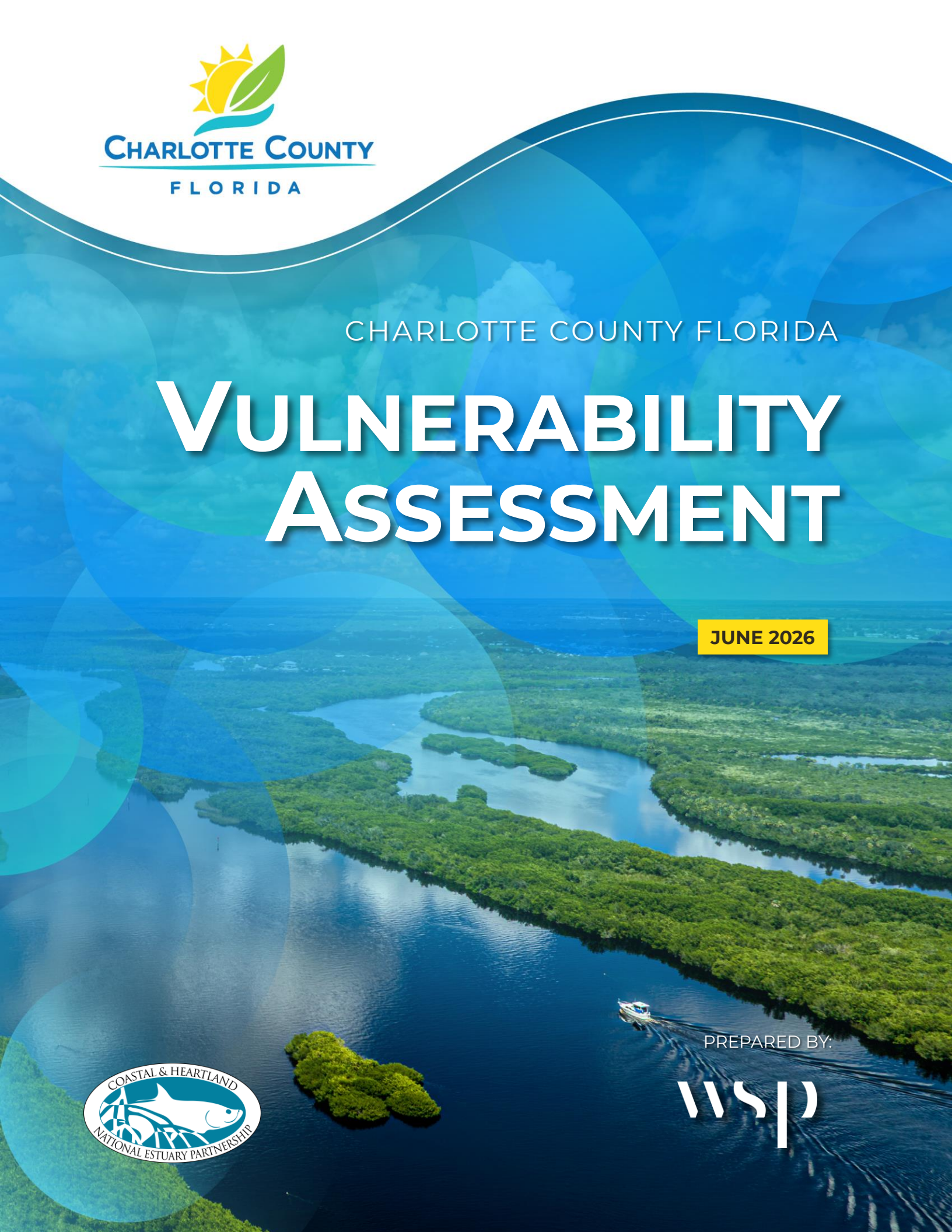
CHARLOTTE COUNTY
FLORIDA

CHARLOTTE COUNTY FLORIDA

VULNERABILITY ASSESSMENT

JUNE 2026



PREPARED BY:

COASTAL & HEARTLAND NATIONAL ESTUARY PARTNERSHIP

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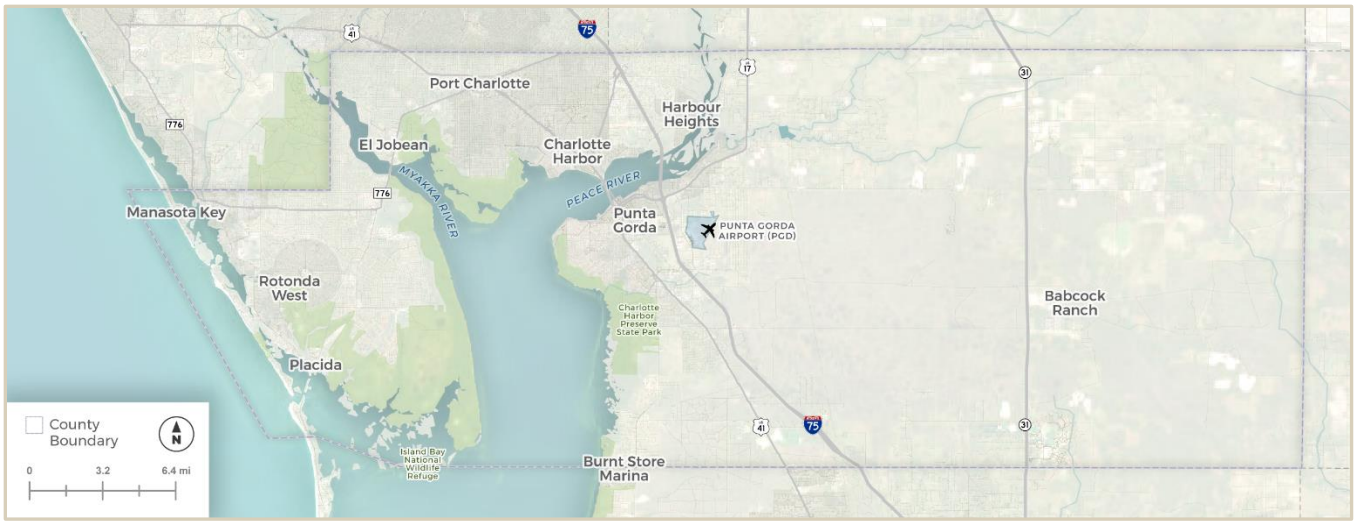
Introduction

Background

Charlotte County, Florida is a community that lives near and with water, includes extensive and diverse natural/biological systems, and is home to a growing population of approximately 217,212 people across 680 square miles in 2025. It sits on the southwest coast of Florida, at the shoreline of the Gulf of America, and surrounds Charlotte Harbor, which branches off into the Myakka and Peace Rivers, which stretch into the northern and eastern parts of the county, as shown in Figure 1. It is an exciting place to live and work in part because of the access to water throughout the county, and it is also an enjoyable place to visit to enjoy these areas and participate in outdoor activities.

Figure 1 Overview of Charlotte County



The county has experienced a number of significant weather events and tropical storms in the recent past with Hurricanes Irma, Ian, Idalia, Helene, and Milton passing by and through the county over the past few years, which resulted in significant flooding and varying levels of damage to a number of communities within the county, including significant impacts to the City of Punta Gorda. To this day, the county continues down the path of recovery from those events. Figure 2 shows the city of Punta Gorda after Hurricane Milton.

Figure 2 City of Punta Gorda after Hurricane Milton

Per Florida Statute 380.093, the county has commissioned this Vulnerability Assessment (VA) study to better define and address the risks from coastal flooding as well as the detrimental effects of potential future higher sea levels. Higher sea levels would be expected to inundate natural areas and some coastal properties in the county while contributing to increased detrimental impacts from storms. These worsening conditions would be due to higher water levels in the Gulf, harbor, and rivers, allowing for more water to be pushed shoreward at higher levels than would be anticipated today and extending farther inland.

The concern is compounded by state and federal recovery support resources becoming increasingly strained by the rising recovery costs of storm events, placing the county in a position of even higher responsibility in this area and highlighting the need for a more comprehensive understanding of changing conditions and risks, so the county can focus on taking effective impact mitigation actions, reducing recovery needs from the county.

Implementing Agencies

This Charlotte County Vulnerability Assessment is being funded through a program administered by the Coastal & Heartland National Estuary Partnership (CHNEP), part of the US Environmental Protection Agency National Estuary Program. The work was performed for Charlotte County, whose staff, together with CHNEP staff, led technical coordination with the consulting team, managed all internal stakeholder agency coordination, led public outreach, and will be responsible for implementation upon acceptance of findings and plan recommendations, ultimately creating a more resilient county as a result of these efforts.

Generally, these efforts provide the opportunity to put definition around an often uncertain concern, outline the pace of change possible from changing environmental conditions, and conduct a solid technical and science-based framework to assess this concern and provide guidance for the county's current and future residents and business owners, such that they can make appropriate decisions based on the analysis outlined in this report.

Florida's Resilient Florida Program

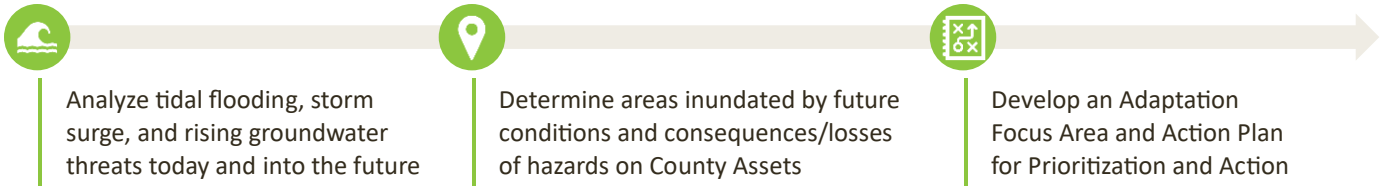
The vulnerability assessment study was conducted following a process framework established by the Florida Department of Environmental Protection, Office of Resilience and Coastal Protection, which administers a program established through state legislation and defined in (Section 380.093), FL Statute. This legislation also established a funding program called the Resilient Florida Program, which provides resources to communities across the state to conduct studies analyzing the impacts of climatological and meteorological events to their communities (such as flooding) and establish and implement appropriate risk-reduction actions as a result. The Resilient Florida Program has funding for both planning and implementation efforts, with the requirement that municipalities complete a compliant VA before becoming eligible for implementation funding. Thus, the county is completing this work in part to establish its eligibility for funding from that program.

The FDEP study framework implemented on this project was set up to establish a consistent analysis methodology to be able to support decision-making within the county, but also to support decision-making and investments at the state level. This is being completed by creating/assembling data representing conditions and vulnerabilities in the county that are common across the state. The framework establishes a method to allow for comparisons and help guide the state towards its most effective investments. The state administers funding to help advance community resilience and allocates funding in an annual Statewide Flooding and Sea Level Rise Resilience Plan, which could be an eventual target for county leadership for financial support, and is a program that other agencies are using to support long-term resilience actions.

The Vulnerability Assessment Approach

What follows in this report is a summary of methodology and findings that presents details on conditions of concern today and into future periods, and the consideration of how these conditions affect various natural areas and/or elevate risks to key assets (buildings, roadways, water, etc.). The intent is to provide the county the basis for determining a set of actions and priorities that can be taken to address these concerns. This is the basic framework of the plan and its intended outcomes. Figure 3 shows the methodology applied in this analysis.

Figure 3 Vulnerability Assessment Approach



This report presents the technical work completed to satisfy the requirements of the FDEP program, which is reliant on significant spatial data analysis to define potential concerns. The focus of the FDEP program and the analysis conducted for this study is toward determining concerns for critical assets within the county, which, if impacted, would be detrimental to the community's capacity to withstand and recover from significant storm events. Long-term resilience concerns extend to other factors beyond "brick and mortar" (e.g. social, economic, etc.), and those issues will be addressed in later planning phases to be conducted after the conclusion of this effort.

This document is accompanied by a series of technical appendices, which provide much more detail on the data assembled and applied to this work (Appendix C: ACUNE Sufficiency Analysis and Appendix D: Hazard and Asset Data), identified data gaps (Appendix D: Hazard and Asset Data), as well as the methodology utilized and a more comprehensive presentation of results (Appendix E Exposure and Sensitivity Analysis and Appendix F Adaptation Focus Area and Recommendations).

Considering Flood Risk Hazards in Charlotte County

Charlotte County is adjacent to and bisected by water, and thus is very familiar with tidal flooding, storm-related flooding, and groundwater rise. Those three concerns are analyzed in detail through this effort, assessing how environmental conditions may change in the future and the extent to which the county could be impacted by those conditions. The consideration of existing and future conditions and how they may impact the county includes two primary concerns[1]:

- **Chronic:** for the county, this is related to tidal inundation, which is a regular and common concern in low-lying areas, considering how those conditions may change in the future. This condition would be related to flooding at the shoreline but also influence elevating the groundwater table. Therefore, this concern would be related to natural areas in transition from wetlands to open water, coastal areas now becoming inundated, and underground utilities losing some of their effectiveness through infiltration of underground infrastructure.

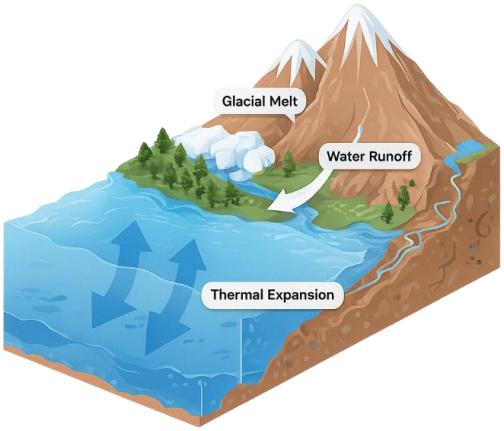
[1] Rainfall impacts were not considered in this assessment.

» **Acute:** These are conditions impacting the county from major coastal storms. The county's recent experiences with storms make it aware of the impact such storms can have on county communities. A consideration of how these events may become more frequent and/or intense in the future is important to define, so that appropriate actions can be implemented to now reduce their impact.

Sea Level Change and Tidal Flooding

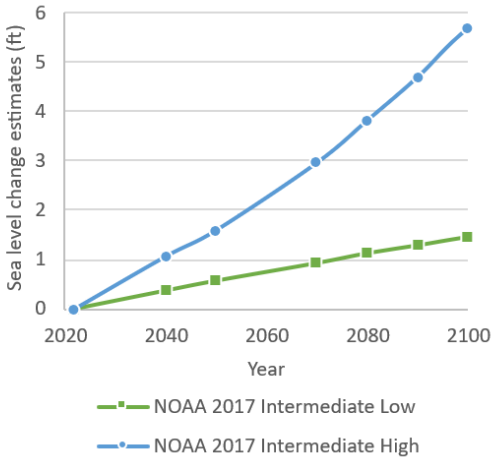
The ongoing change in sea levels, driven by a combination of thermal expansion, water runoff, and the melting of glacial ice (as shown in Figure 4), is leading to higher water levels in the Gulf and may increase the severity of storm surges that threaten properties and communities throughout Charlotte County. Thermal expansion is a condition that occurs as global temperatures increase, and oceans absorb more heat, causing water to expand. The accelerated melting of glaciers and ice sheets, particularly in regions such as Greenland and Antarctica, could add significant volumes of water to the ocean.

Figure 4 Causes of Sea Level Change



These interconnected processes, identified by the National Oceanic and Atmospheric Administration (NOAA), are anticipated to persist, underscoring the importance of understanding and preparing for the evolving risks associated with sea level change in the coming decades. There are two NOAA stations within the study area where sea levels are monitored and change estimates are available: Fort Myers and Naples. The values between these stations differ by 1cm or less; but to generate a solid understanding of what may occur across the region the water levels were averaged between the two stations to produce a single set of sea level and change values used for this study. These trends are visually represented in Figure 5.

Figure 5 NOAA Sea Level Change Projection



The sea level change chart illustrates how conditions are estimated to change over time and represents the inherent uncertainty in the estimates. The state of Florida has identified in statutes the scenarios to apply in conducting these vulnerability assessments, which are shown on the right. For Charlotte County and its decision-makers, it is most important to consider when these changes are expected to occur and then incorporate those timeframes into county processes and planning efforts. In interpreting the data, it can be noted generally that approximately one foot of sea level change is expected around 2040 (intermediate-high scenario), or in 2070 (intermediate-low scenario). An estimated three feet of sea level change is expected to occur around 2070 only for the intermediate-high scenario, as indicated in Figure 5 and Table 1.

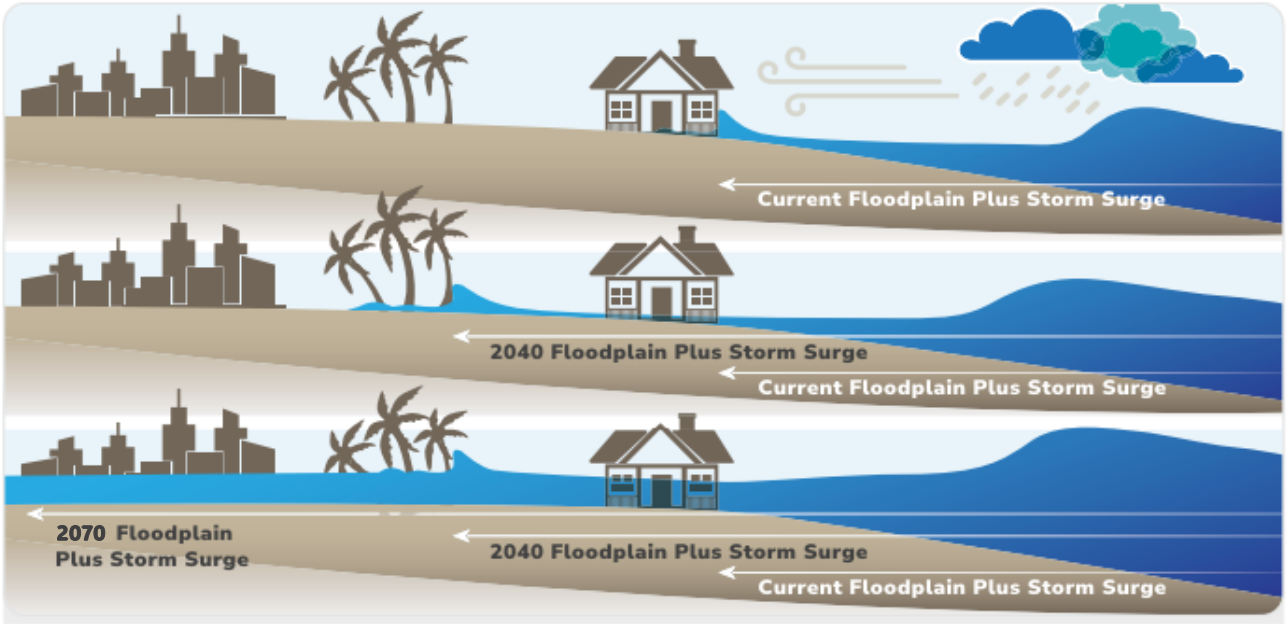
Table 1 Detailed Sea Level Change Estimates (feet) for Selected Policy Scenarios to meet Requirements (FDEP)

Year	Sea level change in feet from NOAA 2017	
	Intermediate-Low	Intermediate-High
2040	0.37	1.06
2070	0.93	2.96

Storm Surge

While sea level change presents ongoing chronic inundation risks, storm surge remains a significant and acute threat during storm events. Storm surges occur when strong winds propel ocean waters and waves toward the coast during such events. Elevated sea levels are expected to exacerbate storm surge risks due to increased water depth reaching the shoreline as heightened water levels and waves. Storm surge is projected to extend farther inland as a result of larger volumes of water being driven shoreward for similar events, as illustrated in Figure 6.

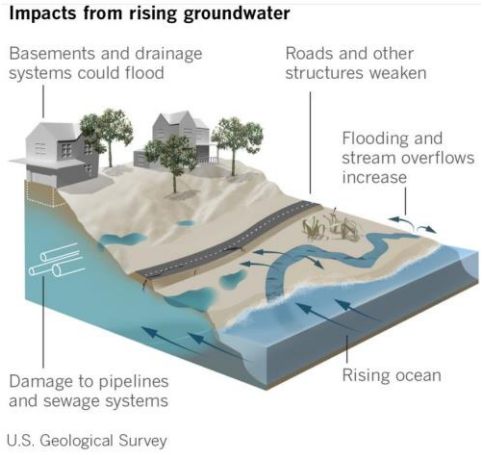
Figure 6 Storm Surge Examples



Groundwater Rise

As sea levels change along coastal regions like Charlotte County, the groundwater table beneath the surface is also expected to rise. When sea levels increase, the "baseline" water level that influences these underground systems also moves higher, pushing groundwater closer to the surface. Higher groundwater conditions (like those shown in Figure 7) will likely impact underground systems (stormwater, sewer, utility, etc.) and this condition should be considered as a part of county planning, policies and actions as well. Groundwater rise can also cause low-lying areas of the county near the coastline to become saturated, or even inundated, impacting the ability to use those areas for various activities.

Figure 7 Groundwater Rise and its Impacts



Source: Rosanna Xia / Los Angeles Times / Aug. 17, 2020

Critical Assets Considered

The FDEP program focuses on the assessment of critical assets to determine the potential impacts of conditions today and into the future, including regionally significant assets that support the needs of communities spanning multiple geopolitical jurisdictions,

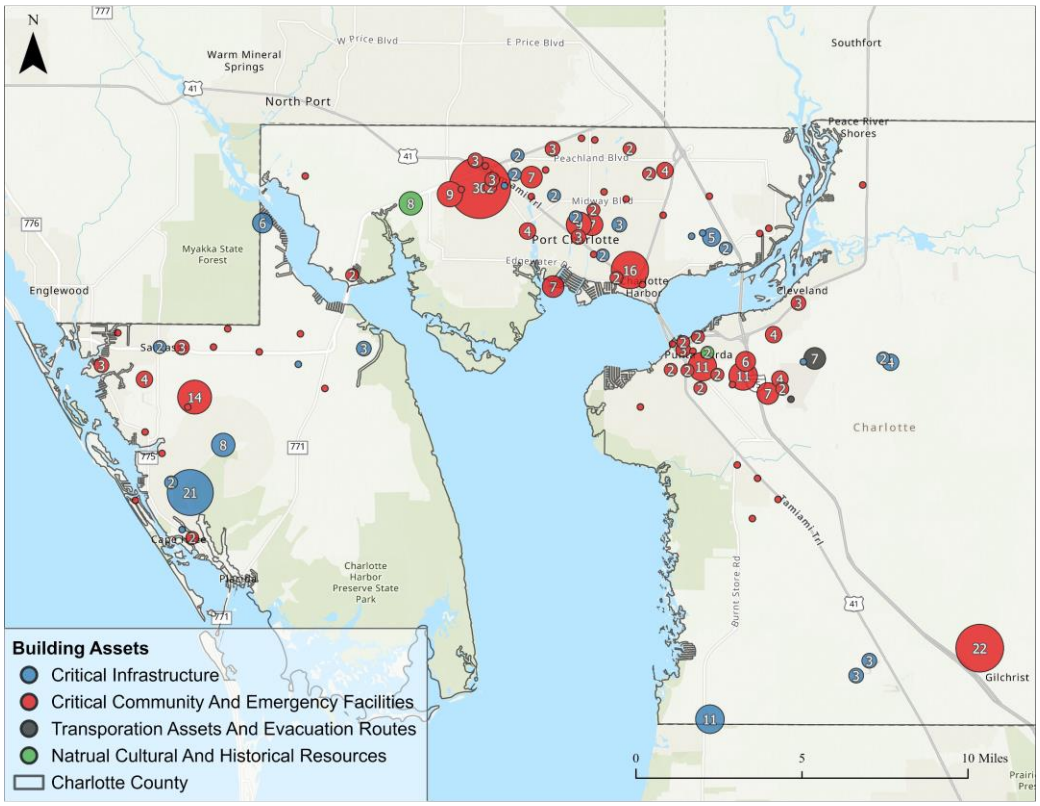
including, but not limited to, water resource facilities, regional medical centers, emergency operations centers, regional utilities, major transportation hubs and corridors, airports, and seaports.. Table 2 lists the asset types included in this work with findings presented in the following pages.

Table 2 Assets Considered in the Risk Assessment

Category	Asset Name	Category	Asset Name
Critical Community and Emergency Facilities	Affordable public housing	Critical Infrastructure	Communications facilities
	Airports		Lift Stations
	Colleges And Universities		Pump Stations
	Community Centers		Solid And Hazardous Waste Facilities
	Correctional Facilities		Wastewater Treatment Facilities
	Disaster Recovery Centers	Transportation and Evacuation Routes	Roadway
	Emergency Medical Service Facilities		Railway
	Fire Stations		Bridges
	Health Care Facilities		Culverts
	Hospitals	Natural, Cultural, and Historic Resources	Historic bridges
	Law Enforcement Facilities		Parks
	Local Government Facilities		Conservation Lands
	Logistical Staging Areas		Wetlands
	Schools		

Figure 8 below identifies the location of these assets and the associated categories throughout the county for reference. The map depicts the clusters of asset types by area of the county where they are present.

Figure 8 Assets Considered in the Analysis



Critical Infrastructure
90 Facilities
362 Lift Stations

Critical Community & Emergency Facilities
256 Buildings

Transportation & Evacuation
491 Mi Roads
45 Bridges
25 Mi Rail

Natural, Cultural, & Historic
657K AC Conservation
418K AC Wetlands
9 Historic Bridges
30 Parks

Stakeholder and Public Engagement

The project team conducted two public outreach meetings to inform stakeholders and solicit feedback regarding both the project's scope and the County's focus areas. In addition, the project team will participate in the Board of Charlotte County (BOCC) meeting to gather further input from committee members.

According to FDEP guidance on public engagement, outreach activities should occur during both the data collection and recommendation stages of a project. The initial meeting introduced the project to interested parties and invited their perspectives on setting general priority recommendations. The second meeting presented analysis results and sought feedback on the draft VA recommendations. Participants had the opportunity to offer community-specific insights related to the analysis outcomes. Detailed information about the public meetings and materials presented is available in Appendix B Stakeholder and Public Engagement.

Current and Future Risks in Charlotte County

Countywide Exposure

The County used sea level change projections to evaluate how critical assets might be affected by tidal flooding across 2040 and 2070 (the time periods identified by FDEP in their guidance), and surge flooding from a 100-year storm event across three time periods: 2022 (representative of today's conditions), 2040, and 2070. More information on the historical records and processes used to determine a 100-year storm event may be found in Appendix D: Hazard and Asset Data.

A "100-year event" refers to an event occurrence that has a 1% chance of happening in any given year. This does not mean the event will only happen once every 100 years, but rather that there is a small, but possible, risk of it occurring each year. As shown in Figure 9, a 100-year event could have an 18% chance of occurring at least once during 20 years and a 26% chance of occurring during 30 years.

Figure 9 Probability of a 100-year Event Occurring over Time

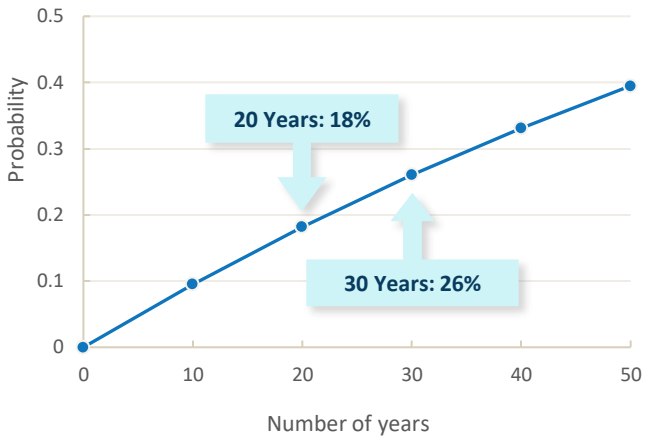


Figure 10 illustrates tidal flooding at the Intermediate-high sea level change scenario, showing where high tide events may increasingly affect land over time. The mapping applies projected sea level rise values on top of the Mean Higher High Water (MHHW) tidal datum, the average of the higher of the two daily high tides. Areas shown represent land at or below the projected future MHHW surface, meaning they would be subject to recurrent tidal flooding during routine high-tide cycles. This is not a rare event, but a chronic condition that intensifies over time. Light green areas indicate land exposed to tidal flooding risk by 2040, while dark green areas represent additional land at risk by 2070, illustrating the progressive expansion of coastal inundation as sea levels rise. Figure 11 shows the impact of storm surge from the present day through 2070 under the same scenario, highlighting locations vulnerable to flooding caused by storm surge events. While this map displays where flooding will occur, it does not show how flood depth increases over time, which is anticipated for many coastal areas in the future. Comparing Figure 10 and Figure 11 illustrates that storm surge scenarios result in more extensive and severe inundation of land than tidal flooding. Figure 12 highlights areas prone to groundwater rise with groundwater depth less than 1 ft, which may lead to increased flooding inland and affect infrastructure. As sea levels change, groundwater is projected to move significantly closer to the surface by 2070 compared to current conditions. Figure 13 illustrates expected transitions in natural system areas under sea level change scenarios, helping visualize how landscapes and ecosystems may shift over time. For example, wetlands may be permanently inundated and transition into open water, while upland areas could become new wetlands due to increased flooding and changes in groundwater levels. These transitions illustrate how landscapes and ecosystems are likely to evolve over time, potentially affecting habitat types, biodiversity, and the services these systems provide to the community.

Figure 10 Potential Tidal Inundation Areas

Figure 11 Potential Storm Surge Inundation Areas

Figure 11- A Current

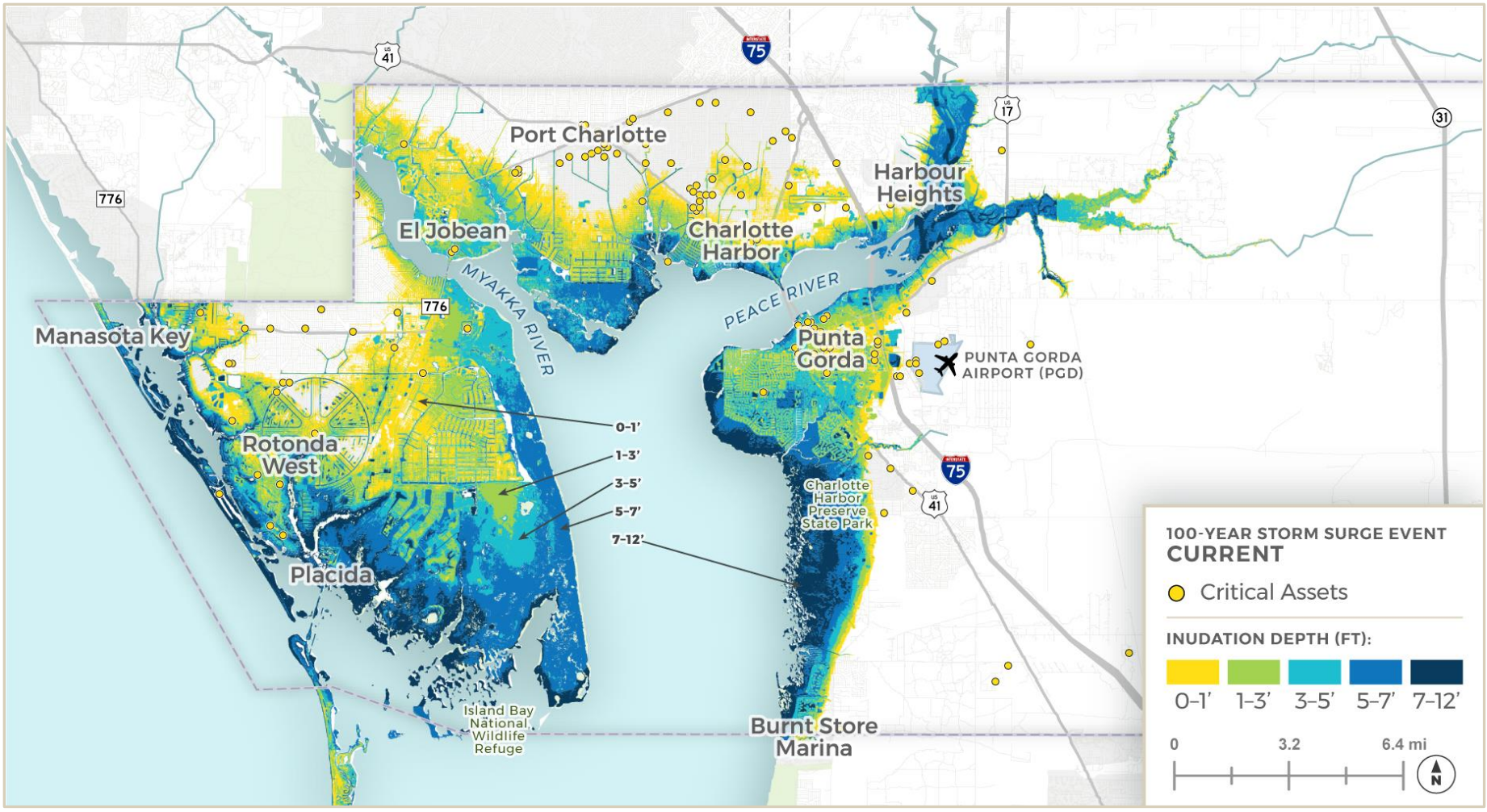


Figure 11- B 2040 High SLC

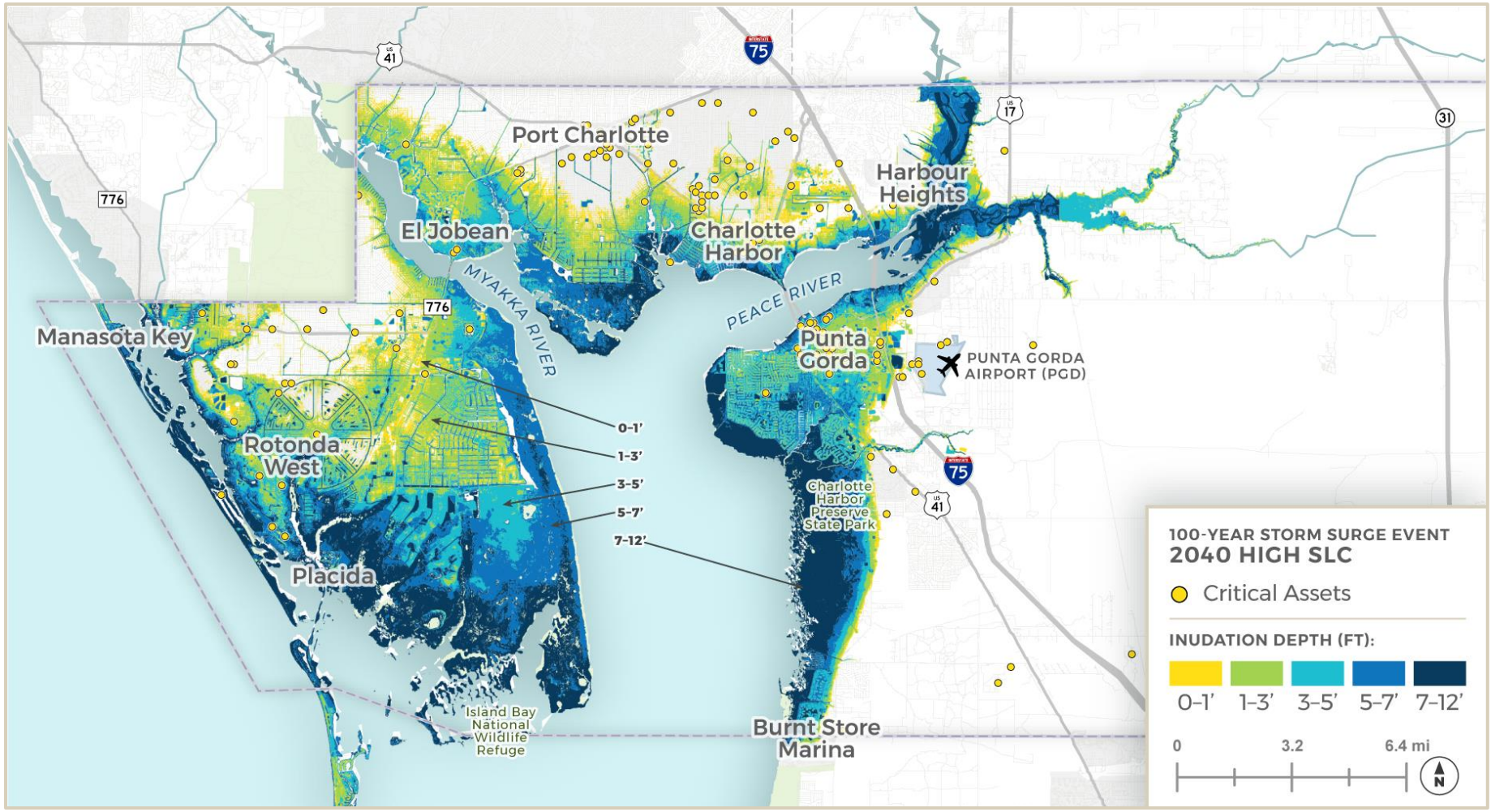


Figure 11- C 2070 High SLC

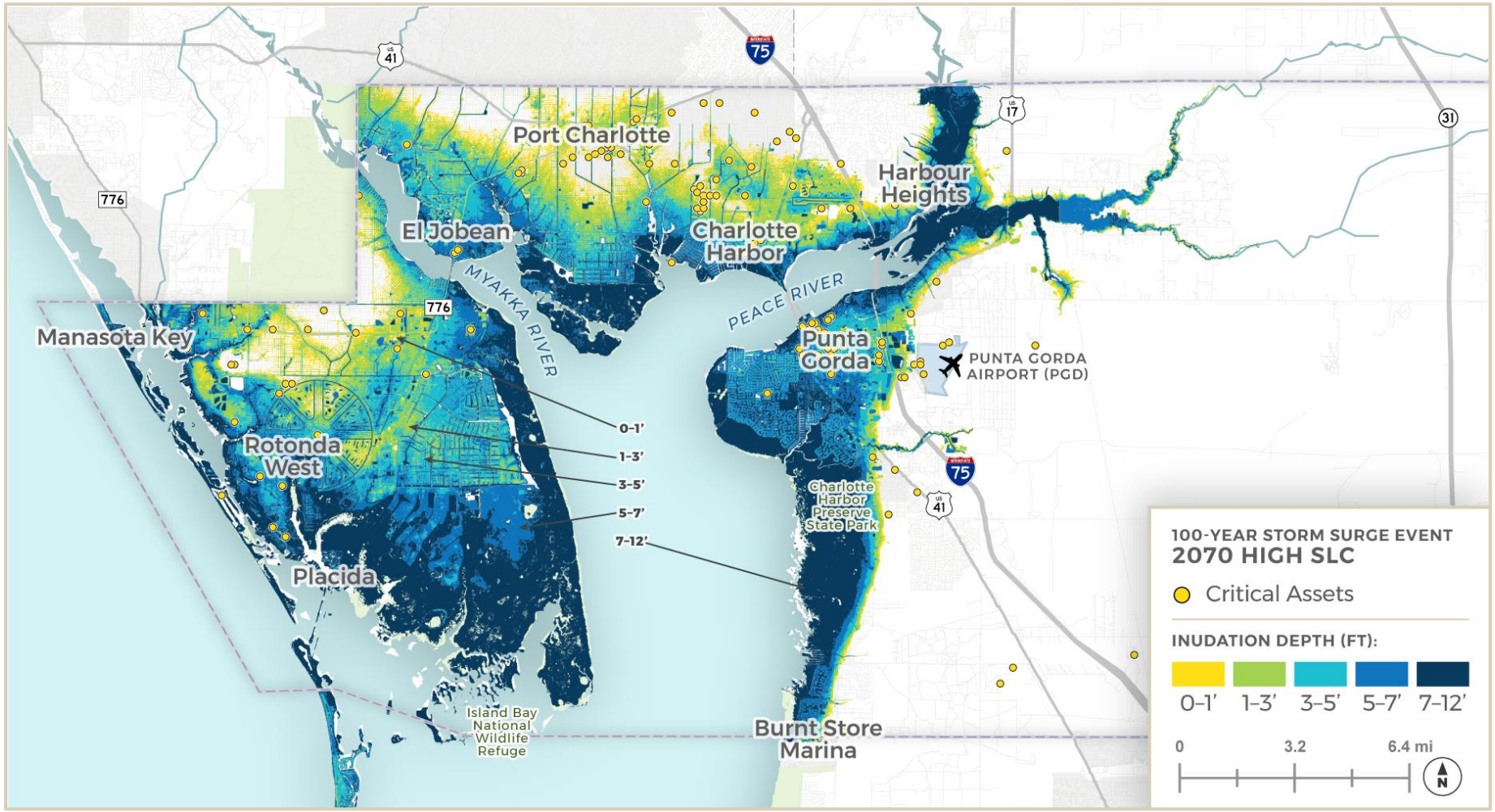


Figure 12 Potential Groundwater Rise Areas

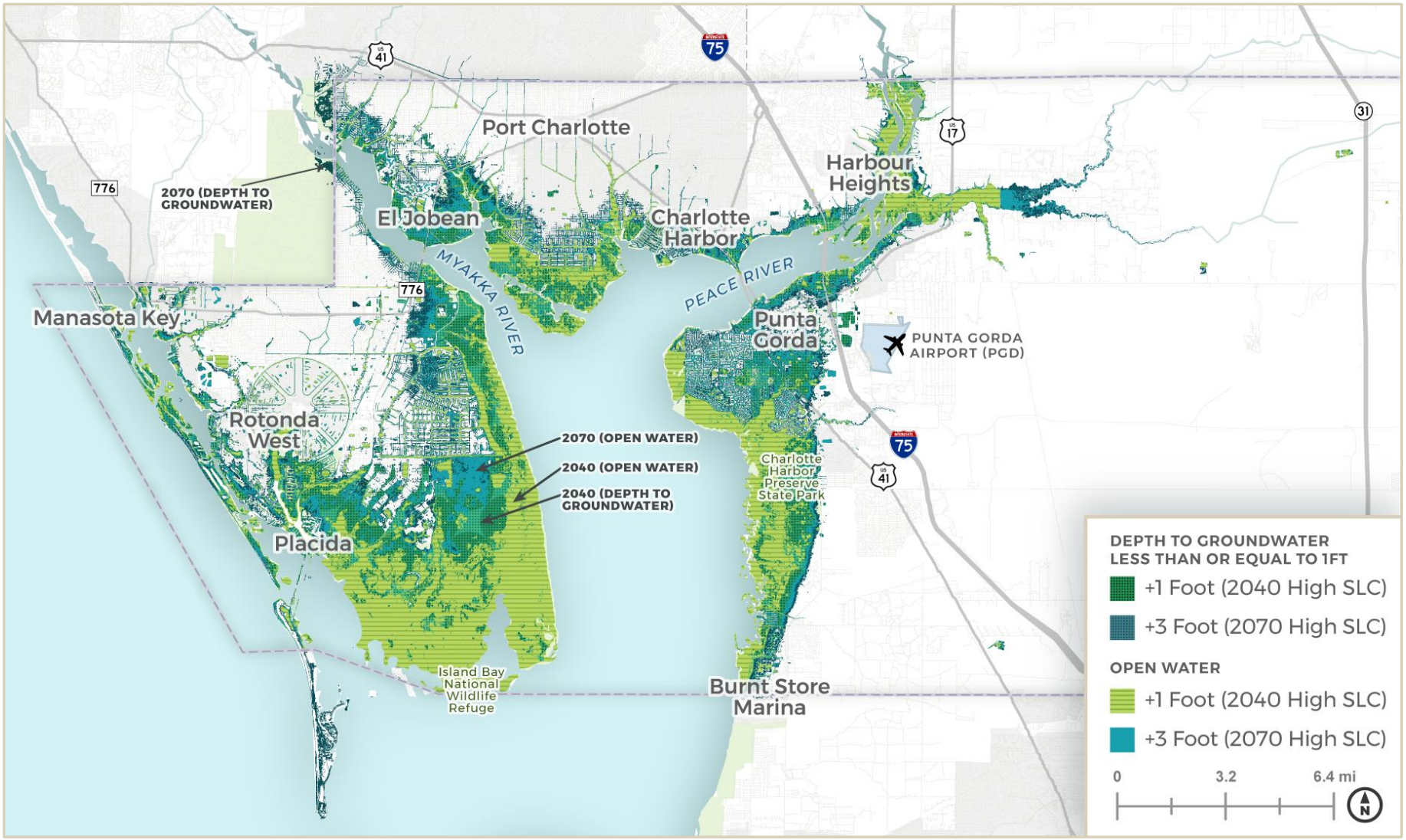


Figure 13 Potential Natural System Area Transition under Sea Level Change

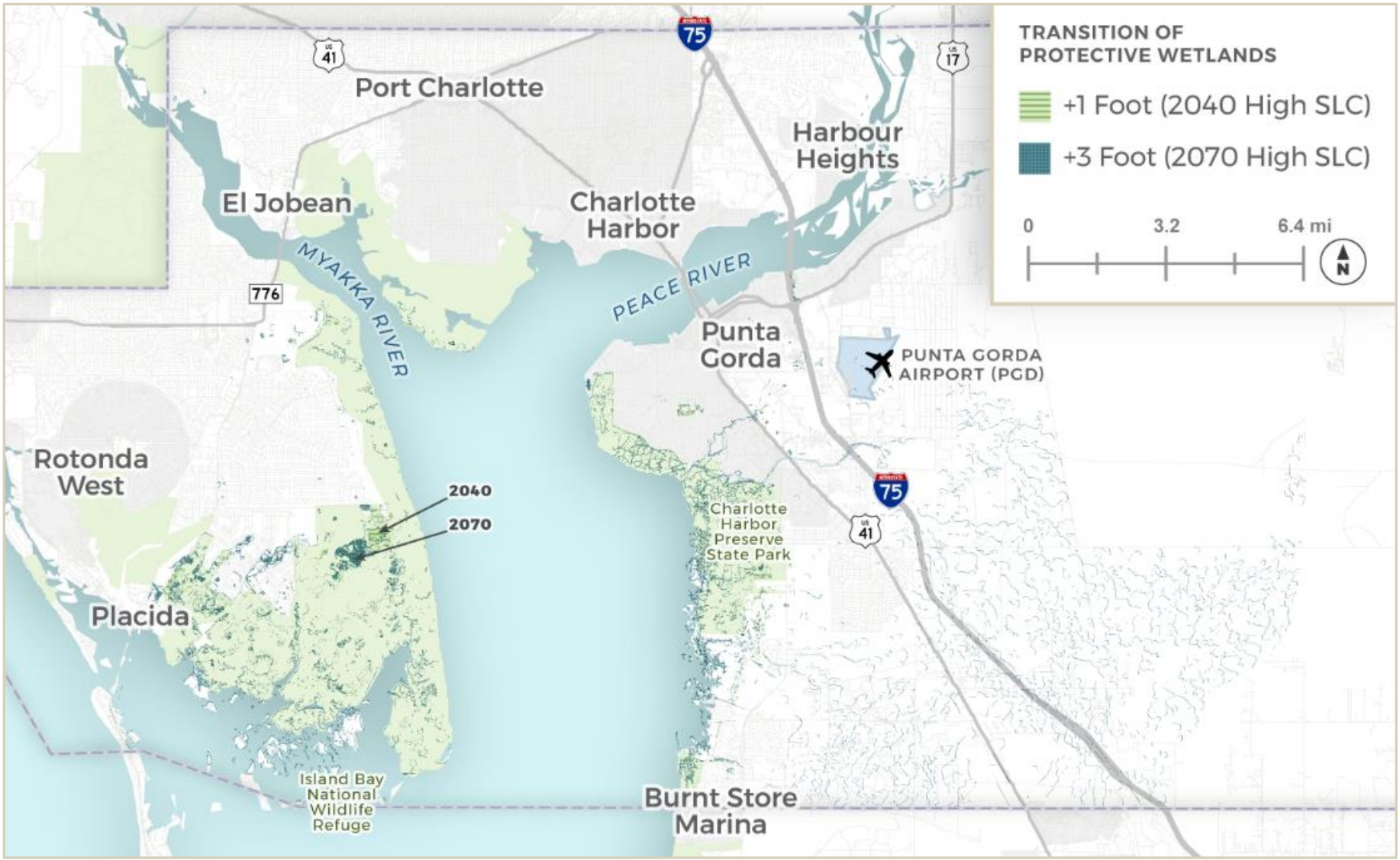


Figure 14, Figure 15, Figure 16 and Figure 17 present an overview of the findings at the county scale of this analysis for all types, identifying the amount of inundated land area for each condition and also the chance of inundation and the risk to critical assets and communities from sea level change and storm surge. The material highlights how this concern is expected to grow over time with changing future conditions.

Figure 14 Summary of Countywide Assets Inundated by Tidal Conditions over Time

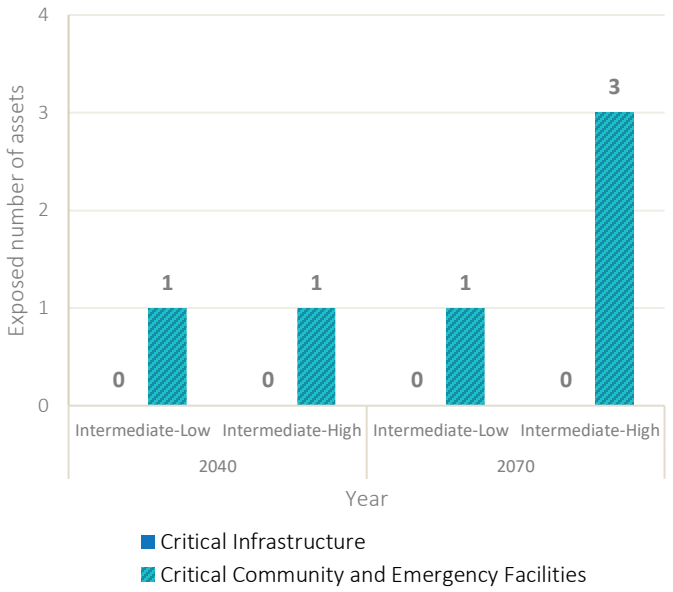


Figure 15 Summary of the Mileage of Roadways and Railways Inundated by Tidal Conditions over Time

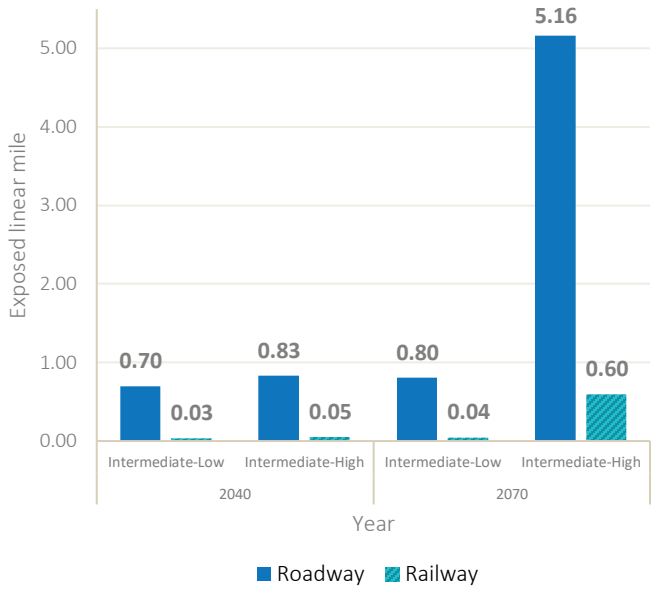


Figure 16 Summary of Countywide Asset Exposure to Storm Surge over Time

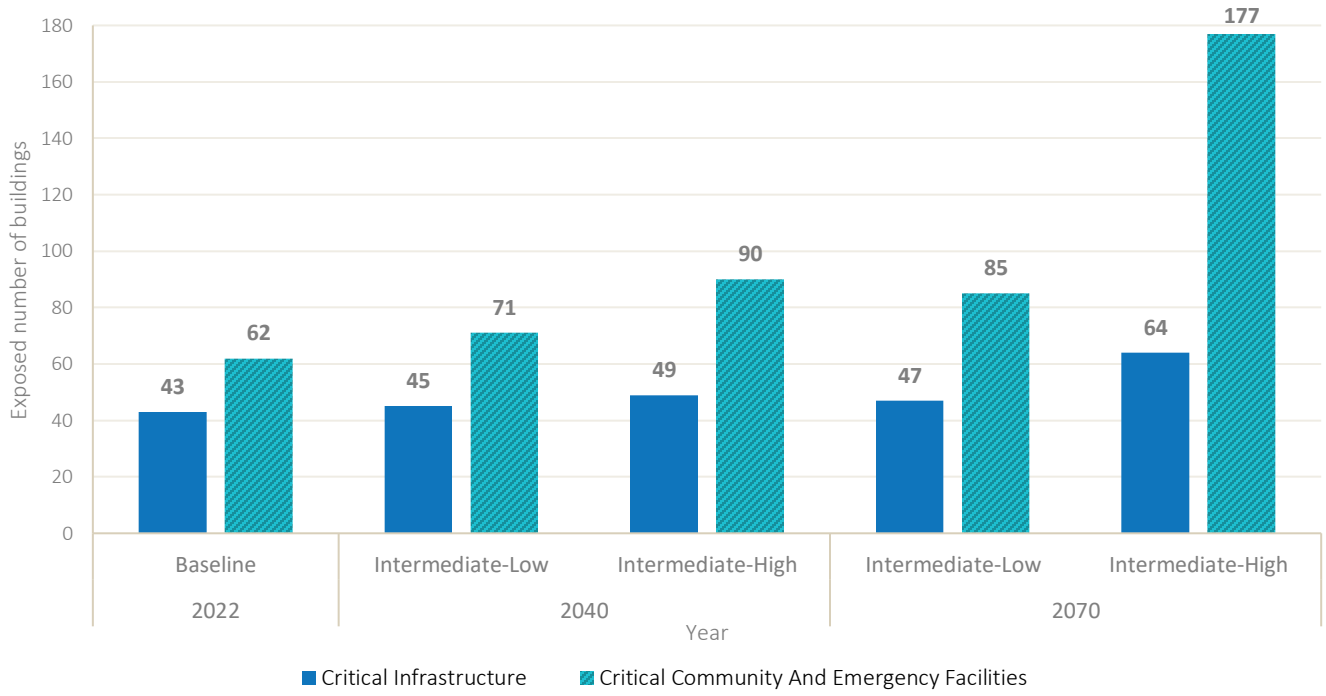
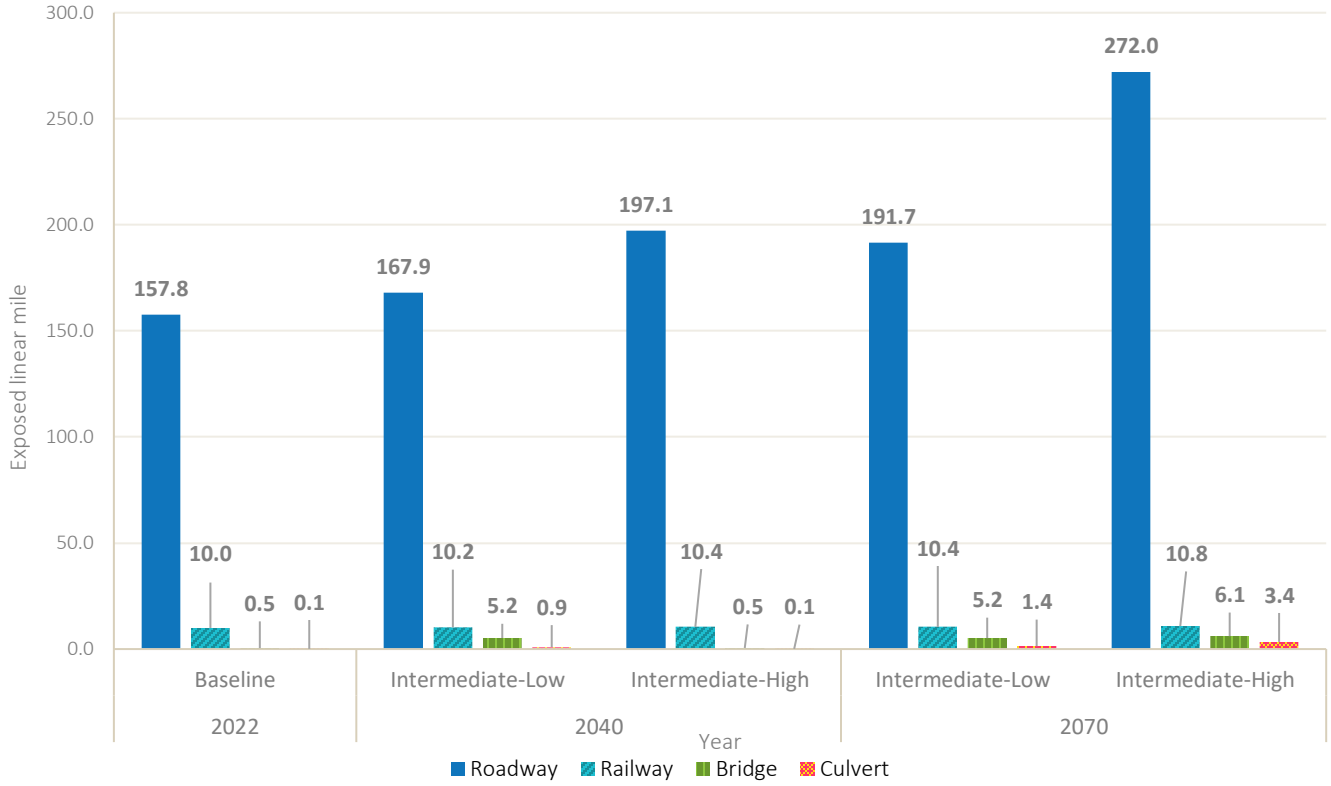


Figure 17 Summary of the Mileage of Roadways, Railways, Bridges, and Culverts Exposed to Storm Surge over Time



Risk Assessment

Preliminary Evaluation

The preliminary evaluation centers on the extent of land inundated under the specified scenario through exposure analysis (details about exposure analysis can be found in Appendix E Exposure and Sensitivity Analysis). Given Charlotte County's geographical position adjacent to both coastal and riverine areas, the results outlined in Table 3 are consistent with expectations.

Table 3 Percentage of Land Area Inundated - by Scenario

Time Horizon	Tidal Flooding		Storm Surge (100-year)	
	Intermediate-Low	Intermediate-High	Intermediate-Low	Intermediate-High
2040	2%	4%	21%	22%
2070	3%	8%	22%	26%

The data shows a clear trend of increasing land area inundation for Charlotte County as time progresses. By 2070, the risk of flooding is expected to become much more severe, bringing greater challenges related to storm surge and rising sea levels. Given these projections, it makes sense to approach flood mitigation across the entire county, not just in the areas currently considered high-risk. These results highlight the importance of understanding the effects of higher inundation levels on infrastructure and key community assets. Going forward, it will be necessary to consider both the spread of flooding and its impact on critical facilities and the county's resilience.

Risk Assessment Methodology

A pressing concern for storm surge flooding is how anticipated flooding affects and impacts the critical assets that are present in Charlotte County, which have been analyzed for this VA. To address this concern, the study team utilized information from a software program maintained and regularly updated by FEMA—HAZUS (Hazards United States), which is based upon observed impacts from storm events. This software program outlines and catalogs in digital form (GIS) the consequence elements for flood loss (and other sources of damage as well) relevant to the county. The consequences of flooding include the cost of damage to an asset, the estimated time to repair an asset, and the ancillary community and economic costs associated with these impacts. This step reflects the sensitivity and vulnerability of analyzed assets under hazards.

Figure 18 below shows conceptually how the program works to determine impacts, as costs to the county, that could be estimated during the recovery phase of any storm event. The key factors in determining costs are depth of flooding (above the floor elevation on the first floor), building size, and building type. These parameters are the basic factors applied (generally) to generate community costs of flooding.

Figure 18 Methodology Used to Calculate Consequence Costs for Each County Asset (Conceptual)

Methodology Used to Calculate Consequence Costs for Each County Asset (Conceptual)

	Asset 1	Asset 2	Asset 3	Asset 4
Flood Depth (ft) for the Analysis Storm	1 ft	2 ft	3 ft	4 ft
% Loss (building & contents)	10%	20%	30%	40%
Repair Time (days)	50	100	150	200
Broader Economic Costs (relocation, rental, etc.)	$10	$20	$30	$40

Under the same 100-year storm surge event (same sea level), flood depth increases as elevation decreases.
This leads to greater losses, longer repair times, and higher economic costs for assets closer to the coast.

Data Source: Federal Emergency Management Agency Research

For this study, the values currently maintained by HAZUS were applied directly (without adjustment) to support an efficient and effective analysis and enable comparisons of the cost of relative impact across all different asset types. The costs estimated and applied for this effort should be considered high-level estimates, which could and should be refined in the following phases. Key cost elements like repair construction costs would likely need to be updated, as they have increased dramatically over the past few years. The analysis results support the prioritization of vulnerable assets.

Prioritization Framework

Figure 19 Prioritization Considerations

Figure 20 Prioritization basis

The technical analysis outlines measures of impact to key assets within the county, for extreme conditions modeled for significant coastal events. The analysis leverages a few of the assembled data points to outline the results of the vulnerability assessment. For this planning-level vulnerability assessment, prioritization was developed as a screening framework to identify facilities that may warrant further evaluation in subsequent adaptation planning. The county has established its policy for priority to focus on the combination of asset importance for recovery and financial impact to the county as its two primary factors in establishing actions, as both of these factors impose significant penalties on community functioning. The framework considers three factors: potential flood exposure, estimated damage and service-loss cost, and the importance of the asset to broader community recovery, as shown in Figure 19.

The considerations include:

1. Potential flood depth indicates the estimated severity of exposure under the evaluated flood scenarios. This information helps identify where flooding may affect individual buildings or facilities and provides context for interpreting the estimated consequences.
2. The cost element outlines the significance of damage that would require a response from the county (and the damage that would be expected), highlighting those that would be most beneficial for protection.
3. The loss of some of the assets from the list (water treatment, energy, schools) would lead to loss of basic government functions in the county and would have a higher likelihood of imposing significant impacts to the broader community (not just the county) – for those that live and work in the county, likely require periods of closure, requiring relocation for county residents and businesses for a period of time.

Based on these considerations, the basis for prioritization is summarized in Figure 20 for this planning-level assessment.

These factors were not combined using a formal weighted scoring method, instead, estimated damage and service-loss cost was used as the primary basis for the High, Medium, and Low categories shown in Table 4, while potential flood exposure and broader community recovery considerations provide context for interpreting the results and identifying facilities that may require additional review.

Prioritization Results

Table 4 presents the preliminary results of this combined method, noting the cost associated with consequences. The actions needed for today, 2040, and 2070 are color-coded as High (> $ 15M), Medium ($ 10M – 15M), and Low ($ 5M- 10M) based on the cost of damage and service losses. The impacts to broader community during recovery

need to be considered for subsequent stakeholder discussions and next-phase adaptation planning, where facility-specific service functions, recovery needs, and community priorities can be further evaluated.

Table 4 Prioritization List[2]

Prioritization Facility[3]	Number of Buildings Assessed	Today	2040 (SLC=1ft)	2070 (SLC=3ft)
Myakka River Elementary School	1	High	High	High
Charlotte High School	5	High	High	High
Baker Center Head Start	1	High	High	High
Lemon Bay High School	3	High	High	High
Punta Gorda Middle School*	1	Medium	High	High
Life Care Center Of Punta Gorda	1	Medium	High	High
Justice Center	1	Medium	High	High
Meadow Park Elementary School	4	Medium	High	High
Neil Armstrong Elementary School	1	Medium	High	High
Verandas Of Punta Gorda*	2	Low	Medium	Medium
Peace River Elementary School*	13	Low	High	High
Charlotte Harbor Event & Conf. Center	1	Low	Low	Medium
Punta Gorda Post Office	1	Low	Low	Low
Charlotte Behavioral Health Care*	1	Low	Low	Low
Port Charlotte Artificial Kidney Center	1	Low	Low	High
Brookdale Rotonda	1		Low	Medium
Sallie Jones Elementary School*	2		High	High
Punta Gorda Police Station 1	2			Low
CCU Eastport Treatment Plant*	8			Low
Charlotte Community Mental Health Services	1			Low
South County Annex	1			Medium
South County Regional Park	2			Low
Deep Creek Elementary School*	1		High	High
Fawcett Memorial Hospital	6		Low	Low
Family Christian Academy*	7			Medium
Family Services*	2			Medium
Charlotte Sports Park Stadium Clubhouse	1			Medium
Charlotte County Public Works- Florida Street*	5			Low

[2] Due to limitations in data availability, a first-floor elevation of 0.5 ft is assumed for facilities where first-floor elevation data are not available. This assumption will be refined once the appropriate elevation data become available. Facilities for which this assumption has been applied to one or more buildings are denoted by an asterisk (*).

[3] The facilities are named based off different sources of data used at the beginning of the project. For example, Police Station 1 is in 3 different data sources as different names, including "PG STA 1" "POLICE" "PG Station 1/Rescue 32" and "Punta Gorda Police Dept HQ". "Police Station 1" was used in this assessment. Data sources are noted in **Appendix D:** Hazard and Asset Data.

Prioritization Facility[3]	Number of Buildings Assessed	Today	2040 (SLC=1ft)	2070 (SLC=3ft)
Florida Southwestern State College - Charlotte Campus	9			High
Medical Examiner*	2			High
Charlotte County Community Development	1			Medium
County Administration*	1			Medium
Port Charlotte High School*	8			Medium
Port Charlotte Library	1			Low
Advent Port Charlotte	1			Low
Economic Development	1			Low
Port Charlotte Middle School	1			Low
St Charles School*	5			Low
Charlotte County Fleet Management	1			Low
East Elementary School*	4			Low
Charlotte Technical College*	22			Low

Findings in Table 4 and Appendix F Adaptation Focus Area and Recommendations are derived using different analytical approaches. Appendix F Adaptation Focus Area and Recommendations is based on single-building–level results and presented by the Adaptation Focus Area, whereas Table 4 aggregates individual building results to assess risk at the full facility level and reports findings at a countywide scale. As a public-facing document, the VA summarizes individual structure-level risks as facility-level outcomes to communicate risks clearly and effectively. Detailed single-building analysis results are not presented in the VA, but are documented in Appendix F Adaptation Focus Area and Recommendations for reference.

The prioritization list is not necessarily intended to be addressed in order. It is instead presented as a recognized policy need, to be woven into the regular processes the county will be undertaken through the business of government, to search for funding to mitigate known risks that may be targeted to different facility types, or to influence capital planning in the coming decades for facilities, or to advocate for changing county policies and practices that seek to directly address those risks identified through this analysis, as an important additional element/consideration to carry forward in parallel with others focused on maintaining Charlotte County as a viable community and wonderful place to live and work.

Advancing Towards Strategic Decision-Making

County Adaptation Focus Areas

"Focus Areas" is recommended as part of a holistic approach to resilience planning. These are specific zones within a jurisdiction where mitigation actions are necessary, based on risks highlighted in the vulnerability assessment. In Charlotte County, much of the region faces possible future flood threats. To better target efforts, the county has designated three focus areas: south, mid, and west, which are illustrated in Figure 21. These zones help collate risk

issues, summarize vulnerability findings, and guide the development of targeted implementation strategies throughout the document.

Figure 21 County Adaptation Focus Areas

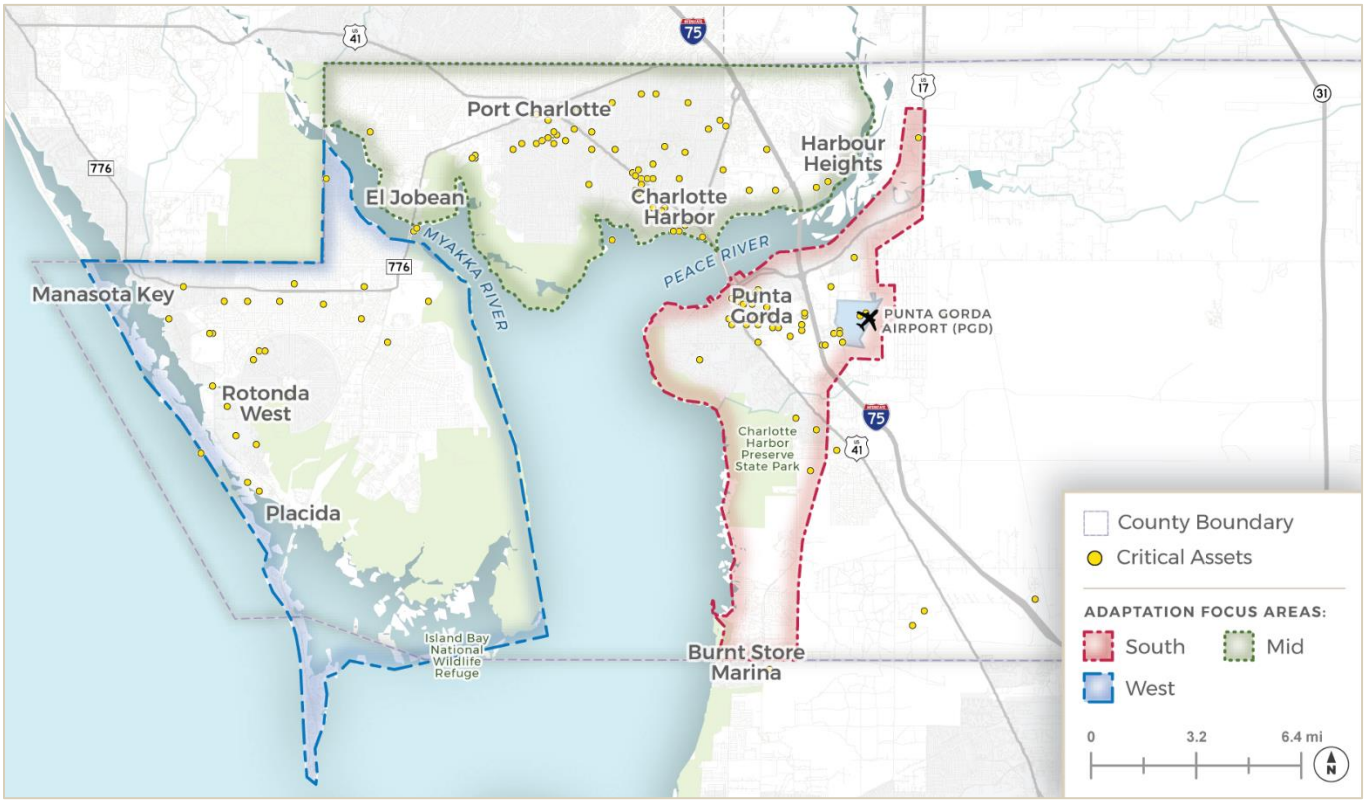


Table 5, Table 6, and Table 7 summarize the critical infrastructure, critical community and emergency facilities, and transportation and natural resources present in each Adaptation Focus Area.

Table 5 Summary of the Critical Infrastructure Buildings Present in Each Adaptation Focus Area

Critical Infrastructure	Total Quantity	South	Mid	West	Not Included
Wastewater Treatment Facilities	55	17	8	30	0
Solid And Hazardous Waste Facilities	9	0	2	1	6
Communications Facilities	6	2	3	1	0
Pump Stations	18	0	6	12	0
Lift Stations	2	0	2	0	0
Total	90	19	21	44	6

Table 6 Summary of the Critical Community and Emergency Facilities Buildings Present in Each Adaptation Focus Area

Critical Community and Emergency Facilities	Total Quantity	South	Mid	West	Not Included
Fire Stations	23	7	7	8	1
Correctional Facilities	28	6	0	0	22

Critical Community and Emergency Facilities	Total Quantity	South	Mid	West	Not Included
Local Government Facilities	22	11	9	2	0
Logistical Staging Areas	1	1	0	0	0
Health Care Facilities	21	5	13	3	0
Schools	108	15	74	19	0
Logistical Staging Areas, Emergency Operation Centers, Correctional Facilities	1	1	0	0	0
Emergency Medical Service Facilities	2	1	1	0	0
Affordable Public Housing	7	2	5	0	0
Law Enforcement Facilities, Airports	1	1	0	0	0
Law Enforcement Facilities	3	2	1	0	0
Airports, Law Enforcement Facilities	1	1	0	0	0
Colleges And Universities	9	9	0	0	0
Airports, Fire Stations	1	1	0	0	0
Community Centers	11	1	8	2	0
Law Enforcement Facilities, Fire Stations	1	1	0	0	0
Disaster Recovery Centers, Community Centers	2	0	1	1	0
Hospitals	8	1	7	0	0
Schools, Risk Shelter Inventory	6	0	6	0	0
Total	256	66	132	35	23

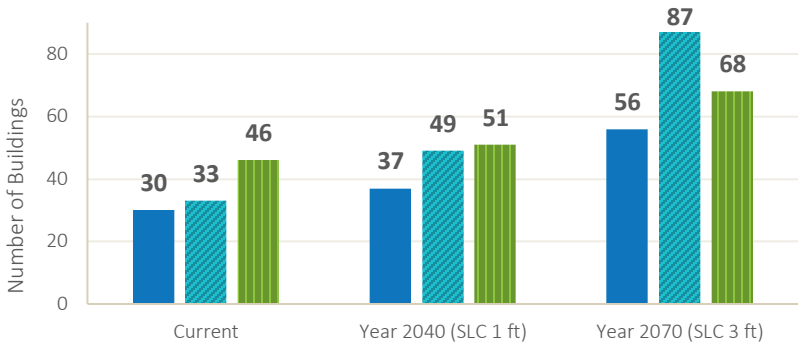
Table 7 Summary of Transportation and Natural Resources Present in Each Adaptation Focus Area

Adaptation Focus Area	Total Miles		Count			Total Acres
	Major Roads	Rail	Standalone Lift Station	Bridges/Culverts	Historic Bridges	Parks
South	131	16	54	26	3	30,078
Mid	177	0	194	68	0	375
West	106	0	104	56	6	578
Outside	68	9	10	2	0	28

Overall, the distribution of infrastructure and community assets across the Adaptation Focus Areas reflects the distinct roles and priorities of each region. The Mid area functions as the primary transportation and utility center, characterized by dense development and a high concentration of social services. The South area includes a greater number of parks, rail assets, and resilient emergency facilities, reflecting its exposure to coastal risks. The West area demonstrates a balance between community-serving facilities and historic preservation. Areas outside the

Adaptation Focus Areas contain fewer assets overall, consistent with lower population density and operational demand. These spatial differences provide important context for emergency response planning and future development decisions. The number of impacted buildings of each Adaptation Action Area across the time horizon is summarized in Figure 22.

Figure 22 The Number of Impacted Buildings in each Adaptation Action Area



Recommended Actions

Table 8 and Table 9 summarize recommended actions the County can take to enhance the County's resilience in the future, based on the findings outlined in the analysis above, a review of similar actions being taken by other agencies in Florida, and in coordination/collaboration with county stakeholder group members. The list of actions is intended to advance the county from its current position to one that is more robust in responding to changing conditions and heightened risks.

Table 8 Recommended Countywide Planning and Policy to Increase Resilience of Charlotte County

Category/Asset	Recommended Actions
Risk Assessment and Data Integration	○ Expand the analysis completed by this study to include private property, social, and economic concerns to develop a full inventory of risk from collective stressors. ○ Integrate climate hazard projections (e.g., sea level change, extreme rainfall, and storm surge) into future land-use, infrastructure investment decisions, and capital improvement programs.
Floodplain Management and Policy Development	○ Consider strengthening the existing Charlotte County floodplain ordinance by increasing freeboard requirements above the 100-year flood elevation (potentially to the 500-year flood) to further reduce future flood risks. ○ Establish a minimal roadway level of service or accessibility standards for transportation infrastructure located in flood-prone areas to ensure continued access during storm surge events. ○ Encourage elevation or floodproofing retrofits for existing structures located within high-risk flood zones identified in the vulnerability assessment.
Nature-Based Solutions and Risk Reduction Strategies	○ Promote nature-based solutions, such as wetlands restoration and green stormwater infrastructure, to improve flood storage and water quality. ○ Evaluate voluntary property acquisition and demolition programs for repetitive flood loss areas. These programs purchase high-risk properties, remove structures, and convert the land into open space or natural buffers, which can permanently reduce flood risks. ○ Undertake an effort to define county policies on managed retreat from future inundated areas.
Funding and Implementation Coordination	○ Complete a detailed scan of the funding sources that may be available to Charlotte County to address resilience concerns outlined in this assessment. ○ Develop grant/formula funding requests for various eligible sources (IIJA, FEMA, FDEP, etc.). ○ Strengthen coordination between county departments to integrate resilience considerations into transportation, utilities, and capital improvement planning.
Public Awareness and Community Engagement	○ Conduct an educational and public information campaign to increase stakeholder awareness of the concerns, and the planned county actions to address them.

Table 9 Recommended Actions to Increase Resilience of Charlotte County

Category	Recommended Actions
Wastewater Treatment Facility	○ Evaluate the elevation of critical wastewater treatment equipment and consider elevating or floodproofing vulnerable components. ○ Improve redundancy in power supply systems, such as installing backup generators and ensuring adequate fuel storage for extended outages. ○ Upgrade drainage and stormwater management around wastewater facilities to prevent onsite flooding during extreme rainfall events. ○ Develop emergency response procedures to maintain wastewater service continuity during hurricanes and major storm events. ○ Consider alternative or supplemental power technologies for lift stations, such as solar photovoltaic systems with battery storage, to provide additional power resilience during grid outages. ○ Evaluate the feasibility of microgrid systems or hybrid energy systems combining solar power, battery storage, and backup generators to improve redundancy and reliability for critical wastewater infrastructure.
Emergency Response Facilities (Fire Stations)	○ Elevate critical building systems, including electrical panels, communications equipment, and generators above projected flood levels. ○ Install deployable flood barriers or floodproof doors to reduce water intrusion. ○ Elevate emergency vehicles or relocate vehicle storage areas where flooding risk is significant. ○ Ensure backup power and communication systems remain functional during prolonged flood events.
Healthcare Facilities and Hospitals	○ Elevate or floodproof mechanical, electrical, and medical support systems that are vulnerable to storm surge flooding. ○ Ensure backup power systems and fuel storage are protected from floodwater. ○ Protect building access points and entrances using flood barriers or elevation improvements. ○ Develop contingency plans to maintain critical medical services during flood disruptions.
Schools And Shelter Facilities	○ Elevate critical assets such as electrical systems, HVAC equipment, and generators above projected flood levels. ○ Improve stormwater drainage systems around school campuses to reduce localized flooding during surge events. ○ Retrofit selected schools to function as flood-resilient emergency shelters. ○ Protect building entrances and utility rooms using flood barriers or floodproofing measures.
Community Facilities	○ Elevate or floodproof critical mechanical and electrical equipment within facilities. ○ Improve site drainage and install localized flood protection where feasible. ○ Retrofit community facilities to support emergency operations during storm surge events
Local Government and Administrative Facilities	○ Protect critical information technology infrastructure from flood exposure. ○ Elevate electrical systems and communications equipment above flood-prone levels. ○ Ensure backup power systems are protected from storm surge flooding.
Parks	○ Revise and enhance the Resiliency Master Plan to address evolving needs and resilience strategies. ○ Establish living shorelines on waterfront parks to improve natural defenses and adaptation. ○ Plant native vegetation that can withstand high storm surge events, maintain shoreline stabilization and encourage wildlife utilization. ○ Develop additional amenities throughout sites to provide comfortable spaces for visitors to find relief from the heat. ○ Modernize/enhance stormwater systems using resilient design strategies that incorporate green infrastructure. This may include upstream detention basins and bioretention areas to reduce flood risk, increase infiltration, improve water quality, and strengthen long term system adaptability.
Transportation Infrastructure	○ Incorporate green infrastructure strategies such as bioswales, permeable surfaces, and natural drainage features near bridge approaches and transportation corridors to reduce localized flooding during storm surge events. ○ Integrate flood-resilient design considerations into transportation infrastructure upgrades, including bridge retrofits and roadway improvements located in surge-prone areas.

Category	Recommended Actions
Homeowner Flood Resilience Actions	○ Encourage property-level flood mitigation measures such as elevating utilities, installing flood barriers, or floodproofing critical building components. ○ Develop partnerships with community organizations to promote residential resilience and access to mitigation funding programs. ○ Provide education and outreach programs to inform homeowners about flood risk and available mitigation strategies.

Conclusion and Next Steps

This study provides Charlotte County with preliminary data to prioritize complex resiliency challenges across planning, programming, and stakeholder needs. By considering sea level change and storm surge impacts in decision-making, officials can start to create strategic policies and invest proactively, supporting long-term infrastructure, community, and economic stability. This framework enables the development of targeted mitigation and adaptation strategies to address rising flood risks.

Supporting Strategic Planning, Investment, and Shared Responsibility

With these details, the County possesses the foundational components necessary to implement an advanced decision-support system. This system can assist the County in:

- Estimating costs to the County of sea level change and storm surge.
- Informing effective capital investments.

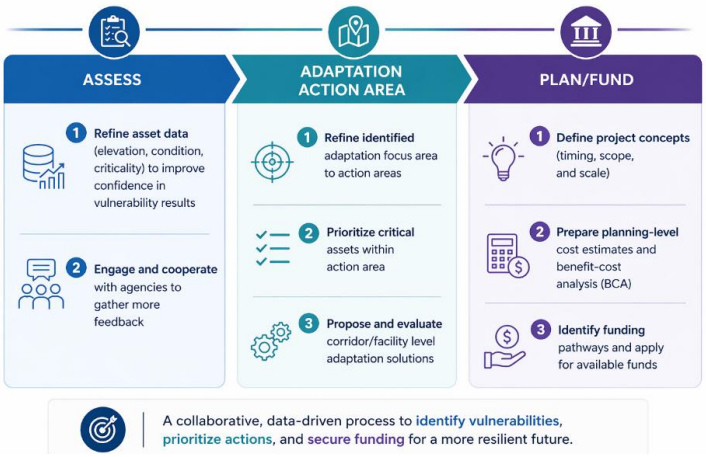
The data provided to Charlotte County from this assessment supplies the critical information required to support decision-making. It also highlights the shared responsibility of landowners, developers, businesses, residents, and government agencies who provide services in areas now identified as being at risk.

Sea level change and storm surge concerns are no longer uncertain possibilities; they must now be integrated into both public and private decision-making strategies. By recognizing these risks, Charlotte County can take proactive steps to ensure resilient communities and sustained infrastructure for the future.

Next Steps

It is important to note that this assessment represents an initial, preliminary study. The next phase will involve a more comprehensive and in-depth investigation to further refine findings and recommendations, including the exploration of other effects on the county other than to its critical assets (economy, community, etc.). This continued effort will provide Charlotte County with even more detailed insights to guide future planning and resiliency actions. The specific series of actions to take next to advance the program and to adhere to state guidance should include items listed in Figure 23.

Figure 23 Recommended Next Steps Based on this Study



APPENDICES

Appendix A: Compliance with FDEP Requirements

The development of the VA fulfills the criteria established by the FDEP for conducting these assessments. The subsequent sections present the details of the hazard and asset data collected and utilized to conduct this study. At the same time, the FDEP checklist is attached to list the key elements/requirements for compliance.

Appendix B: Stakeholder and Public Engagement

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Appendix C: ACUNE Sufficiency Analysis

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Appendix D: Hazard and Asset Data

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Appendix E: Exposure and Sensitivity Analysis

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Appendix F: Adaptation Focus Areas and Recommendations

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