along the coast in Collier County and may include direct localized impacts, such as inundation of land and property, as well as broader indirect impacts, such as interruption of transportation networks, drainage, or other infrastructure. Sea level rise is generally measured by the number of feet of relative rise and the areas that such rise would inundate. The estimated inundation extent of 1 foot, 2 feet, and 3 feet of sea level rise is shown in Figure 4-36 according to data from the NOAA Sea Level Rise viewer. This map of estimated sea level rise shows inundation above mean higher high water (the average of each day's higher high tide line). Sea level rise will likely affect coastal marsh lands as well as land along rivers, streams, and canals. In addition to inundation of low-lying lands, sea level rise will likely increase future risk of flooding from the other flood hazards discussed later in this plan, as more land will have a lower elevation relative to sea level.

FMP Working Group members also raised concerns around the impact of sea level rise on the county's gravity drainage system. As sea level rises above outfall elevations, systems designed to drain at low tide are no longer able to do so, causing canals to remain backed up and stagnant and reducing their capacity.

Sea level rise is a slow onset hazard, and because the full extent of anticipated sea level rise has not yet been realized, the effects of sea level rise have not yet been fully felt. However, sea level rise has already begun to cause "clear sky" or "nuisance" flooding, which is brought on by high tidewaters rather than storm or rain events. Tidal flooding causes temporary inundation of low-lying areas during high-tide events. The 2022 NOAA Sea Level Rise Technical Report finds that the national rate of high-tide flooding has more than doubled since 2000 due to sea level rise. NOAA projects that by 2050 high tide flooding events will occur 45 to 70 days a year, triple the current rate. While sea level rise increases the frequency of these events, it also is expected to increase the depth and extent of tidal flooding. Figure 4-37 shows areas in Collier County that are susceptible to high tide flooding as defined by NOAA based on derived national flood thresholds from NOAA Technical Report NOS CO-OPS 086: Patterns and Projections of High Tide Flooding along the U.S. Coastline Using a Common Impact Threshold.

Impact: 3 – Critical

Figure 4-36 – Extent of Sea Level Rise, Collier County

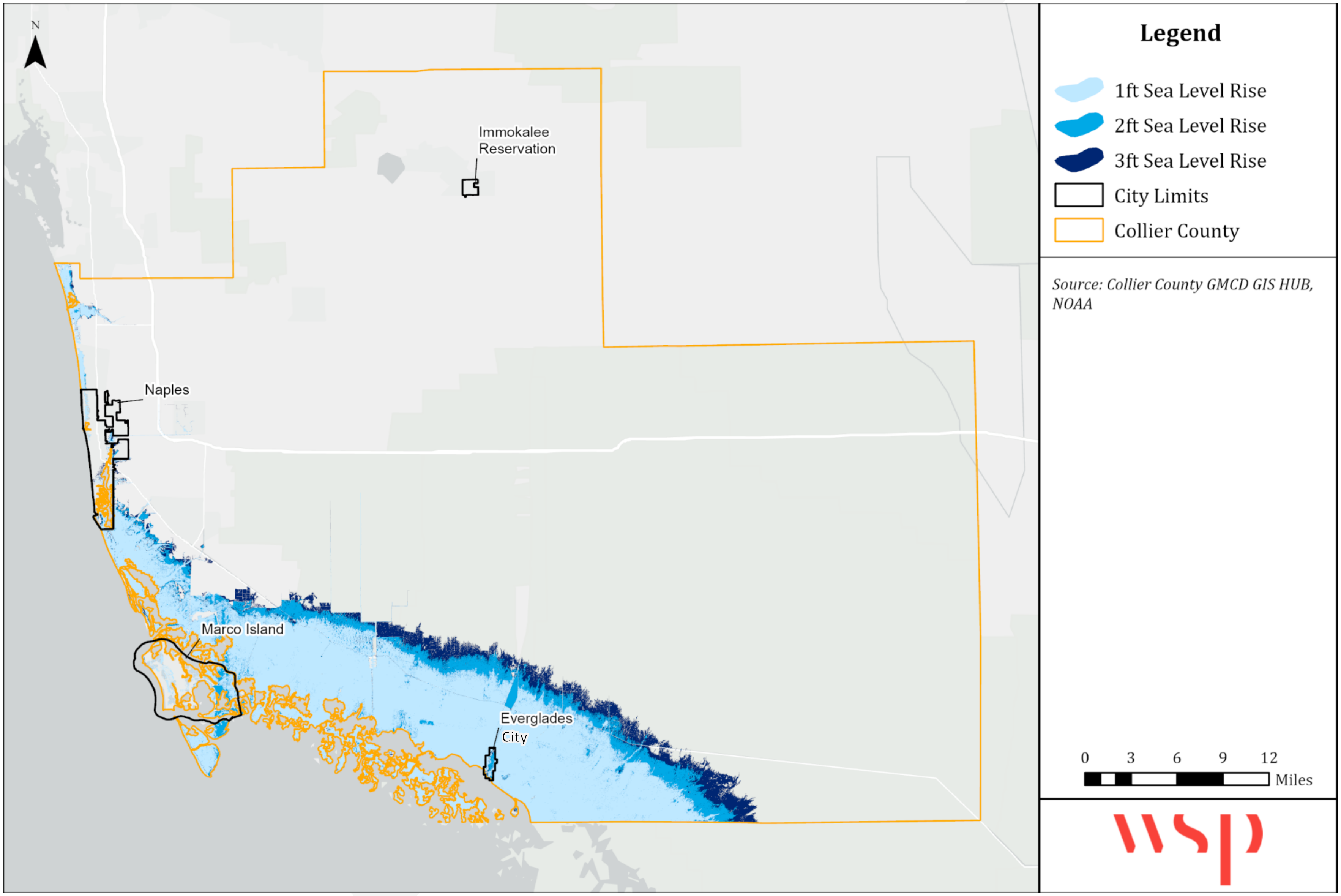
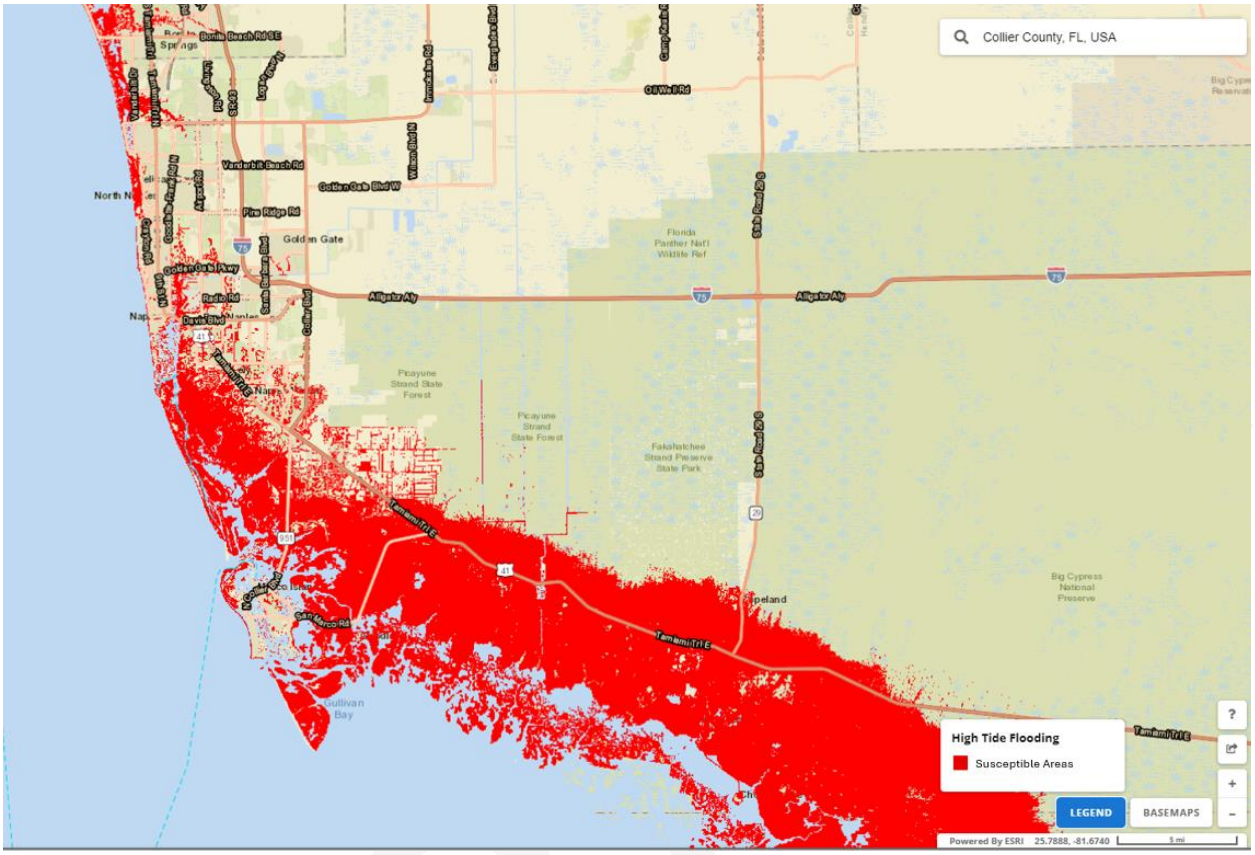


Figure 4-37 – Areas Susceptible to High Tide Flooding, Collier County



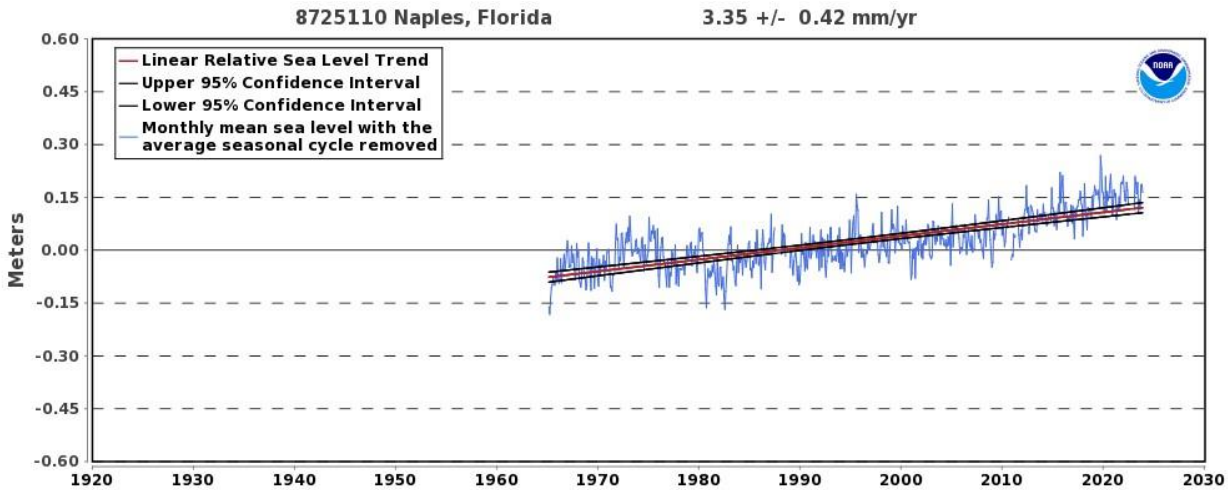
Source: NOAA Coastal Flood Exposure Mapper

Past Occurrences

Historic trends in local MSL are best determined from tide gauge records. The Center for Operational Oceanographic Products and Services (CO-OPS) has been measuring sea level for over 150 years, with tide stations operating on all U.S. coasts. Changes in Mean Sea Level (MSL), either a sea level rise or sea level fall, have been computed at 142 long-term water level stations using a minimum span of 30 years of observations at each location. These measurements have been averaged by month to remove the effect of higher frequency phenomena (e.g. storm surge) in order to compute an accurate linear sea level trend. At the Naples, FL station, the relative sea level trend is 3.35 mm/year with a 95% confidence interval of +/- 0.42 mm/year based on monthly mean sea level data from 1965 to 2023 which is equivalent to a change of 1.10 feet in 100 years. It should be noted that the Naples, FL station only contains data until 2023 and has been inactive since the beginning of 2024.

Figure 4-38 shows the monthly mean sea level at NOAA's Naples, FL station without the regular seasonal fluctuations due to coastal ocean temperatures, salinities, winds, atmospheric pressures, and ocean currents. The long-term linear trend is also shown, including its 95% confidence interval. The plotted values are relative to the most recent Mean Sea Level datum established by CO-OPS.

Figure 4-38 – Mean Sea Level Trends, Naples, FL



Source: NOAA Tides and Currents, April 2026

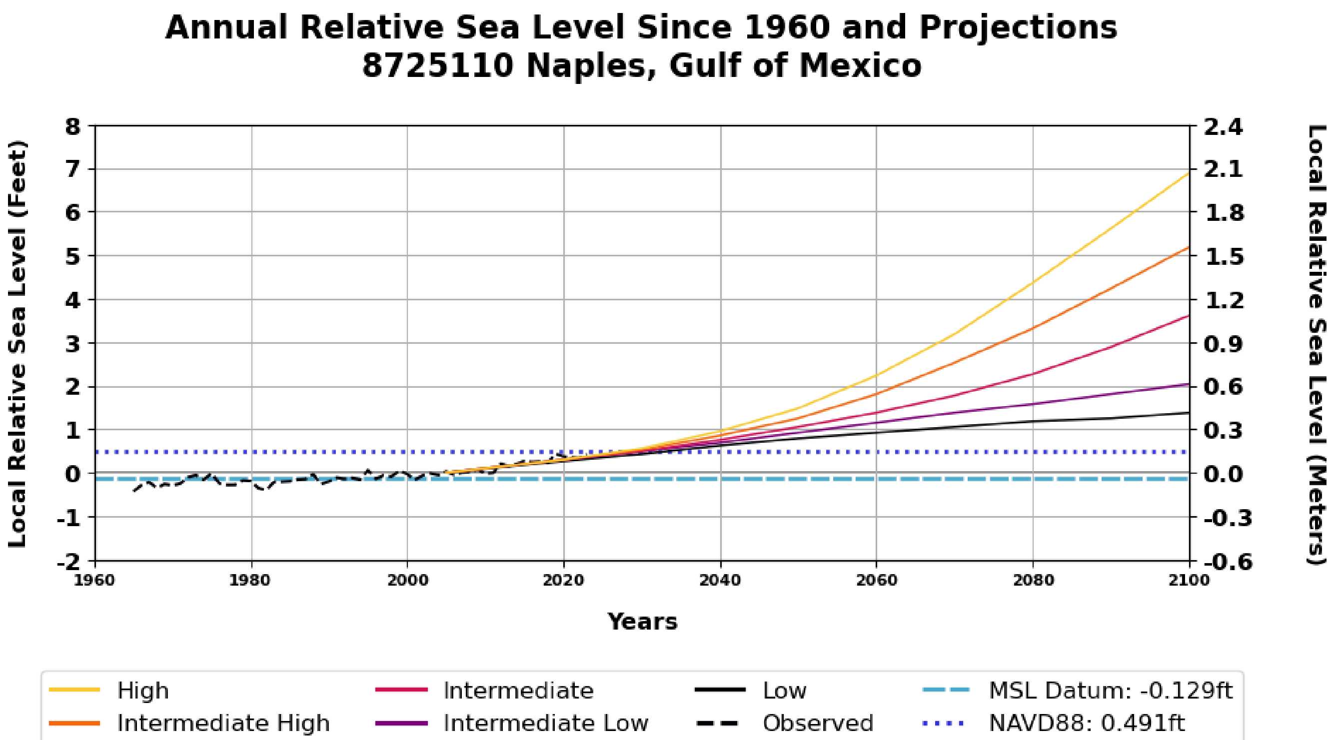
Probability of Future Occurrence

Under current climate change models, changes in global temperatures, hydrologic cycles, and storm frequency and intensity are expected to continue. Climate change will continue to drive nonlinear trends in sea level that deviate from historic trends. Figure 4-39 from NOAA Tides & Currents shows five regionalized sea level rise scenarios plotted relative to a 1996-2014 baseline period with the year 2000 as the "zero" point. The five scenarios are generated to account for emissions uncertainty and process uncertainty. Emissions uncertainty relates to the unknown amount of greenhouse gases that will be emitted in the future, and process uncertainty relates to ice-mass loss, ocean thermal expansion, and local ocean dynamic changes, which will be affected by increased emissions. According to these projections, under the intermediate scenario, Collier County could experience just under 1 foot of SLR by 2040, over 1.4 feet of SLR by 2060, and over 3.5 feet by 2100.

- **Short term:** by 2040, sea level is projected to rise approximately 0.82 feet
- **Medium term:** by 2060 sea level is projected to rise about 1.44 feet
- **Long term:** by 2100 sea level is projected to rise almost 3.67 feet

Probability: 3 – Likely

Figure 4-39 – Relative Sea Level Rise Projections for Collier County



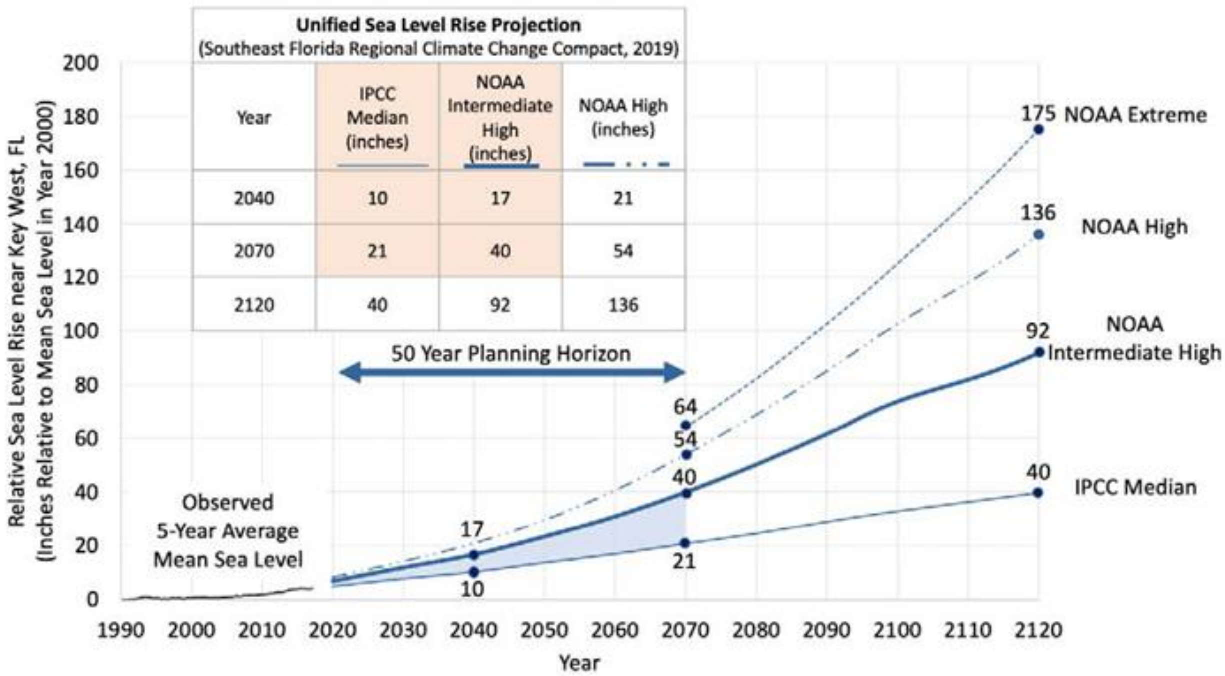
Source: NOAA Tides and Currents

The South Florida Regional Climate Change Compact's 2019 Unified Sea Level Rise Projection document was created to unify the diversity of local sea level rise projections into a single, unified projection to ensure consistency in adaptation planning, policy, and infrastructure and siting design in the South Florida region.

This report used projections from three global curves adapted for regional application: the median of the IPCC AR5 RCP 8.5 scenario as the lowest boundary, the NOAA Intermediate High Curve as the upper boundary for short term use (until 2070) and the NOAA High Curve as the upper boundary for medium and long-term use. Figure 4-40 below shows these projections. The IPCC median curve represents the most likely average sea level before 2070; sea level rise is unlikely to exceed the NOAA Intermediate High curve by 2100.

It should be noted that the figure below uses data from the Key West station, which varies from the values shown in Figure 4-39 which uses station data within Collier County and the most recent climate data from NOAA.

Figure 4-40 – South Florida Unified Sea Level Rise Projections



Source: Southeast Florida Regional Climate Change Compact, Southeast Florida Climate Indicators 2020 Update

The projection is an important complement to a vulnerability assessment in order to inform the user of the potential magnitude and extent of sea level rise now and into the future using various scenarios with associated timelines. In making infrastructure siting decisions, users must consider the nature, value, interconnectedness, and lifespan of existing and proposed infrastructure. The following summarizes the Unified Projection's recommendations for application of the three curves:

- **IPCC Median Curve:** The lower bound of the projection; can be applied to most infrastructure projects before 2070 or whose failure would result in limited consequence to others.
- **NOAA Intermediate High Curve:** Consider designing to this curve for projects in need of a greater factor of safety; this includes projects with a design life beyond 50 years.
- **NOAA High Curve:** Existing and proposed critical infrastructure should be elevated using this curve; projects that are not easily replaceable, have a long design life, and are interdependent with other infrastructure or services are included in this application.

Climate Change and Future Conditions

Sea level rise is a direct result of global climate change. Estimates for sea level rise are based on projected greenhouse gas emission levels and their associated impacts on global temperature change. As such, these projections contain substantial variability but are nonetheless important to consider when planning for coastal areas because they indicate where flooding can be expected should actual sea level rise meet estimated levels.

Vulnerability Assessment

Vulnerability—High

Collier County is vulnerable to many of the potential impacts of climate change, including sea level rise. This vulnerability assessment focuses on the potential losses to sea level rise. The reader should refer to the other hazard profiles for the current exposure and risk to these hazards with the perspective that climate change has the potential to exacerbate the existing risk and vulnerabilities. The "Climate Change and Future Conditions" section in each hazard profile includes a discussion of how climate change may impact other flood hazards. The potential impacts of climate change include increased flooding frequency, potential damage to critical infrastructure, and increasing public costs associated with flood insurance claims, infrastructure repair and maintenance, environmental impacts and increased costs associated with emergency management efforts.

Property

An estimate of affected property by occupancy type and sea level rise extent is summarized in Table 4-42. The categories are cumulative, such that the estimates for 3-foot SLR include all property also exposed to 1-foot and 2-foot SLR.

Table 4-42 – Property Exposure to Sea Level Rise

Occupancy	Estimated Parcel Count	Structure Value	Estimated Content Value	Total Value
1-Foot SLR	**345**	**$413,698,312**	**$237,788,891**	**$651,487,204**
Agriculture	0	$0	$0	$0
Commercial	37	$61,734,010	$61,734,010	$123,468,019
Education	0	$0	$0	$0
Government	1	$145,460	$145,460	$290,920
Industrial	0	$0	$0	$0
Religious	0	$0	$0	$0
Residential	307	$351,818,843	$175,909,421	$527,728,264
2-Foot SLR	**804**	**$694,479,790**	**$383,619,469**	**$1,078,099,260**
Agriculture	0	$0	$0	$0
Commercial	54	$72,613,688	$72,613,688	$145,227,377
Education	0	$0	$0	$0
Government	1	$145,460	$145,460	$290,920
Industrial	0	$0	$0	$0
Religious	0	$0	$0	$0
Residential	749	$621,720,642	$310,860,321	$932,580,963
3-Foot SLR	**2,121**	**$1,528,074,455**	**$865,562,276**	**$2,393,636,731**
Agriculture	1	$40,649	$20,324	$60,973
Commercial	109	$177,335,4834	$177,335,484	$354,670,968
Education	0	$0	$0	$0
Government	3	$166,338	$166,338	$332,676
Industrial	1	$12,690,359	$19,035,539	$31,725,898
Religious	2	$231,500	$199,528	$431,028
Residential	2,005	$1,337,610,126	$668,805,063	$2,006,415,188

Source: NOAA; Collier County Property Appraiser Parcel Data, 2025-2026

People

Sea level rise will lead to increased flooding and the associated harms to humans, such as illness, or injury or death from driving into flooded waters and drowning.

People at risk to sea level rise was estimated based on the exposure of residential property and the U.S. Census Bureau's average household size estimate for Collier County of 2.3 persons per household. The resulting estimated population at risk to 1-foot, 2-foot, and 3-foot SLR is summarized in Table 4-43.

Table 4-43 – Estimated People at Risk to Sea Level Rise

Sea Level Rise Extent	Residential Property Count	People at Risk
1-foot	307	706
2-foot	749	1,722
3-foot	2,005	4,611

Source: American Community Survey 2020-2024 5-Year Estimates; Collier County Property Appraiser Parcel Data, 2025-2026

Critical Facilities

Critical facility exposure to sea level rise was also evaluated through a spatial analysis. Table 4-44 lists critical facilities that may be exposed to direct impacts from sea level rise. Facilities are listed according to the lowest level of sea level rise that could affect the facility. No critical facilities were exposed only to the 2-foot sea level rise extent.

Table 4-44 – Critical Facility Exposure to Sea Level Rise

FEMA Lifeline	Name	Address
1 Foot Sea Level Rise		
Communications	WVOI (Radio Communications Tower)	12801 Curcie Rd
Safety and Security	Ochopee Fire Control Dist St 66	41015 Tamiami Trl E
Safety and Security	Collier County Sheriff's Dept Dist. 7 Everglades City Substation	32020 Tamiami Trail E
Energy	8736533 - Fuel Facility along Evacuation Route	150 Smallwood Dr
Transportation	US 41/State 90 And County 29	
3 Foot Sea Level Rise		
Communications	WMKO (Radio Communications Tower)	
Safety and Security	Big Cypress Natl Preserve Fire & Avn	33090 Satinwood Dr
Energy	8518190 - Fuel Facility along Evacuation Route	20018 Tamiami Trl E
Energy	FPL-Capri (Electric Substation)	5785 Collier Blvd
Hazardous Materials	City Of Everglades City - Water Plant	
Hazardous Materials	Gargiulo - Farm 7	15000 East Us Highway 41
Water Systems	Lee Cypress Co-Op	Po Box 513
Water Systems	Everglades Shores/Big Cypress Preserve	

Source: NOAA; Collier County FMP Working Group

4.5 Risk and Vulnerability Conclusions

4.5.1 Flood Hazards Profile Summary

Table 4-45 summarizes the results of the hazard profile for Collier County based on hazard identification data and input from the FMP Working Group. For each hazard profiled within Section 3.9.1, this table includes the relative risk for the County according to the results of the Priority Risk Index (PRI).

Table 4-45 – Summary of Flood Hazard Profile Results

Hazard	Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Coastal/Canal Bank Erosion	Highly Likely	Minor	Negligible	More than 24 hrs	More than 1 week	2.2
Dam/Levee Failure	Unlikely	Limited	Negligible	Less than 6 hrs	Less than 1 week	1.8
Coastal and Inland Flooding	Highly Likely	Critical	Large	6 to 12 hours	Less than 1 week	3.5
Stomwater/Localized Flooding	Highly Likely	Limited	Small	6 to 12 hours	Less than 24 hours	2.8
Hurricane and Tropical Storm	Highly Likely	Critical	Large	More than 24 hrs	Less than 1 week	3.3
Sea Level Rise	Likely	Critical	Moderate	More than 24 hours	More than 1 week	2.9

The results from the PRI have been classified into three categories based on the assigned risk value which are summarized in Table 4-46 below:

- **Low Risk** – Minimal potential impact. The occurrence and potential cost of damage to life and property is minimal.
- **Medium Risk** – Moderate potential impact. This ranking carries a moderate threat level to the general population and/or built environment. Here the potential damage is more isolated and less costly than a more widespread disaster.
- **High Risk** – Widespread potential impact. This ranking carries a high threat to the general population and/or built environment. The potential for damage is widespread.

Table 4-46 – Summary of Hazard Risk Classification

High Risk (≥3.0)	Coastal and Inland Flooding Hurricane and Tropical Storm
Medium Risk (2.0 – 2.9)	Coastal/Canal Bank Erosion Sea Level Rise Stormwater/Localized Flooding
Low Risk (< 2.0)	Dam/Levee Failure

4.5.2 Assessment of Areas Likely to Flood in the Future

The following areas have been identified as likely to flood in the future. Some of these areas are already experiencing flooding but others are not. For example, changes in floodplain development, changes in the watershed, and increases in population in combination with climate change and sea level rise will make these areas more likely to flood in the future.

Identified Area #1: SFHAs and 0.2%-Annual-Chance Floodplains

According to a February 8, 2024, Flood Insurance Study prepared by FEMA, almost the entire county is located within a Special Flood Hazard Area. According to the University of Florida, Bureau of Economic and Business Research, the population of Collier County is projected to increase by 22% between 2025 and 2045. Given the projected population increase, development in the watershed and associated increases in impervious surface are expected to cause changes in the floodplain and may increase the base flood elevation in SFHAs. Furthermore, with its low topography, Collier County's infrastructure may be vulnerable to the effects of climate change and sea level rise.

Identified Area #2: Areas of Localized Stormwater Flooding

Due to the planning area's relatively flat topography and the heavy precipitation that is expected to continue from thunderstorms, tropical storms, and hurricanes, with the potential for increasing intensity and frequency due to climate change, it is highly likely that underperforming drainage infrastructure and unmitigated properties will continue to experience localized flooding problems. An increase in impervious areas due to future development could exacerbate localizing flooding issues unless measures are taken to reduce the volume of runoff. As noted in Section 4.4.4, increases in future flooding may occur in the drainage basins where localized flooding is already a noted problem if additional development and increases in impervious surface occur in these areas. Many of these areas are currently used for residential estate density. Increases in density would also increase overall property exposure in these areas.

Identified Area #3: Repetitive Loss Areas

Properties categorized as repetitive loss properties have a greater need for flood protection. Repetitive loss can be attributed to development within the SFHA as well as localized stormwater flooding. As mentioned above, both types of flooding are likely to increase in the future due to development in the floodplain/watershed as well as due to the effects of climate change and sea level rise. Therefore, it is very likely that unmitigated repetitive loss properties will continue to flood in the future.

4.5.3 Impact of Future Flooding

Changes in the watershed (particularly an increase in impervious areas) could make these targeted areas even more likely to flood in the future. Development in the floodplain affects natural floodplain functions by removing needed flood storage capacity and forcing floodwaters elsewhere, also contributing to expansion of the floodplain and an increase in future flood risk. This process can have similar effects on the likelihood and magnitude of stormwater flooding. Stormwater drainage systems can manage limited capacities. As development occurs and increases stormwater runoff, stormwater system capacities can be exceeded more quickly, resulting in more frequent and/or more severe stormwater flooding.

Additionally, unregulated changes in the floodplain and development within the watershed may increase the base flood elevation in SFHAs. The 1%-annual-chance flood could become more severe as a result of increased development, and the floodplain of the 1%-annual-chance flood could expand. Consequently, existing development in those areas would become exposed to flood risk, meaning more people and property would be at risk.

Based on the future land use map (discussed in further detail in Section 3.9), much of the county's land is planned for conservation, agriculture, with some areas of estate density residential and urban residential subdistrict. Most of Collier County's land area in the Big Cypress basin and Everglades basin is planned to remain as conservation or agricultural, however there are some plans for increased density of development along the northeastern coastal edge of the County.

New development or redevelopment, if it occurs in or near the SFHA or localized flooding areas, could also increase exposure of people and property to flood impacts. As discussed in Section 4.4.4, future flood conditions in these areas will also be impacted by climate change and sea level rise.

To evaluate the potential for new development in the SFHA, unimproved parcels (those that are vacant, have no building footprint, or have no improved value) were compared with the SFHA and the unincorporated County's future land use – shown in Table 4-47. There are approximately 61,492 parcels with 940,914 acres of unimproved area within SFHA in unincorporated Collier; 61 percent of that acreage is in Zone A. Across all SFHA flood zones, 74 percent of the unimproved acreage is planned to remain as conservation area. Just over 0.5 percent of the SFHA is designated as Rural Fringe - Receiving Lands which would allow developers to build higher density. Around 17 percent of the SFHA acreage is designated as rural industrial or residential uses. These areas have existing development with mixed uses. Several residential areas encourage new development while also prioritizing the protection of natural resources. It is important that the County continues to maintain its conservation land as these undeveloped areas help minimize potential increases in flooding and associated impacts on existing development.

Collier has several regulatory tools in place, including a growth management plan and the County's floodplain regulations, which help County staff minimize the potential for new development in the floodplain.

Table 4-47 – Future Land Use of Unimproved Parcels in SFHA

Future Land Use Category	Zone A		Zone AE		Zone AH		Zone VE	
	Parcel Count	Total Acreage	Parcel Count	Total Acreage	Parcel Count	Total Acreage	Parcel Count	Total Acreage
Agricultural	325	52,882	692	11,244	4,200	64,039	-	-
Conservation	8,805	524,966	7,695	142,322	51	18,392	855	14,605
Estates	1,055	2,324	13,840	27,817	11,823	23,379	-	-
Incorporated Area	-	-	-	-	-	-	-	-
Industrial District	-	-	42	41	28	93	-	-
Mixed Use Activity Center Subdistrict	-	-	73	82	58	130	-	-
Rural Fringe - Neutral Lands	-	-	681	963	477	2,956	-	-
Rural Fringe - Receiving Lands	-	-	275	2,500	97	2,869	-	-

Future Land Use Category	Zone A		Zone AE		Zone AH		Zone VE	
	Parcel Count	Total Acreage	Parcel Count	Total Acreage	Parcel Count	Total Acreage	Parcel Count	Total Acreage
Rural Fringe - Sending Lands	-	-	269	9,276	1,020	18,807	-	-
Rural Industrial District	-	-	3	2	3	260	-	-
Rural Settlement Area District	-	-	14	120	250	94	-	-
Urban Coastal Fringe Subdistrict	-	-	1,719	3,511	-	-	2	0.67
Urban Residential / Urban Coastal Fringe Subdistrict	-	-	380	147	-	-	-	-
Urban Residential Fringe Subdistrict	-	-	289	1,534	951	1,035	-	-
Urban Residential Subdistrict	-	-	2,954	5,553	2,492	8,868	74	106
Total	**10,185**	**580,172**	**28,926**	**205,111**	**21,450**	**140,920**	**931**	**14,712**

Source: Collier County Future Land Use data, FEMA Effective FIRM, Collier County building footprint (2021) and parcel data (2025)

4.5.4 Health & Safety Consequence Analysis

Flooding poses a significant risk to life and safety, including the threat of injury or drowning during a flood event as well as numerous health risks during and after an event.

Public Health

In addition to the threat to life safety that people face during flood events, certain health hazards are also common. While such problems are often not reported, the following general types of health hazards may arise during and after floods:

- Floodwaters carry anything that was on the ground that the upstream runoff picked up, including dirt; oil; human and livestock waste; household, medical, and industrial hazardous waste; coal ash waste that can contain carcinogenic compounds; or lawn, farm and industrial chemicals. Pastures and areas where farm animals are kept or their wastes are stored can contribute polluted waters to the receiving streams.
- Flood-borne debris, including lumber, vehicles, or smaller sharp objects such as glass or metal fragments, can cause injury and subsequent infection.
- Floodwaters saturate the ground, which leads to infiltration into sanitary sewer lines. When wastewater treatment plants are flooded, there is nowhere for the sewage to flow. Infiltration and lack of treatment can lead to overloaded sewer lines that can back up into low-lying areas and homes. Even when it is diluted by flood waters, raw sewage can be a breeding ground for bacteria such as e.coli and other disease-causing agents.
- Stagnant pools can become breeding grounds for mosquitoes and other disease vectors.
- Floodwater can also displace insects, rodents, snakes, and other animals, potentially bringing them into contact with people. Animals can spread disease and can bite people and pets. They may also cause asthma or allergic reactions in some people.

- Wet areas of a building that have not been properly cleaned breed mold and mildew. Mold and mildew can pose a severe health hazard, especially for small children and the elderly.
- Building utilities can harbor health hazards if not properly cleaned. When a furnace or air conditioner is turned on after a flood, the sediments left in the ducts are circulated throughout the building and breathed in by the occupants. If the County water system loses pressure, a boil order may be issued to protect people and animals from contaminated water.
- Flooding can affect mental health due to trauma or stress. People can experience a long-term psychological impact of having been through a flood and seeing their home damaged and personal belongings destroyed. The cost and labor needed to repair a flood-damaged home puts a severe strain on people, especially the unprepared and uninsured. There is also a long-term problem for those who know that their homes can be flooded again. The resulting stress on floodplain residents takes its toll in the form of aggravated physical and mental health problems.

Life Safety

Flood waters may prevent access to areas in need of response or to the critical facilities themselves, which may prolong response time. The public must understand that they should never drive through flooded streets. The Centers for Disease Control and Prevention report that over half of flood-related drownings occur when a vehicle is driven into flood water, and the next highest percentage of deaths is due to people walking into or near flood waters. The National Weather Service warns that just 6 inches of fast-moving flood water can knock down an adult, 12 inches can carry away a small car, and 2 feet can carry away most vehicles. When someone drives through floodwater, they put their life and the lives of first responders at risk. First responders are at risk when attempting to rescue people from floodwaters. They are subject to the same health hazards as the public and are more likely to be exposed to these hazards during their response efforts.

Residential, commercial, and public buildings, as well as critical infrastructure such as transportation, water, energy, and communication systems may be damaged or destroyed by flood waters. Floods can severely disrupt normal operations, especially when there is a loss of power. This can affect the operations of critical facilities, which affects response times. Loss of power also puts the public at risk. Downed power lines pose a serious hazard and should always be treated as if they are still energized. When a building loses power during a flood, electricity should be turned off and not used until the wiring can be inspected, to avoid risk of electrocution or fire. Ocean water and salt spray can be particularly damaging to electrical equipment due to the corrosive and conductive nature of the salt-water residue. Damage to electrical equipment can also result from exposure to flood waters contaminated with chemicals, sewage, oil, and other debris.

Warning and Evacuation

Collier County coordinates with Collier County Emergency Operations Center and the National Weather Service in issuing public warnings concerning expected floods and storms.

Severe flooding may require evacuation orders to protect the life and safety of Collier County residents and visitors. Residents and visitors should use US 41 and Interstate 75 for evacuation from flooding and hurricanes and tropical storms.

Figure 4-41 depicts hurricane evacuation zones for Collier County. This figure utilizes a polygon set created by the county emergency management departments based on regional surge zones from a 2007-2010 statewide evacuation study initiated by FDEM.

Evacuation zones are correlated with storm surge planning zones. Collier County primarily falls within all six different zones. Zone A is at greatest risk for storm surge for Category 1 and higher storms. Zone B is at risk for storm surge for Category 2 and higher storms, and Zone C is at risk for storm surge for Category 3 and higher storms.

Figure 4-41 – Collier County Evacuation Zones